COMPONENTS AND COST ESTIMATE

CITY OF UNION, OREGON
ALTERNATIVE 3C
WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION
SYSTEM IMPROVEMENT COMPONENTS

1. Modify Existing Wastewater Treatment Facility (WWTF) Piping
   - Connect new treated effluent line to existing Catherine Creek outfall.
   - Connect new treated effluent line to existing 10-inch effluent forcemain.
   - Abandon outfall line to Catherine Creek.
   - Modify aerobic digesters by removing the fine bubble diffusers and replacing them with coarse bubble diffusers.
2. New Treated Effluent Line from WWTF
   - Estimated 5,500 feet of 8-inch pipeline from existing WWTF effluent pump station to new storage ponds.
3. Modify Existing Effluent Pump
   - Modify existing Catherine Creek outfall pump to pump treated effluent to the new storage ponds.
4. Electrical, Controls, and Instrumentation
   - New electrical, controls, and instrumentation as required.
   - New monitoring and alarms.
5. New Effluent Storage Ponds with Lagoon Piping
   - Two new lined storage ponds.
   - Surface area of the storage ponds at 8-foot depth = 6 acres x 2 = 12 acres.
   - Approximate storage volume of the storage ponds at 8-foot depth = 31.3 million gallons.
   - Piping and control structures.
6. New Irrigation Pump Station
   - One pump with 300 gallons per minute (gpm) capacity and 15 horsepower (Hp).
   - One pump with 100 gpm capacity and 2 Hp.
   - 30-foot x 30-foot building with wetwell.
   - New 480 volt, 3-phase electrical service.
7. Fence and Signs/Security
   - New fence and signs around the new storage ponds.
8. New Effluent Reuse (Irrigation) Facility
   - 50 acres of new irrigation site.
   - One 50-acre pivot with a radius of approximately 850 feet.
   - Irrigation distribution piping.
   - Preparation and seeding of irrigation site.
9. New Pump Station at Storage Ponds
   - One pump with 100 gpm capacity and 2 Hp in a new vault.
10. New Low Head Supplemental Irrigation Water Supply Pump and Line
    - One pump with 200 gpm capacity and 1 Hp on a concrete pad.
    - Estimated 1,100 feet of 6-inch pipeline from new pump to existing 10-inch irrigation line.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3C - WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION
(YEAR 2018 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 162,000	All Req'd	$ 162,000
2	Modify Existing Wastewater Treatment Facility (WWTF) Piping	LS	58,500	All Req'd	58,500
3	Replace Fine Bubble Diffusers with Coarse Bubble Diffusers	LS	52,700	All Req'd	52,700
4	Treated Effluent Line from WWTF	LF	47	5,500	258,500
5	Modify Existing Effluent Outfall Pump	LS	58,500	All Req'd	58,500
6	Electrical, Controls, and Instrumentation	LS	204,800	All Req'd	204,800
7	Effluent Storage Pond, Lagoon Piping, and Transfer Structures	LS	1,754,900	All Req'd	1,754,900
8	Pump Station at Storage Ponds	LS	81,900	All Req'd	81,900
9	Irrigation Pump Station	LS	210,600	All Req'd	210,600
10	Low Head Supplemental Irrigation Water Supply Pump	LS	46,800	All Req'd	46,800
11	Polyvinyl Chloride (PVC) Irrigation Line	LF	47	3,500	164,500
12	Effluent Irrigation System Including Pivot Irrigation and Seeding	LS	117,000	All Req'd	117,000
13	Fence and Signs/Security	LF	12	10,000	120,000
14	Project Safety and Quality Control	LS	29,300	All Req'd	29,300
15	Electrical Service	LS	41,000	All Req'd	41,000
16	Dewatering	LS	41,000	All Req'd	41,000
	Subtotal Estimated Construction Cost				$ 3,400,000
	Contingencies (10% of Estimated Construction Cost)				340,000
	Total Estimated Construction Cost				**$ 3,740,000**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 748,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2018)				**$ 4,488,000**
	Other Estimated Project Costs				
	Funding Acquisition				$ 46,800
	Legal and Administration				58,500
	Environmental Review Report				23,400
	Archaeological Report				17,550
	Cultural Resource Monitoring				40,900
	Regulatory Agency Reporting and Review Fees				5,850
	Total Other Project Costs (2018 Dollars)				**$ 193,000**
	TOTAL ESTIMATED CAPITAL COST (2018 DOLLARS)				**$ 4,681,000**

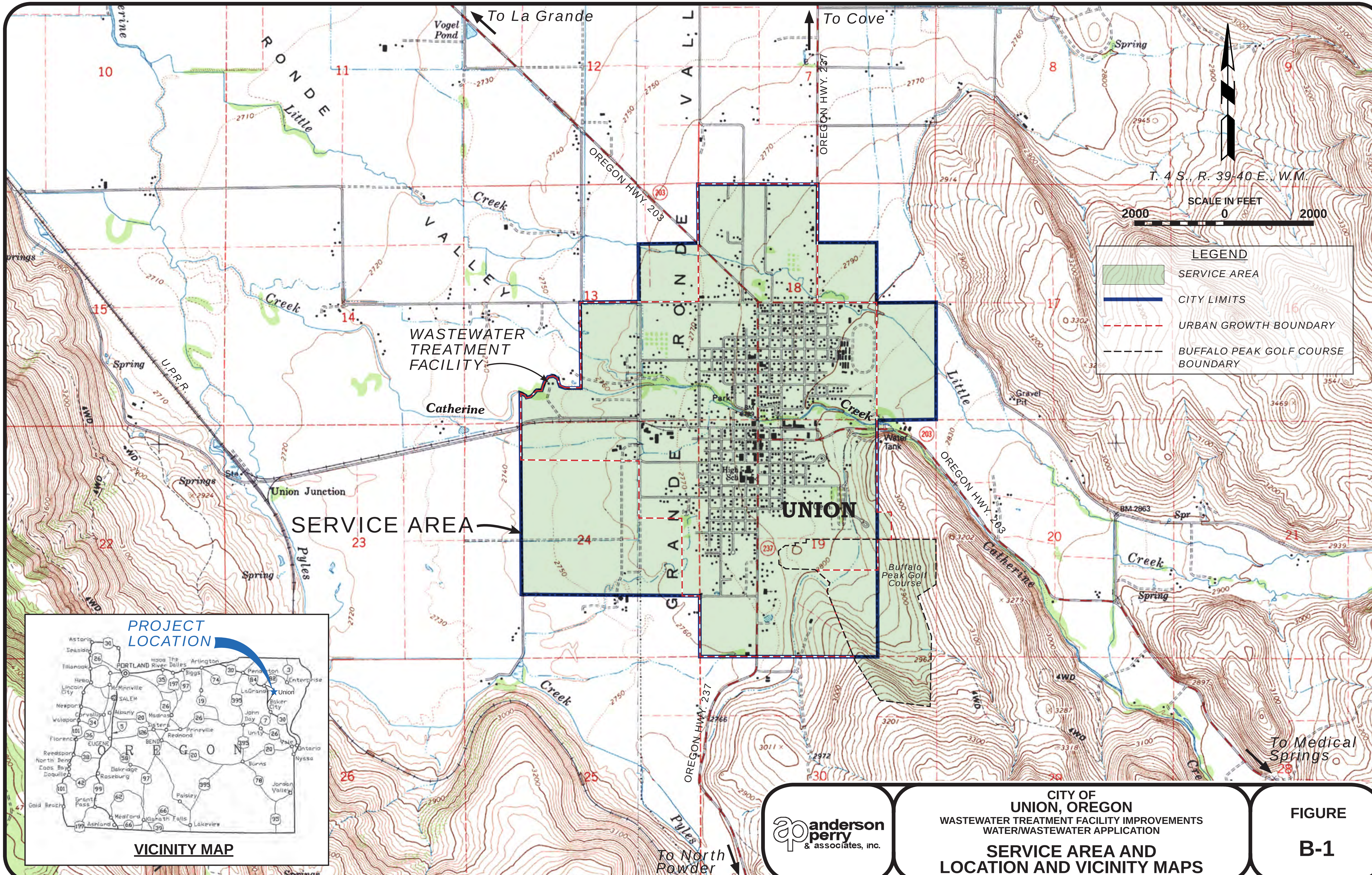
anderson perry & associates, inc.

CITY OF
UNION, OREGON

ALTERNATIVE 3C
PRELIMINARY COST ESTIMATE

FIGURE
5-15
Updated to 2018 Costs

FIGURES



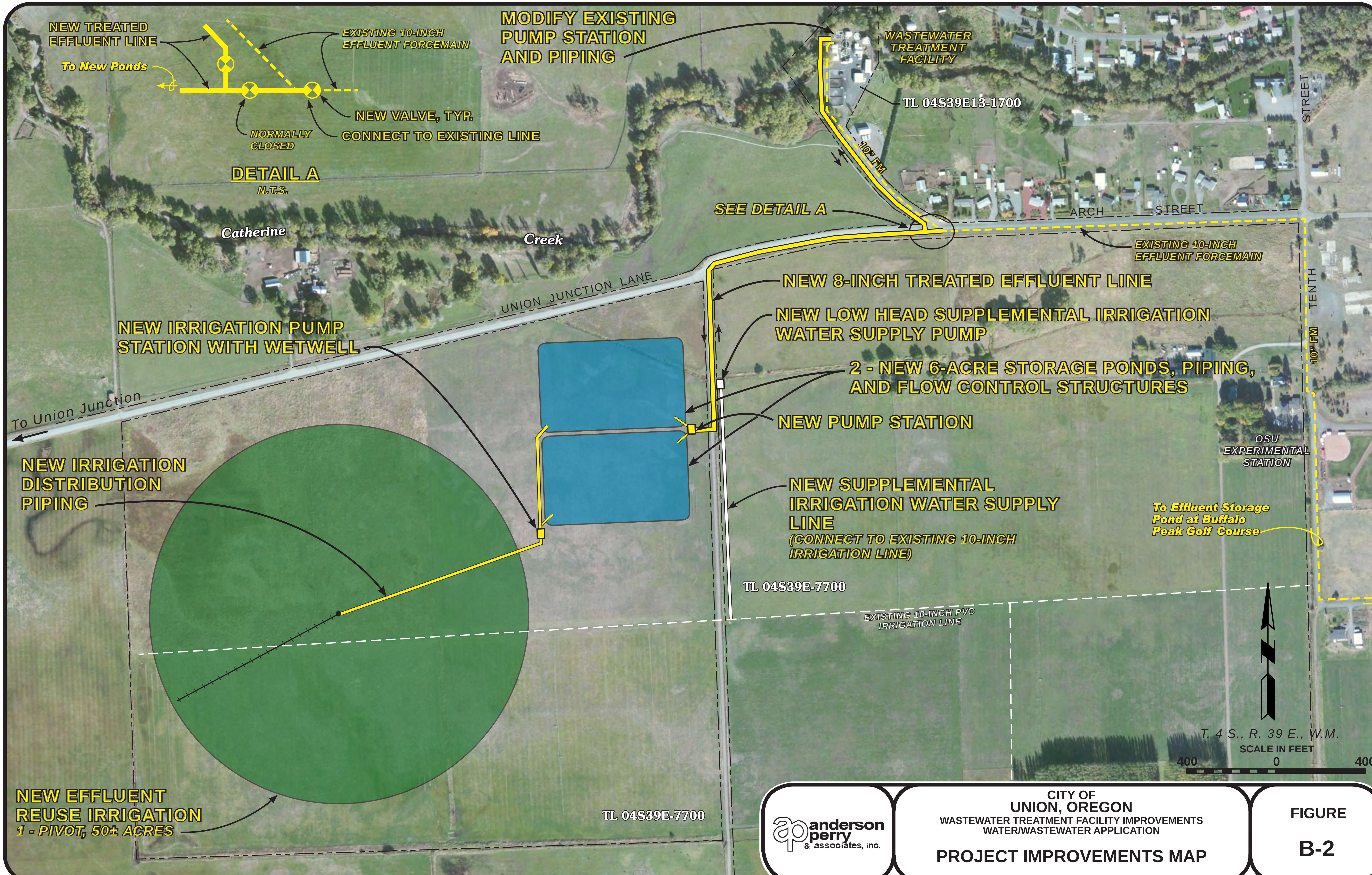
anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER TREATMENT FACILITY IMPROVEMENTS
WATER/WASTEWATER APPLICATION

SERVICE AREA AND
LOCATION AND VICINITY MAPS

FIGURE
B-1

Job#482-45-030 Aug. 28, 2015 lbauer



anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER TREATMENT FACILITY IMPROVEMENTS
WATER/WASTEWATER APPLICATION

PROJECT IMPROVEMENTS MAP

FIGURE B-2

Job#482-45-030 Sep. 1, 2015 lbauer

LETTERS OF SUPPORT

Oregon State University
Eastern Oregon Agricultural Research Center
Union Station

Eastern Oregon Agricultural Research Center/Union Station
Oregon State University, 372 South 10th Street, P.O. Box E, Union, Oregon 97883
T 541-562-5129 | F 541-562-5348 | http://oregonstate.edu/dept/eoarcunion/

January 15, 2016

Oregon Water Resources Department
Water Supply Development Account

To whom it may concern;

It is my pleasure to write a letter in support of the **City of Union "Wastewater Facilities Plan."** Oregon State University's Eastern Oregon Agricultural Center (Union Station) has been identified as a potential site for the effluent and settling ponds. Discussions to date with the College of Agricultural Science and University Administration have been positive and supported the lease or selling of the property to make this project a reality. Therefore, I anticipate that, when funded, this project can and will be sited on what is currently University property.

This project may offer some benefits to Oregon State University. First, our research advocates for water conservation and cooperative solutions to complex problems. Locating the settling ponds on our property and using the effluent for late season irrigation would work well with our "forage research program" that focuses on optimizing production with limited water use. In addition, using agricultural production systems to help mitigate problems with water quality is a novel and needed approach to waste water treatment.

If you have any questions about the project and Oregon State University's commitment to cooperate with the City of Union, please feel free to call or email.

Sincerely,

Dr. Tim DelCurto
Associate Professor
Program Head and Director
OSU Ag & Natural Resource Sciences Program
Eastern Oregon Agric. Res. Center
Union and Burns Stations
Oregon State University
tim.delcurto@oregonstate.edu
Phone: (541) 562-5129 work
(541) 910-8970 cell

Oregon
Kate Brown, Governor

Department of Environmental Quality
Eastern Region - Pendleton Office
800 SE Emigrant Ave, Suite 330
Pendleton, OR 97801
Phone: (541) 276-4063
Fax: (541) 278-0168
Relay Service: 711

October 5, 2015

Jon Unger
OWRD
725 Summer St. NE, Suite A
Salem, OR 97301

Re: City of Union WWTP
WQ-Union County
File # 90800, NPDES #101624
Reuse project

Dear Mr. Unger:

The City of Union (City) is applying for funding to upgrade its wastewater treatment plant (WWTP) in accordance with the recently approved facilities plan (plan). The plan identifies needed upgrades to meet future ammonia limits and also more restrictive temperature limits due to the recent bull trout listing.

Although renewal of the City's National Pollutant Discharge Elimination System (NPDES) permit has not yet occurred, it is known that the proposed permit will include these new limits. The existing WWTP will not be able to meet these limits, therefore, the upgrade is needed.

The City selected an upgrade project, which includes removal of effluent flow to Catherine Creek, storage of effluent in ponds from October through April, and irrigation of treated effluent to farm ground and the Buffalo Peak Golf Course. New components will include an effluent transfer pipe to new lined storage ponds, irrigation pump station, irrigation equipment, and farm land for irrigating.

The Department supports the City's search for financial assistance to address ways to improve wastewater treatment.

Sincerely,

Heidi Williams

Heidi Williams, PE
Sr. Plan Review Engineer
Eastern Region

c: WQ Source File
Rod Mckee, PE, City of Union, PO Box 529, Union, OR 97883
✓ Paul Stevens, PE, Anderson Perry & Assoc., Inc., PO Box 1107, La Grande, OR 97850

MEETING MINUTES AND NOTES

Meeting OSU w/Tim, Kim 8-2014
Paul, Troy and myself

We discussed effuent issues @ the City. Looking at new location for water to be placed. Troy shared map layout of proposel, then explained what is needed.

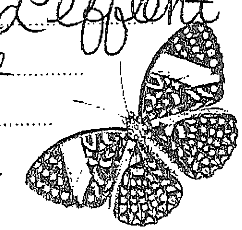
★ 6.9 million gallons of water
There is a main line for irrigation right in the middle of the proposel.

★ Classifide as C level 75 feet

OSU needs the water in this 136 acres and willing to help the city.

★ look into the water Spring [redacted] to the east mix with effluent to make more water to irrigate.

Ask how and if it can change ~~over~~ over from ditch water and efflent water and go be yond the limet footage.



UNION CITY COUNCIL MEETING
Monday, October 13, 2014 – 7:00 P.M.

LEONARD ALMQUIST COUNCIL CHAMBERS, UNION CITY HALL

1. **CALL TO ORDER, PLEDGE OF ALLEGIANCE & ROLL CALL:** Mayor William C. Lindsley called the meeting to order at 7:00 p.m. Present were Roger Clark, Bryan Russell, Doug Osburn, Mayor Bill Lindsley, Matthew Later and Sue Briggs. Don Voetberg was excused.

2. **CONSENT AGENDA**

   a) Minutes from September 8, 2014 – *Work Session, pg. 3-8*

   b) Minutes from August 11, 2014 – *Regular meeting, pg. 9-12*

Motion by: Briggs *(2nd by Later)* to accept the consent agenda with minor corrections. The motion passed unanimously.

3. **MAYOR COMMENTS**

   a) Landlord Responsible for utilities. There has been a concern about a letter regarding rentals and utility bills. The council decided to raise the fees if bills weren't paid on time instead of requiring the landlord to be responsible if the occupant didn't pay their bill.

4. **PUBLIC COMMENT**

James Tippet, 917 N. Gale. He understands that council is out and about walking on personal property rights. He is also concerned about the maintenance of the right of ways. It's not his property yet he is required to maintain it? It doesn't seem right. He has had the sheriff and the fire department at his house for having a recreational fire on his property without a permit. What is the city administration up to? They are abusive in the way it delegates it power. Now the newsletter that came in the water bill says we are trying to get $20 per hour jobs. Word of mouth is that loggers can't park in the right of way. They make good wages, but can't use city property so they are moving out. Using the fire department for code policies, is absurd, it is abusive power and a violation of rights and misuse of city funds. His neighbors are moving out one after another. Something has to change and council knows it.

Coy Wilde, 1493 S Third. Asked for explanation on the water bill fees.

Mayor Lindsley explained the procedure for comments and that no response from council is allowed during public comment.

5. **INFORMATIONAL ITEMS**

   a) Sheriff's Office Report, pg. 13-14. An officer gave the report.

   b) Public Works Report, pg. 15. Clark – how much longer before all the radio read meters are done? Patterson said about 2 years and some big meters will need to be done.

   c) Union Carnegie Public Library, pg. 16

   d) Office Manager Report, pg. 17

   e) Ordinance Officer Report, pg. 18

   f) EMS Report. Keith Montgomery gave the report. They went to the wild land fire on Mt. Harris. There has been several 911 calls to him regarding people having fires after dark.

The FEMA grant items are starting to show up.

6. ADMINISTRATOR / RECORDER REPORT

a) FBLA Students. Requested if we would allow some students shadow the workers within the city hall.

b) Water reservoir painting update, pg. 19. It was supposed to start soon, but because of the frost there is a chance that the paint won't stick so they have suggested we wait until spring.

c) Audit update. It is done. Copies will be in councilor's box soon.

d) CIS member report, pg 20. We need to get training for council members. On Oct. 30 there will be a manager/staff training at city hall if the councilors could attend. Other cities will be invited to help with costs.

7. CORRESPONDENCES

a) None

8. ACTION ITEMS - OLD BUSINESS

a) Discuss alternative enforcement ideas for sidewalk violations. Clark - Violations are mostly after noon and after school. Perhaps councilors could take down names and addresses and give parents a warning. Later – the level of fine is out of control and perhaps that is the hesitancy in issuing. Fine should be lowered to allow a student to earn the money to pay the fines. Do some education to the public. Perhaps paint a red paw print in districts where there are no bikes allowed. Clark said the ordinance is specifically for the downtown. The children either can't read or don't care. Parents should get one warning and then get a citation.

b) Union County Sheriffs contract quality/level of work discuss alternatives. Briggs – agrees that the contract might use some tweaking and we should notify the sheriff of any changes we would like. Later – doesn't want to see the city going without police coverage, but is okay with pursuing other alternatives. Osburn – The communication that we require from the sheriff department and that we have asked for on several occasions is still insufficient. We aren't able to convey our needs in a way that they can understand. He is okay with doing away with it and finding an alternative. Russell – agrees with Later. Need to work on communication. Clark – Financially we can't afford our own department. Need open communication that is clear. We should look at alternatives.

c) Second reading of Ordinance 541 an ordinance regulating solid and other wastes. Page 21. Read by title.

Motion to adopt by Ordinance 541 an ordinance regulating solid and other wastes. ***(2nd by Briggs.)*** **Discussion.** Later is concerned that we are regulating organic materials that decompose. If someone wants to compost leaves and egg shells, it bothers him. Clark says it is only a violation if it creates a foul smell or creates a health hazard. Russell – it is too fine of a line that can be taken in any direction way to easy. **The motion failed with Clark and Briggs voting yes and Russell, Osburn and Later voting no.**

d) Second reading of Ordinance 542 an ordinance concerning the abatement of dangerous and nuisance buildings. Page 22. Patterson read by title.

Motion by Clark *(2nd by Briggs)* to accept Ordinance 542 an ordinance concerning the abatement of dangerous and nuisance buildings. Discussion. The motion passed with one no vote from Osburn.

e) Discuss and decide on regulating noxious vegetation in the City of Union.

Briggs – She read it through. Noxious weeds are noxious and it is good to have something for the four or five people who abuse it. Maybe the county has something we can go by. Later – he is objecting to all of the ordinances we are putting forward and the way in which it is being put forward, but he doesn't have a problem with this ordinance itself. Osburn – we need a clear definition and whose interpretation it is. Because we have pasture and livestock in the city limits, it may conflict with an ordinance for a residential area. It needs to be worked on. Russell – we do need something but this is complicated and not real clear. Clark – we need a noxious vegetation ordinance. We could reference what the county refers to as noxious weed. Thistles and white top still need to be abated. Patterson – states that we will adopt a resolution that clarifies the types of weeds, but we need to pass the ordinance before we can pass a resolution. Mayor asked the council to provide a list of what they would like to see to Patterson and then there will be a work session.

f) Proposed language and application for Union's Mini Economic Development Stimulus Package, pg 23. Briggs – this is a great start to this. Likes the way it is read. Later – still not addressed to the city council or employees not being eligible. Osburn – agrees with Later. Clark – Likes the way it is written. Mayor suggested Patterson put it on next month's agenda.

9. ACTION ITEMS - NEW BUSINESS

a) Discuss and decide on of Resolution 2014-13. A resolution extending workers compensation coverage to volunteers of City of Union in which City of Union elects the following, pg. 24. Patterson said our insurance agent wants us to do a new worker's comp package in a new format. It is the same as we have done in the past.

Motion by Later to adopt Resolution 2014-13. A resolution extending workers compensation coverage to volunteers of City of Union in which City of Union elects the following. *(2nd by Briggs.)* The motion passed unanimously.

b) Discuss and decide on of Resolution 2014-14 a resolution approving the City of Union wastewater treatment plant facilities plan as part of the city's wastewater treatment plant comprehensive plan, pg 26.

→ **Motion by Clark to adopt Resolution 2014-13. A resolution approving the City of Union wastewater treatment plant facilities plan as part of the city's wastewater treatment plant comprehensive plan *(2nd by Later).* The motion passed unanimously.**

c) First reading of Ordinance 543 an ordinance amending the restating City of Union code chapter 92 regulating fire protection and regulation. See attached. Patterson gave the first reading by recording.

d) First reading of Ordinance 544 an ordinance amending 50.013 of the City of Union code relating to exemptions for system development charges. See attached. Patterson gave the first reading by recording.

e) **First reading of Ordinance 545** an ordinance amending City of Union code section 50.068 (F) (5) relating to minimum fees during periods of disconnection and providing for new provisions relating to water and sewer rates. See attached. Patterson gave the first reading.

f) **First reading of Ordinance 546** an ordinance repealing and replacing sections 92.60, 92.61, 92.62, and 92.63 of the City of Union code relating to emergency services fee. See attached. Patterson gave the first reading by recording.

Patterson announced changes for the record. Ordinance 543 section 92.50 was read as 97.5 in error.

Ordinance 546 section 92.62 not 92,62. Section 92.71 Appeal process 4 D should be public fire safety.

g) PUBLIC COMMENT –

Mike Lowery 975 S 4th. Thought it was a bunch of mumble jumble. There should be a public meeting and public comment. About the kids riding on the sidewalk, there is an ordinance about signs not allowed on the sidewalk.

Rondy Johanson, Where can she find the agenda prior to the meeting? Patterson asked the Mayor if she could answer the questions and that the meeting time and date is on the city website. The agenda is in the window of council chambers, at the post office and at city hall. She takes offence at what Clark said that kids can't read a sign. She compliments Later about trying to be proactive and appreciates his consideration of resolving situation. She suggests taking a proactive approach like attending a school function to educate children would be helpful. Stranger danger is high alert and for council to stop a child and ask for their name and number is not legal.

Bob Joseph, asked how does this ordinance affect him. He said he even asked Patterson and she called him nasty, yet she is a public servant. Does it affect his vacant lot? It is wrong if it does affect him. He will get a lawyer to go after the council members. It is not a vacation fee, but is a disconnect fee. He wants a letter informing him how it affects him.

Coy Wilde, 1493 S Third. Start educating kids where they can and can't ride, send a note home with parents at the beginning of each school year and after it warms up. Instead of a fine, have them do an after school work activity. He'd like to see a better relationship with Sherriff.

Tara Richter 101 E Bryan. Needs to understand building codes that are a nuisance. How does she find this information? Other than getting a ticket or a violation first. Patterson said to come to the office and she'd be happy to talk to her about it.

James Tippett, where does city council stand on private property and civil rights? Can they just write laws to vacate people's property? He feels that council is trying to get rid of residents.

h) COUNCIL CONCERNS

Clark – Online is overdrive.com which is books on tape, but it is not available through our library system.

Osburn – 543, 544 and 546 ordinances. Concerned and wants to discuss them next month. Hope that we understand this and that this is just another way to tax citizens and we are overstepping and over reaching. Lindsley asked if he would like to schedule one or two work sessions to discuss these concerns. Council consented. Briggs stated that these work sessions are also posted as open to the public.

Mayor Lindsley recessed the meeting to Executive Session at 8:36 p.m.

i) EXECUTIVE SESSION permitted 192.660 (2)

(a) to consider the employment of a public officer, employee, staff member or individual agent,

(b) to consider the dismissal or disciplining of, or to hear complaints or charges brought against, a public officer, employee, staff member or individual agent who does not request an open hearing,

(h) to consult with counsel concerning the legal rights and duties of a public body with regard to current litigation or litigation likely to be filed.

10. Council returned from executive session at 9:17 pm with Mayor William C. Lindsley Roger Clark, Bryan Russell, Doug Osburn.

Osburn motioned to amend Patterson's contract to replace it with the proposed language Patterson has provided, except change 12 months to 6 months (2^{nd} Later), vote Clark, Briggs no and Russell, Osburn, Later yes. Approved 3/2.

Clark motioned to direct city administrator to advertise the new public works position / assistant city administrator position with Worksource Oregon (2^{nd} Later), vote passed by all.

Osburn requested the position be advertised in the Oregonian, USA Jobs and other sources to reach outside Eastern Oregon, Councilors agreed. Patterson stated she been given a few other popular locations from Worksource Oregon that she'd had plan to look into.

j) ADJOURNMENT

The meeting was adjourned at 9:35 p.m.

Approved: [signature] Attest: [signature]

Mayor, William Lindsley — Administrator/Recorder, Sandra Patterson

UNION CITY COUNCIL MEETING
Monday, December 8 2014 – 7:00 P.M.

LEONARD ALMQUIST COUNCIL CHAMBERS, UNION CITY HALL

1. **CALL TO ORDER, PLEDGE OF ALLEGIANCE & ROLL CALL:** Mayor William C. Lindsley called the meeting to order at 7:00 p.m. Present were Roger Clark, Bryan Russell, Doug Osburn, Mayor Bill Lindsley, Sue Briggs and Matt Later. Don Voetberg was absent.

2. **CONSENT AGENDA**

   a) Minutes from November 10, 2014 – *Regular meeting.*

   Motion by: Later *(2nd by Osburn)* to accept the consent agenda. The motion passed unanimously.

   Briggs noted that on page 7 of the minutes there is a time error.

   Motion by Later to add in New Business at 9E to discuss and decide on advertising of open council positions that will be open in January. *(2nd by Russell).* The motion passed unanimously.

3. **MAYOR COMMENTS-** Lindsley reported that he sat down with the Rural Fire Dept. The city's insurance company didn't care for our agreement so they sent sample contracts. The rural department said they would take it back to their board and would discuss with us what they decide later.

   Regarding Ordinances 543, 545 and 546. People have mentioned that they are having a hard time understanding and hearing the readings. Chapter 8, number 45 says the ordinance will be read twice in full in a distinct manner. Clark said he understood every word. The ordinances are available for anyone to get before the reading of them. He feels the Mayors comment is a matter of opinion.

   Don Voetberg arrived to the meeting at 7:13 p.m.

4. **PUBLIC COMMENT** – Ken McCormack, he recalls in the budget committee the payment of the public works manager would be partly funded by the rental of our camera. It has been used a couple of times without payment. How can we pay for the position if we aren't receiving any funds?

5. **INFORMATIONAL ITEMS**

   a) Sheriff's Office Report. The report was given by a sheriff deputy according to the written report in the packets. Patterson asked what kind of presentation was given at the school. The officer did not know. Briggs asked what SART stands for in the school presentation. He did not know, but said he would find out.

   b) Public Works Report.

   c) Union Carnegie Public Library.

   d) Office Manager Report.

e) Ordinance Officer Report.

f) EMS Report.

6. **ADMINISTRATOR / RECORDER REPORT**

a) SHPO and OR Park grant cycles have opened up at State Historic Pres. Office. Hoping council will allow Patterson to move forward in seeking grant money for some arch shaped windows above city hall that are covered up with wood and the metal facet on the roof of city hall and money to redo the sprinkler system in the park.

b) WWTP facility plan / MOA update. It is finished and a final draft has been sent to OSU Experiment Station. Will pick this back up after the first of the year.

c) Welcome signs, thank you. The signs have been repainted by Meridith Matthews at her cost and time. A thank you card is being passed around for the council to sign.

d) Accounting transition update. The transition to the front office has begun. Patterson said she will be putting in parameters with checks and balances with councilors needing to check some of it.

e) Noise code update. The Attorney in Enterprise has replied. She said what we had is very good and that the language is what we need with today's regulations. Patterson will let council look at it again and then decide what to do.

f) Mini Stimulus package. An article was in the paper. Do we want this brought back or just let it go? Clark – it is important to encourage businesses. Russell – it's a good idea; just had one hiccup. Osburn – is for the package as long as council or mayor doesn't directly benefit. It might be an incentive for property owners to make their property rentable. Later, Voetberg and Briggs are for it with language exempting the council and mayor. Clark said the downtown revolving loan fund is available to the mayor and council members. To eliminate people who are trying to stimulate business means you are stepping on them.

g) Patterson has a resident who is adamant as to why the city councils names and phone numbers are not in the newsletters. She told him she would ask the council what they want. Clark, Russell and Later said they are okay with it. Briggs, Osburn and Voetberg preferred their phone number not be published. They can come to city hall if they want to meet with a council member. Mayor said to look at this issue at the next meeting.

h) Other communities are using tablets instead of paper form agendas, so consider this. Also a request for a drop box for Union Sanitation payment be available at City Hall. Union Sanitation is a franchise in Union. Clark said then there would need to be a drop box for cable, electric and gas company. There is a drop box located at the Union Sanitation's place of business in town.

i) Patterson said she is still looking through the handbook and will bring it back when she is done.

7. **CORRESPONDENCES**

a) Local Oregon Capital Assets Program.

b) Portland State University population estimate.

c) Union County election results.

d) Charter fee increase letter.

e) LOCC License Renewals.

8. ACTION ITEMS - OLD BUSINESS

a) **Second reading of Ordinance 540 an Ordinance regulating noxious vegetation.** Patterson said there was a misprint of a second reading for 541. This was rejected by the council so she wanted to state that for the record.

Mayor asked if there was anyone who did not understand the last reading of the Ordinance. No one responded.

Patterson read Ordinance 540 an Ordinance regulating noxious vegetation by title.

Motion by Later to discuss and decide on Ordinance 540 an Ordinance regulating noxious vegetation. *(2nd by Briggs)* The motion passed unanimously.

b) **Second reading of Ordinance 543 an ordinance amending and restating City of Union code chapter 92 regulating fire protection and regulation.**

Mayor asked if anyone at last reading did not understand the ordinance. No one responded.

Patterson read Ordinance 543 an ordinance amending and restating City of Union code chapter 92 regulating fire protection and regulation.

Motion by Later to discuss & decide on adoptions of Ordinance 543 an ordinance amending and restating City of Union code chapter 92 regulating fire protection and regulation. *(2nd by Voetberg.)* Discussion. Later noted that the things discussed at the last meeting were removed. 92-18 on page 36 B needs a period behind the word basis. Permits would be ..on a permit basis. Strike for approved burning containers. Clark said if you change it you have to re read it. Patterson said we can bring it back next month. **The motion passed with Later voting no.**

c) **Second reading of Ordinance 546** an ordinance repealing and replacing sections 92.60, 92.61, 92.62, and 92.63 of the City of Union code relating to emergency services fee.

Mayor asked if there was anyone who did not understand the last reading.

Patterson read Ordinance 546 an ordinance repealing and replacing sections 92.60, 92.61, 92.62, and 92.63 of the City of Union code relating to emergency services fee.

Motion by Voetberg *(2nd by Briggs)* to pass Ord 546 an ordinance repealing and replacing sections 92.60, 92.61, 92.62 and 92.63 for the City of Union code relating to emergency services fee. Discussion. Osburn said he is still against the intent of this ordinance that by it's own language page 1 9265. He challenges it and doesn't' think it is the proper way to fund the health and safety of our city. We should fund what we can and when the money runs out we stop funding them. He said we should prioritize what will be funded. Mayor asked Patterson if the ordinance will still be in place if it is not passed. Patterson said it only updates the language. Clark, Briggs, Voetberg voted yes. Later, Osburn and Russell voted no. The Mayor broke tie with a yes vote. Osburn said "of course, that was predictable."

9. ACTION ITEMS - NEW BUSINESS

a) Appoint new applicants to the Historic Preservation Committee. Todd Hewitt, Charma Vaage and Donna Beverage were appointed.

b) Discuss and decide on Resolution 2014-18 a resolution of the city council identifying properties that fell into a time frame between April 2006 and October 2014 which had a home removed and not replaced and setting regulations for those properties, pg 51. Patterson said this goes along with an ordinance that has recently passed. These properties fell into a dead zone when the ordinance was being worked on. Giving Patterson permission to talk to them and put them on the time period and to proceed.

Motion by Briggs to pass Resolution 2014-18 a resolution of the city council identifying properties that fell into a time frame between April 2006 and October 2014 which had a home removed and not replaced and setting regulations for those properties. *(2nd by Later.)* The motion passed unanimously.

c) Discuss and decide on Resolution 2014-19 a resolution adjusting the budget for fiscal year 2014-2015 to acknowledge payment of unanticipated funding from State of Oregon for Mt. Harris and Tye Ridge Fires and authorizing expenditures thereof. Patterson said this is a resolution that during the fires, the federal government paid the workers and equipment. This will cover payroll and cost of fuel and equipment.

Motion to adopt Resolution 2014-19 a resolution adjusting the budget for fiscal year 2014-2015 to acknowledge payment of unanticipated funding from State of Oregon for Mt. Harris and Tye Ridge Fires and authorizing expenditures thereof by Later *(2nd by Russell)*. The motion passed unanimously.

d) Discuss and decide on Resolution 2014-20 a resolution approving the enforcement of Oregon house bill 2662 laws for foreclosed properties, pg 55. Patterson said just over a year ago the state passed a bill to allow government entities to enforce regulations on foreclosed properties to force banks and owners to maintain the foreclosed properties. Now they have to stay in contact with us and take care of ordinance violations.

Motion by Later to discuss and decide on Resolution 2014-20 a resolution approving the enforcement of Oregon house bill 2662 laws for foreclosed properties. *(2nd by Osburn).* Discussion. Patterson said we talked about it and weren't sure if it should be an ordinance or a resolution. The motion passed.

e) Advertise for a new council position. Council consented. Later said it would be nice to do this at the next council meeting so there is time to plan the retreat. Briggs asked if it can be put out before there is a vacancy? Clark said we know there will be a vacancy.

10. PUBLIC COMMENT

11. COUNCIL CONCERNS – Later attended the school board meeting and reported that they were encouraged by the passing of the bond in La Grande.

Clark –hope the new council will to learn to work together, read the charter and make sure you are informed as council members and forego personal opinions and do what's best for the city.

Voetberg – Would like next council to get the charter updated. Enjoyed working with council and looks forward to next part of his life.

7:45 recessed to executive session.

12. EXECUTIVE SESSION ORS 192.660 (2) the governing body of a public body may hold an executive session: (a) to consider the employment of a public officer, employee, staff member or individual agent.

a) Discuss and decide on public works director / assistant administrator position.

Returned from executive session and reconvened at 8:01 pm.

Roll call; Clark, Russell, Osburn, Mayor Lindsley, Later, Briggs and Voetberg.

Osburn motioned to re-advertise the position (2nd Later), motion passed with all members voting in favor.

13. ADJOURNMENT

The meeting was adjourned at 8:02 p.m.

Approved: [signature] Attest: [signature]

Mayor, William Lindsley Administrator/Recorder, Sandra Patterson

One Stop Meeting 4-1-15

Review of programs 2018 dollars

Affordability Rate $41.34 → $1.14 per user

Distressed → 3.5% to 0%

DEQ Financial Authority offer funds @ rate 1.9%

(environmental and impact study)

Sponsorship project: stream bedwork,

this might work well for the city and OSU and drop our project to 1%.

Application is deadline is 3 x a year

UNION CITY COUNCIL WORK SESSION MINUTES
Tuesday April 28, 2015 – 6:00
LEONARD ALMQUIST COUNCIL CHAMBERS, UNION CITY HALL

Opened at 6:02pm by President Doug Osburn along Councilors Ken McCormack, Matt Later, Mayor Lindsley, Public Works Director Rod McKee and City Administrator Sandra Patterson. Troy Baker and Paul Stevens with Anderson Perry also attended. Sue Briggs was excused. Coy Wilde arrived at 6:18pm. Bryan Russell arrived at 6:25 pm.

1) Discuss clean water act, wastewater facilities plan and cost and impacts with Anderson Perry and Associates.

McKee explained the clean water act and the waste water facilities plan. There are requirements from DEQ regarding tempter and ammonia and the city needs to make changes to the current plan. This plan offers a new plan to fix our system to meet the requirements. We can try and fight it, but we won't win.

There is no do nothing option, we have to do something.

Baker shared we are on a pending on our permit and the regulations will be put in the new permit. City has a couple options.

City can have the new provision written into a permit and we would be out of compliance right way. It's a permit that outlines what we will do. It is stringent. It outlines exactly what the city will do. It is a pain in the butt to do.

The other way to do it is to recognize the city has no option and get out of the river. Get out of the river and work with DEQ and make the changes while working on the permit we currently have. Water quality controls permit from the State.

Osburn shared if there is a lawsuit during this timeframe. He felt it would be a temporary permit if issued. Baker agreed it is a risk.

Baker shared it is preferred if the city works with DEQ and fix the problems and work to a solution.

Mayor asked for what the time frame would be. Baker said they are looking at a 3 year time frame by 2018. We don't have options and we will

Coy Wilde arrived at 6:18pm.

Stevens share cost is 4.6 million. Operate $29,000, cost sheet was handed out.

Osburn shared he is in full agreement with this approach.

Bryan Russell arrived at 6:25 pm.

Council reviewed lending sources and rates. Stevens felt the DEQ/IFA was the most interesting funding pick. Council after further reviewing the options felt DEQ/IFA was the better option.

Council will have on their next agenda a resolution to move forward with funding of the above project.

Council will hold community meetings to educate local public on the subject. Later suggested we hold different type of ways to educate the public. Anderson Perry said they can make a tri fold flyer that can be mailed with the newsletter that explains the rate increase.

2) Public Comment

3) Continue discussion regarding proposed waste ordinance.

4) Public Comment

5) ADJOURNMENT at 7:26 pm

Approved: ______________________ Attest: ______________________

Mayor, William Lindsley — Administrator/Recorder, Sandra Patterson

Town Hall Meeting 10-21-15 - 1 pm

Questions:

Joseph: Other communities - they don't care discharge to streams. Labrande will have some impacts.

Randy: AP - Paul no, no run off no one knows, but some people have a better guess. What is to say the city's new proposal won't get regulated again bec DEQ ?

* Rod presented there are things that can be done temp to delay the improvements but its a double edge sword. Cove project was competive and it brought down the price.

* Other ideas (think outside the box)

1.) Can't meet amonia limits NSPD permit discharge in December we are looking @ right now.

2) Dulut the water - how is still in question??

3) Change discharge window time?

4) Storage going into winter (golf course) Bring water back to plant and fix with waste water → Clornato it and then put into the creek.

2002

Funding alternative grant has 25% Match

Rod and Paul provided review of slideshow

Questions:

Paul answers Randy's Questions
this is the safest approch.

LaBold → can we truck amonia? no-
Up til now it wasn't regulated.

Lower - do you know any other Citys paying $60 or $65 a month and what does it do to the city. He is concerned the city is a fire hazered. Havening a high rate ~~at~~ over $100 will have a higher fire risk.

LaBold - Lead Standards for WWT Standards based on sasunability. Would like to see those looked at. Asked if golf course could pay for water. Orego sustanablity Board

Paul - Said some of them work real well

Rod $23 water [illegible] $40 sewer LaGrande rate

Hank Rodmen - how do you remove amonida
Paul explained - bugs eat

* Send Dug Hojem email about WWTP Projet

Dick Middleton - what about odor
Land owners - purchase.
Odor - treated felluent (Storage lagun
Materials will be taken out 20 ye
Property → 99 yr. Lease w/ OSU?

Craig George → why can we put it on other ground ~~e~~ instead putting it in laguns. Why can we find a private land owner to take the water

Middleton → cost to run lines to other people. How many gals in ponds (31 mi

LaBold - What is the city commitment spelled out in agreement.

Middleton → pump into ditchs in town.

Sealy - back up generator - year @ plan
If the city purchase ~~[illegible]~~ property.

Middleton → time line → 3-4 ~~[illegible]~~ years

Randy ~ Ralph has worked hard to off set to midigate the impact.

CITY OF UNION RESOLUTION
RESOLUTION NO. 2016-01

A RESOLUTION BY THE CITY OF UNION TO AUTHORIZE THE CITY ADMINISTRATOR/RECORDER TO SIGN AN APPLICATION TO THE OREGON WATER RESOURCES DEPARTMENT (OWRD) TO FUND INFRASTRUCTURE IMPROVEMENTS TO THE CITY WASTEWATER TREATMENT SYSTEM

Whereas, the City of Union Wastewater Treatment Plant (WWTP) discharges treated effluent to Catherine Creek during a portion of the year; and,

Whereas, water quality standards for Catherine Creek are established by the Oregon Department of Environmental Quality (ODEQ) and approved by the Environmental Protection Agency (EPA);and,

Whereas, Catherine Creek supports endangered fish and aquatic species adversely impacted by the presence of introduced pollutants in the stream; and,

Whereas, the City Council of the City of Union (City Council) commissioned the preparation of a Wastewater Facility Plan (WWFP) to identify improvements necessary for the wastewater treatment system to produce treated effluent which will meet various water quality standards before discharging to Catherine Creek; and,

Whereas, the WWFP identified seven alternatives for the City Council to consider; and,

Whereas, Alternative A was to do nothing; and,

Whereas, the City Council selected Alternative 3C for implementation; and,

Whereas, Alternative 3C includes continued operation of the existing treatment plant, improvements to the existing treatment plant, lagoon storage of treated effluent, development of irrigated cropland, and continued irrigation of the Buffalo Peak Golf Course; and,

Whereas, discharge to Catherine Creek is eliminated with Alternative 3C; and,

Whereas, Elimination of the City of Union treated wastewater effluent to Catherine Creek improves the instream water quality; and,

Whereas, the Preliminary Engineer's Estimate for Alternative 3C as detailed in the WWFP is $4.68 million (2018 cost); and,

Whereas, the City Council has reviewed multiple funding options and has chosen to pursue the funding package as provided by the OWRD; and,

Whereas, the ORWD funding package could significantly reduce sewer rate impacts resulting from construction of the improvements.

CITY OF UNION RESOLUTION
RESOLUTION NO. 2016-01

Now therefore be it resolved,

Section 1. The City Council authorizes the City Administrator/Recorder to execute the OWRD funding application and submit it to OWRD for consideration.

Adopted by 5 members of the City Council voting therefore, and approved by the Mayor of the City of Union this 11th day of January 2016.

Approved:

Ken McCormak, Mayor

Attest:

Sandra Patterson, Administrator/Recorder

CORRESPONDENCE

Oregon
John A. Kitzhaber, MD, Governor

Department of Environmental Quality
Eastern Region - Pendleton Office
800 SE Emigrant Ave, Suite 330
Pendleton, OR 97801
Phone: (541) 276-4063
Fax: (541) 278-0168
Relay Service: 711

January 5, 2015

Ralph Riomondo
City of Union
P.O. Box 529
Union, OR 97883

Re: WQ-Union County
City of Union
NPDES #101624, File No. 90800
Wastewater Facilities Plan – 2014

Dear Mr. Riomondo:

The Department of Environmental Quality (Department) has completed review of the document entitled City of Union, Oregon, Wastewater Facilities Plan – 2014, as required per OAR 340-052. The plan was received at the Pendleton office on November 24, 2014, from Paul Stevens, P.E., of Anderson Perry & Assoc., Inc.

Background

The City of Union (City) operates a secondary wastewater treatment facility, which includes a mechanical screen, Parshall flume with flow recorder, an influent pump station, bar screen, primary clarifier, a submerged biological contactor (SBC) unit, two rotating biological contactors (RBCs), secondary clarifier, chlorine contact chamber, chlorination equipment, dechlorination unit, two aerobic sludge digesters, sludge drying beds, and discharges to either Catherine Creek or Buffalo Peak Golf Course.

Project Description

The City of Union (City) evaluated its collection and wastewater treatment systems. The collection system condition was prioritized into high, medium, and low categories. The City will implement improvements as part of an Implementation Plan, rather than as part of the improvements project.

The City selected Alternative 3C, which removes effluent flow to Catherine Creek, stores effluent in ponds from October through April, and irrigates treated effluent to farm ground and the Buffalo Peak Golf Course. This alternative will use the existing components of the treatment plant except for the discharge to the creek. New components will include an effluent transfer pipe to new lined storage ponds, irrigation pump station, irrigation equipment, and farm land for irrigating.

Conditions

The plans are hereby approved provided the following conditions are met:

- Wastewater facilities and pump stations are to be designed, where necessary, to maintain their structural integrity during the 500-year flood event.

- The diffusers for the aerobic digesters must be part of this project or installed in 2015.

We look forward to working with you on this project. If you have any questions, please call me at (541) 278-4608.

Sincerely,

Heidi B Williams

Heidi Williams, PE
Sr. Plan Review Engineer
Eastern Region – Pendleton

c: ✓Paul Stevens, PE, Anderson Perry & Assoc., Inc., PO Box 1107, La Grande, OR 97850
Shanna Bailey, DEQ, Pendleton
Tawni Bean, OBDD-IFA, 233 Badgley Hall, 1 University Blvd., La Grande, Oregon 97850
WQ Source File

Oregon
Kate Brown, Governor

Department of Environmental Quality
Eastern Region - Pendleton Office
800 SE Emigrant Ave, Suite 330
Pendleton, OR 97801
Phone: (541) 276-4063
Fax: (541) 278-0168
Relay Service: 711

August 7, 2015

Sandra Patterson
City of Union
P.O. Box 529
Union, OR 97883

Re: WQ-Union County
City of Union
NPDES #101624, File No. 90800
Permit compliance issues for FP funding

Dear Ms. Patterson:

The City of Union (City) is applying for funding to upgrade its wastewater treatment plant (WWTP) in accordance with the recently approved facilities plan (FP or plan). The plan identifies needed upgrades to meet future ammonia and temperature limits, which will be included in the City's renewed National Pollutant Discharge Elimination System (NPDES) permit. Although renewal of the NPDES permit has not yet occurred, it is known that it will include new ammonia limits and a more restrictive temperature limit due to the recent bull trout listing.

The facilities plan includes planning for the future limits, and also identifies that the existing WWTP will not be able to meet the proposed limits. Obtaining funding to upgrade is essential for the City to meet future environmental regulations and the renewed permit.

Sincerely,

Heidi Williams

Heidi Williams, P.E.
Sr. Plan Review Engineer
Eastern Region

c: Shanna Bailey, OBDD-IFA, 233 Badgley Hall, 1 University Blvd., La Grande, Oregon 97850
✓Troy Baker, PE, Anderson Perry & Assoc., Inc., PO Box 1107, La Grande, OR 97850
WQ Source File

Paul Stevens

From: Stephanie O'Brien
Sent: Tuesday, October 20, 2015 8:59 AM
To: Paul Stevens
Subject: Union WWFI cultural questions

Hey Paul,

I finally was able to do some research for the Union WWFI. Here's the summary.

The Oregon Archaeological Records Remote Access database was accessed on October 20, 2015 to investigate the presence of known cultural resources in the area. No known archaeological or historic sites were found to exist within the proposed project area. One previous archaeological survey has been conducted within the proposed project area. In 1997, Mount Emily Archaeological Services conducted a pedestrian survey for the Buffalo Peak Golf Course and water pipeline. This survey followed the route of the currently proposed treated effluent line. No cultural resources were located in this part of the surveyed area.

Stephanie O'Brien
Project Archaeologist
Anderson Perry & Associates, Inc.
1901 N Fir Street/PO Box 1107
La Grande, OR 97850
541-963-8309 office / 541-963-5456 fax
818-634-9432 cell

Web Facebook

Paul Stevens

Subject: FW: OWRD Program Funding for Union Water System Improvements

From: Quigley Karen M [mailto:karen.m.quigley@state.or.us]
Sent: Friday, January 15, 2016 11:44 AM
To: Stephanie O'Brien Union, Oregon Water System Improvements

Hello Stephanie,
The two tribal governments in Oregon I suggested be listed are:
The Confederated Tribes of Umatilla and the Confederated Tribes of Warm Springs.
Thank you,
Karen

Sent from my Verizon Wireless 4G LTE DROID

Stephanie O'Brien <sobrien@andersonperry.com> wrote:

Good morning Karen,

The City of Union, Oregon is currently in the process of completing a funding application for the Oregon Water Supply Development (OWRD) Program. Funds would be utilized for proposed improvements to the City's wastewater system. **The funding application from OWRD requires that the Legislative Commission on Indian Services be contacted in order to identify tribes affected by the project.** A copy of the correspondence with LCIS is also required for the project funding application.

The proposed project will occur adjacent to the city limits of Union, in Township 4 South, Range 39 East, Section 24. Please advise us of the appropriate tribal government contacts for this project. If you have any further questions, please feel free to contact me at 541-963-8309.

Thank you,
Stephanie O'Brien

Stephanie O'Brien
Project Archaeologist
Anderson Perry & Associates, Inc.
1901 N Fir Street/PO Box 1107
La Grande, OR 97850
541-963-8309 office / 541-963-5456 fax
818-634-9432 cell

Web Facebook

Paul Stevens

From:	Paul Stevens
Sent:	Friday, January 15, 2016 3:06 PM
To:	'garyburke@ctuir.org'
Cc:	'catherinedickson@ctuir.org'; 'tearafarrowferman@ctuir.org'
Subject:	Notification of Wastewater Treatment Facility Improvement project in Union, Oregon

Good afternoon, Gary:

This email communication is intended to inform you of a proposed Wastewater Treatment Facility Improvement project in Union, Oregon. The project eliminates treated wastewater effluent discharge to Catherine Creek.

The City of Union, Oregon is currently in the process of completing a funding application for the Oregon Water Resources Development (OWRD) Program. Funds would be utilized for proposed improvements to the City's wastewater system. **The funding application from OWRD requires that affected Native American tribes be contacted in order to identify potential concerns or comments relevant to a project in this area.** A copy of the correspondence with affected tribes is also required for the project funding application.

The proposed project will occur on property adjacent to the city limits of Union, in Township 4 South, Range 39 East, Section 24. This communication is tied to OWRD (a state agency) funding requirements. At the moment, no preliminary design or specific locations have been proposed, but fuller details and descriptions will be sent to you once they are finalized. This initial contact is to inform you of the proposed project and to assess potential concerns which may arise as a result of such a project.

If you have any further questions, please feel free to contact me via email or the phone numbers listed below.

Paul Stevens, P.E.
Senior Engineer
Anderson Perry & Associates, Inc.
1901 N Fir Street/PO Box 1107
La Grande, OR 97850
541-963-8309 office / 541-963-5456 fax

Web Facebook

Paul Stevens

From:	Paul Stevens
Sent:	Friday, January 15, 2016 3:09 PM
To:	'austin.greene@wstribes.org'
Cc:	'rbrunoe@wstribes.org'; 'Roberta.kirk@ctwsbnr.org'
Subject:	Notification of Wastewater Treatment Facility Improvement project in Union, Oregon

Good afternoon, Austin:

This email communication is intended to inform you of a proposed Wastewater Treatment Facility Improvement project in Union, Oregon. The project eliminates treated wastewater effluent discharge to Catherine Creek.

The City of Union, Oregon is currently in the process of completing a funding application for the Oregon Water Resources Development (OWRD) Program. Funds would be utilized for proposed improvements to the City's wastewater system. **The funding application from OWRD requires that affected Native American tribes be contacted in order to identify potential concerns or comments relevant to a project in this area.** A copy of the correspondence with affected tribes is also required for the project funding application.

The proposed project will occur on property adjacent to the city limits of Union, in Township 4 South, Range 39 East, Section 24. This communication is tied to OWRD (a state agency) funding requirements. At the moment, no preliminary design or specific locations have been proposed, but fuller details and descriptions will be sent to you once they are finalized. This initial contact is to inform you of the proposed project and to assess potential concerns which may arise as a result of such a project.

If you have any further questions, please feel free to contact me via email or the phone number listed in the signature block.

Respectfully,

Paul A. Stevens, P.E.

Paul Stevens, P.E.
Senior Engineer
Anderson Perry & Associates, Inc.
1901 N Fir Street/PO Box 1107
La Grande, OR 97850
541-963-8309 office / 541-963-5456 fax

Web Facebook

City of Victorian Heritage

City of

Union, Oregon

Wastewater Facilities Plan

2015

anderson perry & associates, inc.

engineering · surveying · natural resources

1901 N. Fir Street (P.O. Box 1107) · La Grande, Oregon 97850
(541) 963-8309
www.andersonperry.com

WASTEWATER FACILITIES PLAN

FOR

CITY OF UNION, OREGON

2015

REGISTERED PROFESSIONAL ENGINEER
17918PE
OREGON
JULY 25, 1995
PAUL A. STEVENS
RENEWS 6-30-16
SIGNED FEB 6, 2015

Preparation of this Wastewater Facilities Plan was funded in part with a financial award from the Water/Wastewater Program, funded by the Oregon State Lottery and administered by the State of Oregon Business Development Department, Infrastructure Finance Authority.

The City of Union, Oregon, has reviewed this Wastewater Facilities Plan and adopted it.

Signature and Title City Administrator Date 2-4-2015

ANDERSON PERRY & ASSOCIATES, INC.

Civil Engineers

La Grande, Oregon
Walla Walla, Washington

 Job No. 482-38

Table of Contents

LIST OF TABLES, CHARTS, AND FIGURES

MAPS

APPENDICES

Acknowledgments

Anderson Perry & Associates, Inc., thanks the City of Union for the opportunity to provide this Wastewater Facilities Plan and especially wishes to thank City personnel who provided key information.

Executive Summary

Introduction and Overview

This 2014 Wastewater Facilities Plan (WWFP) has been developed to provide the City of Union with an up-to-date review of their wastewater collection system, the wastewater treatment facility (WWTF), and financial components of its wastewater system. This WWFP addresses needs and changes that have developed since the 1992 WWFP and subsequent 1997 WWFP Update. Specifically, this WWFP evaluates the wastewater collection system and the wastewater treatment plant for overall condition and performance, provides a schedule for low, medium, and high priority collection system repairs, and provides alternatives to upgrade the WWTF to comply with the conditions anticipated to be set forth in the upcoming National Pollution Discharge Elimination System (NPDES) Permit renewal. This WWFP also provides an Existing Wastewater System 20-year Improvements Implementation Plan (Implementation Plan) for WWTF components that are expected to need either maintenance or replacement during the 20-year time frame represented by this WWFP.

The following text summarizes existing conditions, describes the treatment facility and collection system evaluation, and briefly discusses improvements. Detailed discussions are provided in the chapters specifically addressing the topic of interest.

Existing Wastewater Collection and Treatment Systems

Wastewater Collection System

Union's wastewater collection system was originally constructed in 1977 in conjunction with the original WWTF. Pipe sizes range from 4-inch diameter to 14-inch diameter. The majority of the collection system is 8-inch diameter gravity flow asbestos cement pipe. Subsequent collection system extensions and new subdivisions use polyvinyl chloride pipe. All manholes are concrete. The 8-inch diameter collectors feed into larger gravity trunklines that are 10-, 12-, and 14-inch diameter, increasing in size as the wastewater volume increases toward the WWTF.

Two forcemains serve the City. A 4-inch forcemain services the most southerly portion of the City's wastewater collection system. The forcemain originates at the Oregon Street lift station and extends to Iowa Street where gravity flow resumes. The second forcemain is 10-inch diameter and extends from the WWTF to the golf course. The 10-inch diameter forcemain was constructed in conjunction with the 2000 WWTF improvements project, is a dedicated, integral component of the effluent reuse system, and is not part of the wastewater collection system.

Wastewater Treatment System

Chapter 3 describes the existing WWTF and evaluates the treatment components. Generally, the original WWTF was constructed in 1977 on the west side of Union. Approximately half of the City lies north of the WWTF and half lies south of the WWTF. The WWTF is located beside Catherine Creek.

The 1977 WWTF consisted of headworks, primary and secondary clarifiers, rotating biological contactors, chlorination system, aerobic sludge digester, sludge drying beds, and an outfall to Catherine Creek.

The WWTF received several minor upgrades in 1989 to correct deficiencies and was expanded in 2000. The 2000 improvements included a submerged biological contactor to increase biological treatment capacity, a second aerobic digester to increase sludge treatment capacity, a travelling bridge rapid sand filter for tertiary treatment, additional sludge drying beds, a blower/generator/ electrical building, increased chlorination capabilities, dechlorination, and an irrigation effluent reuse system that removes WWTF flow to Catherine Creek from April through September and land-applies the effluent to the golf course.

Existing Wastewater System Evaluation Summary

Collection System Evaluation

The City of Union completed a television survey of the collection system and provided the information to Anderson Perry & Associates, Inc., for evaluation. The evaluation showed that most of the collection system is in good condition but that, as expected, age and wear are beginning to show. The evaluation showed areas of root intrusion, areas with cracks, some minor sags, rolled gaskets, and broken cleanouts. Although some areas of minor infiltration generally in the form of leaks were visible in the television survey, the evaluation did not show excessive infiltration and inflow (I/I). I/I is generally considered as a negative impact on a WWTF because it uses capacity that would normally be used to treat wastewater.

The wastewater collection system is in overall good condition. However, several areas requiring repair or replacement were identified. Areas requiring repair were prioritized as high, medium, and low based on the pipe condition as observed in the television survey. Sections of the collection system requiring remedial work are listed on Figure 4-3 and are arranged from high priority to low priority. High priority improvements generally address visible problems such as leaks, broken cleanouts, roots, cracks, and exposed aggregate. Medium priority items address root intrusion, cracks that could develop structural or I/I issues, minor I/I, and other problems that should be finished in a timely manner. Low priority items address minor problems or potential problems stemming from decayed grout and debris in the manholes.

Following is a summary of estimated project costs for the three presented improvement priority levels proposed for the City of Union's collection system.

TABLE ES-1

Improvement and Cost Summary

Improvement Priority	Estimated Project Cost (2014 Dollars)
High	$95,000
Medium	$263,000
Low	$70,000
Total	$428,000

Breakdowns of the estimated costs to repair the collection system are included as Figures 4-5, 4-6, and 4-7. Wastewater collection system priority improvements maps show areas of the collection system that need to be repaired and are included as Figure 4-4, Sheets 1 through 6. The priority level is color coded with red as high priority, magenta as medium priority, and gold as low priority. Chapter 4 provides a complete discussion of areas identified as needing remedial work and the associated collection system evaluation.

Wastewater Treatment Facility Evaluation

The existing WWTF was evaluated based on its condition and ability to serve the current and projected populations based on the current regulations. The WWTF was then evaluated to determine its ability to meet ammonia regulations anticipated to be set forth in the upcoming NPDES Permit renewal.

Current Regulations Evaluation

Design Parameters

The basic wastewater design criteria developed for this WWFP are presented in Chapter 2. See Figure 2-5 for a summary. These data include the existing and year 2034 design population, design flows, and expected future influent wastewater strength characteristics and were the basis of the existing WWTF evaluation.

Age and Capacity

As shown in Chapter 3, Union's WWTF has sufficient capacity to treat projected wastewater flows from the City for the next 20 years. However, the original plant was constructed in 1977 and several components have exceeded their design life. Components that are aged and that could require substantial investments to repair or replace include the clarifiers and the rotating biological contactors.

Union's WWTF also has odor and foam issues associated with the aerobic digesters. Additional study is needed to determine the best and most cost-effective solution. The City is currently gathering data to aid in identification of a sound solution.

An Implementation Plan schedule (see Figure 5-21 in Chapter 5) was developed for the City for the next 20 years so funds can be accrued in keeping with the City Council's pay-as-you-go directive. Preliminary solutions for odor and foam with cost estimates are presented in Chapter 5 and are shown on the Implementation Plan. Additionally, to offset an emergency condition associated with the aging components of the WWTF, the Implementation Plan shows estimated costs and a time frame when significant repairs could be expected during the next 20 years. The Implementation Plan is separate from any improvement projects associated with the anticipated ammonia regulations.

Summary

The City of Union's WWTF is in overall good physical condition. Hydraulic capacities to manage projected flow volumes are adequate for the time frame represented by this

WWFP. The WWTF also has sufficient biological capacity to treat projected loadings for all currently regulated parameters. However, anticipated NPDES compliance parameters are expected to include ammonia.

Changing Regulations Evaluation

The City of Union's WWTF operates under the authority of an Oregon Department of Environmental Quality (DEQ) issued NPDES Permit. The City of Union's NPDES Permit expired on October 31, 2009. The City applied for a new permit in compliance with Schedule F, paragraph 4 of the permit. The permit is administratively extended until the DEQ issues a new permit. The DEQ expects to add an ammonia limit when they reissue the permit.

Although the current WWTF has shown that it can reliably reduce ammonia by approximately two-thirds, it cannot meet the anticipated ammonia limit as currently equipped. Either additional biological treatment capacity or a different treatment process will be needed to meet the expected requirements. A summary of the proposed ammonia limits and the WWTF's historical ammonia levels is shown on Table ES-2.

TABLE ES-2

Ammonia Summary

Average Ammonia Direct (as Nitrogen), mg/L			DEQ Proposed Limits, Rearing Season* (June 16-September 30)		DEQ Proposed Limits, Spawning Season* (October 1-June 15)	
Influent	**Effluent**	**Catherine Creek**	**mg/L Monthly**	**mg/L Daily**	**mg/L Monthly**	**mg/L Daily**
31.38	10.15	0.04	5.9	8.6	4.2	6.2

** Ammonia limits depend on either fish spawning or fish rearing season.*

mg/L = milligrams per liter

Evaluated Wastewater Treatment System Improvements Alternatives

In order to address the conditions anticipated to be set forth in the upcoming NPDES Permit renewal, two conceptual wastewater treatment alternatives and three conceptual effluent reuse alternatives were evaluated and are discussed in Chapter 5 of this WWFP. The conceptual treatment alternatives include:

- Alternative 1 - No action.
- Alternative 2 - Upgrade the WWTF to manage ammonia and continue seasonal effluent discharge to Catherine Creek from October through April. Land-apply treated effluent on Buffalo Peak Golf Course from May through September.
- Alternative 3 - Discontinue seasonal (October through April) discharge of treated effluent to Catherine Creek, store effluent generated from October through April, and land-apply stored effluent from May through September. Analyses are based on the assumption that the point of compliance remains at the initial discharge from the WWTF.
    - Alternative 3A - Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Pump stored effluent to the golf

course for beneficial use from May through September. Pump treated effluent generated from May through September to the golf course.

- Alternative 3B - Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Land-apply stored treated effluent on alfalfa from May through September and treated effluent generated from May through September. Discontinue recycled water use at the golf course.
- Alternative 3C - Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Land-apply stored effluent on alfalfa from May through September. Continue irrigating the golf course with treated effluent from May through September.

- Alternative 4 - Decommission Union's Mechanical WWTF. Treat wastewater in facultative treatment lagoons and land-apply treated effluent at the golf course and on alfalfa from May through September. Store treated effluent generated from October through April in effluent storage ponds for land application from May through September.

Of these conceptual alternatives, Alternatives 2, 3A, 3C, and 4 were further evaluated. A summary of the estimated project costs for these alternatives is presented on Table ES-3.

TABLE ES-3

Summary of Estimated Project Costs

Treatment Alternative	Estimated Project Cost	Estimated Annual OM&R Cost of Treatment Facility	Estimated Present Worth of Treatment Facility (2014)
2	$3,049,500	$31,800	$3,482,500
3A	$3,423,000	$25,500	$3,770,000
3C	$3,997,000	$29,500	$4,398,000
4	$7,699,000	$34,500	$9,556,000
Average	$4,496,000	$30,500	$5,476,875

OM&R = Operation, maintenance, and replacement.

Based on work sessions with the Union City Council and staff, and after reviewing the WWFP, the City of Union City Council chose Alternative 3C and stipulated that the components associated with this alternative would be arranged so treatment lagoons could be added at a later time when the current mechanical treatment plant is decommissioned.

Selected Wastewater System Improvements

The City Council also approved the Implementation Plan presented in Chapter 5 that includes prioritized repairs to the wastewater collection system to address the aging WWTF and correct deficiencies not associated with the anticipated ammonia regulations.

Implementation Plan

Collection System

The City has selected to implement the collection system improvements as part of the Implementation Plan rather than as part of a larger project. As shown on Figure 5-21, the City will accrue funds to repair or replace portions of the collection system such that approximately $100,000 is available for the collection system repairs in 2016-17, $360,000 is available in 2022-23, and $113,000 is available in 2026-27.

Treatment Facility

The Implementation Plan includes installation of mechanical mixers in the aerobic digesters and biofilters to control odors.

The installation of mechanical mixing in the aerobic digesters is intended to keep solids in suspension to allow contact with the biomass for improved solids reduction. Currently, air is utilized to mix sludge and inject air. Mechanical mixing reduces air requirements and mitigates foam production which, in turn, will allow air injection at less violent rates, simultaneously increasing the dissolved oxygen (DO) content in the sludge. The system components and cost estimate associated with the addition of mechanical mixing are presented on Figures 5-22 and 5-23.

Biofilters are intended to capture and neutralize offensive odors. Discussions regarding offensive odors showed that insufficient data exist to develop sound engineering solutions. To correct the data shortfall, the City is proactively upgrading the telemetry system by adding new DO, temperature, and pH sensors. With the sensors in place, data will be collected and analyzed. If the DO data shortfall can be corrected, it may be possible to reduce offensive odors with less expensive solutions. The system components and cost estimate associated with the addition of biofilters are presented on Figures 5-24 and 5-25. A detailed discussion on biofilters and odor control is included in Chapter 5.

Selected Alternative Improvements

Treatment Facility

The most favorable, long-term solution for treating wastewater to meet anticipated ammonia regulations in Union appears to be Alternative 3C. Alternative 3C removes effluent flow to Catherine Creek, stores effluent in ponds from October through April, and land-applies treated effluent to farm ground and the Buffalo Peak Golf Course. The selected treatment alternative leaves the WWTF in its current configuration. The primary difference from current operations will be that effluent will no longer discharge to Catherine Creek. The selected treatment alternative includes the following main components:

- New effluent transfer pipe to the effluent storage ponds
- New lined effluent storage ponds and associated piping and appurtenances
- New irrigation pump station

- New pivot irrigation equipment
- Land for land application

Current Financial Status and Loan Capacity

The annual cost of operating and maintaining the wastewater system is summarized on Figure 7-1 in Chapter 7. This includes all costs for the wastewater system such as OM&R, staff payroll, and capital outlay. A graphical plot of the City of Union's wastewater (sewer) system budget, showing revenue and expenditures, is presented on Figure 7-2 in Chapter 7. By plotting a trend line for the expenditures, the expenditures in a future year can be estimated, assuming no changes to the wastewater system occur. The trend line for the City of Union's operation and maintenance expenditures suggests expenditures should be in the range of $550,000 in the budget year 2015-16. An OM&R cost of $300,000 was determined more realistic after discussions with the City about the capital outlay expenditures in the recent past.

To determine the City's ability to fund a wastewater system improvements project, Figures 7-3 and 7-4 in Chapter 7 were prepared. The data indicate the City could afford to service a Clean Water State Revolving Fund (CWSRF) 30-year bond purchase (approximately 2.23 percent annual interest rate) in the amount of about $5,145,000 with an average monthly sewer cost of approximately $58 to $59 per Equivalent Residential Unit (ERU). The data indicate the City could afford to service a CWSRF 20-year design/construction loan (approximately 2.23 percent annual interest rate) for the same loan amount with an average monthly sewer cost of approximately $65 to $66 per ERU. The data also indicate the City could afford to service a U.S. Department of Agriculture (USDA) Rural Development (RD) 40-year design/construction loan (approximately 3.25 percent annual interest rate) for the same loan amount with an average sewer cost of approximately $60 to $61 per ERU. The City could service similar bond debts using taxes only, which would result in annual property taxes increasing in the range of about $286 to $388 per $100,000 of tax assessed value. These data are summarized on Table ES-4.

TABLE ES-4
Funding Scenarios Comparison

	Scenario A	Scenario B	Scenario C
Funding through CWSRF	$5,145,000 Loan	$5,145,000 Loan	None
Funding through USDA RD Loan	None	None	$5,145,000
Annual Loan Payments and Number of Years	$237,000 for 30 Years	$321,500 for 20 Years	$231,500 for 40 Years
Approximate Interest Paid	$1,966,500	$1,288,500	$4,122,000
Approximate Average Monthly Rate for Sewer Use[1]	$58 to $59	$65 to $66	$60 to $61
Estimated Annual Tax Rate Increase Per $100,000[1]	$286	$388	$280

[1] Depending on the selected funding package, monthly rates will increase or annual taxes will increase as shown on Table 7-5, or a combination of monthly rates and taxes may also be used.

Project implementation

Action items

To implement Alternative 3C, the City of Union will need to work through the following implementation steps.

1. The City needs to contact IFA to schedule a "One Stop" meeting. The Project Notification and Intake Form should be completed and submitted to IFA to initiate funding discussions if the City decides to use IFA funding.

2. The City of Union's charter, Chapter XI, regulates financing of the sewage disposal system and limits indebtedness. To successfully fund a wastewater system improvements project, the City will need to maintain good communications with City residents. A bond election may also be necessary. Once a debt mechanism has been selected (revenue bond or general obligation bond), a bonding attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.

3. The City will need to hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for the required sewer rate increase.

Conclusion

The City of Union has a well-maintained wastewater system. Most of the collection system is in good condition, and the WWTF is in good condition. Aside from normal maintenance, large, in-depth projects stemming from normal wear and tear are not needed. In order to maintain a properly functioning WWTF and prevent the need for a major overhaul in the future, an Implementation Plan schedule was developed for the City so funds can be accrued in keeping with the City Council's pay-as-you-go directive.

Separate from the Implementation Plan, regulatory changes may require WWTF modifications to reduce ammonia discharge to Catherine Creek. The DEQ intends to limit ammonia discharge content such that the current WWTF cannot comply as currently configured. The most favorable alternative to modify the WWTF and achieve regulatory compliance is Alternative 3C. Alternative 3C adds treated effluent storage ponds and a land application site and discontinues all discharges to Catherine Creek. Alternative 3C improvements should provide the City with a reliable, quality wastewater system that should meet the needs of the City for many years and have low exposure to subsequent regulatory modifications.

Chapter 1 - Background Information

Introduction

The City of Union owns and operates a mechanical wastewater treatment facility (WWTF). Currently, the City's wastewater system serves a population of 2,150 residents and several small commercial establishments. The wastewater collection and treatment system operates under authority of a National Pollutant Discharge Elimination System (NPDES) Permit issued by the Oregon Department of Environmental Quality (DEQ). The NPDES Permit authorizes the City to discharge disinfected secondary treated effluent into Catherine Creek between October 1 and June 30 as long as creek flow and temperature conditions are met. When the City is not discharging to Catherine Creek, the effluent is discharged to a storage pond to be land-applied on approved areas of the Buffalo Peak Golf Course.

The City also operates under the September 2005 Biosolids Management Plan. The Biosolids Management Plan was approved by the DEQ on October 12, 2005, and authorizes the City to land-apply sludge to property owned and farmed by the Sheehy family.

WWTF additions were made in 2000 and are nearly 14 years into their 20-year design life. In addition, modifications to wastewater quality regulations are anticipated that could exceed the WWTF's ability to treat.

Authorization

The City of Union, through Work Order No. 2 signed on September 19, 2012, in accordance with the Agreement for General Engineering Services signed on April 16, 2012, authorized Anderson Perry & Associates, Inc., to prepare this Wastewater Facilities Plan (WWFP). This WWFP is generally completed in accordance with the DEQ's guidance document "Preparing Wastewater Planning Documents and Environmental Reports" dated May 2013.

Project Purpose

This WWFP has been prepared for the purposes of determining the existing wastewater collection, treatment, and disposal systems' ability to handle anticipated growth and provide the City of Union with a comprehensive planning document that outlines recommended wastewater system improvements. This WWFP outlines several improvement alternatives for the treatment system that were developed with consideration for the potential addition of ammonia limits to the NPDES Permit that the City is facing due to the discharge of treated effluent into Catherine Creek. The WWFP also presents wastewater system improvements needed for the City based on an evaluation of the existing system to efficiently and effectively treat the anticipated wastewater flows and loadings. A prioritized list of these improvements is presented in Chapter 5 on the Wastewater System Improvements Implementation Plan (Implementation Plan) and schedule for completion over the next 20 years.

Scope

In order to meet the intentions and goals of the WWFP, the following scope was identified in the Agreement for General Engineering Services:

- A statement of purpose, background, and need for the wastewater facilities planning, and demonstration of consistency with the City's comprehensive land use plan, shall be developed.
- Historical wastewater treatment system operational data shall be gathered and analyzed.
- Appropriate design criteria shall be developed based on the historical data analysis. Projections of anticipated future (20-year) wastewater treatment plant flows and loadings shall be completed for use in evaluating the system and developing needed improvements.
- An evaluation of the collection system shall be completed based on the results of the flow, television monitoring, and manhole inspections, including identifying and prioritizing needed improvements. Estimated collection system improvement costs shall be developed.
- A technical description and evaluation of the existing wastewater treatment system, including the recycled water system to outline strengths and deficiencies.
- A discussion of the applicable regulatory requirements, including those concerning surface water, recycled water, groundwater, and sludge management and whether these requirements are permitted or limited by the City's local comprehensive plan.
- Based on the outcome of the existing system evaluation, develop required improvements, prioritize improvements, and outline an action plan and schedule for completing the necessary improvements. Prepare estimated project costs of the identified improvements.
- Analysis of financing options and preparation of a financing plan for design and construction of improvements, if needed, and long-term operation of the facilities, including projection of sewer use impacts and fees.
- A preliminary environmental analysis. Note: This Scope of Work does not include the preparation of environmental reports for design and construction funding applications, biological assessments, wetland delineations, cultural resource evaluations, mitigation plans, or other related environmental documents.

Public Meetings

Public meetings were conducted to obtain information from Union’s citizens. The first meeting was held April 7, 2014, during a City Council work session. Information was general in nature and provided a project overview, improvement alternatives were discussed, and a population growth rate of 0.77 percent was approved. The next meeting was held August 8, 2014, and a detailed discussion of the improvement alternatives was conducted as well as a general overview of the WWFP to date. Input from the meetings helped to guide the preparation of this WWFP and the selected alternative. Alternatives are discussed in detail in Chapters 4 and 5.

Staff Meetings

Staff meetings were conducted to obtain information about the WWTF, provide project updates, discuss improvement alternatives, and obtain information about the City. A walkthrough of the WWTF was conducted on April 2, 2014. During the walkthrough, information was gathered to complete the WWTF description and evaluation presented in Chapter 3. The walkthrough also provided a chance to discuss with the operator how the WWTF was working. A second staff meeting was conducted on June 16, 2014, to discuss capital improvements and improvement alternatives with the WWTF operator and City administrator.

Description of Community

The City of Union is located in Union County in northeastern Oregon. The community is situated in the Grande Ronde Valley, approximately 15 miles southeast of the City of La Grande. The location of the City is shown on Figure 1-1. Catherine Creek, Little Creek, and State Highways 203 and 237 pass through the City.

Located on an alternate route for the Oregon Trail, the area was initially settled by Conrad Miller in 1862. During the next few years, establishment of a post office, flour mill, and a Wells Fargo stage line further helped build the community. The City of Union was named by its citizens to show their loyalty to the North during the Civil War; it was incorporated in 1878. With the establishment of Union County in 1864, the City of Union vied with the City of La Grande for the County Seat. After several changes, the City finally secured the County Seat in 1874, a position it held until 1905 when the County Seat was permanently transferred back to the City of La Grande.

Population

The City of Union's population has fluctuated throughout its history. During the period of 1960 to present, population trends have varied from a historic low of 1,490 in 1960, increasing to 2,062 in 1980, decreasing to 1,847 in 1990, and increasing to the current population. The Center for Population Research and Census (CPRC) at Portland State University has estimated a 2013 population of approximately 2,150 people.

Employment

In past years, the City supported several industries located in and around the City. These industries included a lumber mill, a slaughter house, and a railroad spur. These industries no longer operate, and the City now has few industries. With its collection of historic Victorian homes and buildings, the City's economy is currently based primarily on businesses that serve the community, surrounding farms, and the recreation and tourism industries.

Transportation

State Highways 203 and 237 are the major transportation routes for the City. They provide access to Interstate 84 at points near the Cities of La Grande and North Powder, approximately 15 miles to the northwest and 15 miles to the southwest of Union, respectively. The Union County Airport is located approximately 11 miles from the City of Union along Highway 203, providing services for small private, commuter, and cargo flights. The Union Pacific Railroad maintains a main line through the Grande Ronde Valley that lies approximately 2 miles west of the City. A railroad spur line once served the industries located in Union but is currently not in service.

Study Area

The study area for this WWFP encompasses the entire area within the City limits and Urban Growth Boundary (UGB) of the City of Union. An illustration of the study area is shown on Figure 1-1.

Physical Environment

Topography

The City is located in the southeast corner of the Grande Ronde Valley. The topography of the developed portion of the City on the valley floor is fairly flat, sloping approximately one percent toward the west. The Buffalo Peak Golf Course is located on a nearby hill and spans vertically from the valley floor at approximately 2,800 feet to an elevation just under 3,200 feet.

Regional Geology

The Grande Ronde Valley is located in a fault-bounded depression. The valley is graben bounded by faults to the east and west that are pulling apart. Streams located in narrow, steep-walled canyons can be at risk of landslide damming. Catherine Creek to the east of Union, near the state park, could be at risk for landslide damming. Failure of a landslide dam could put the WWTF at risk of mud and debris flow.

Threatened and Endangered Species

Catherine Creek flows through the City of Union and is designated as critical habitat for steelhead, Chinook salmon, and bull trout. Table 1-1 describes the Endangered Species Act (ESA) status for the three species. Chinook salmon and bull trout use this reach of Catherine Creek for spawning and rearing, and steelhead use this reach for spawning, rearing, and migrating.

TABLE 1-1

ESA Status

Species	Federal ESA Status	Oregon ESA Status	Critical Habitat Designated
Steelhead *(Oncorhynchus mykiss ssp.)*	Threatened	Sensitive Vulnerable	Yes
Chinook salmon *(Oncorhynchus tshawytscha)*	Threatened	Threatened	Yes
Bull trout *(Salvelinus confluentus)*	Threatened	Sensitive Critical	Yes

Climate

The climate in Union is characterized by dry, clear summer days and winters with moderate snowfalls and colder temperatures. Situated at the canyon mouths of Pyles and Catherine Creeks, the community is often subject to moderate to high winds. Since 1910, the Oregon State University Experimental Station located in Union has recorded temperatures, precipitation, and other climatological data, which it reports to the National Weather Service. Based on data for the City of Union spanning the period of record, the average annual precipitation is 13.77 inches. The average annual temperature is 47.9°F, with extremes varying from as high as 108°F in the summer to as low as -27°F in the winter. However, these extremes do not occur for prolonged periods of time.

Soils

The Natural Resources Conservation Service (NRCS) has classified two major soil complexes in the area in and around the City of Union. The first is the Catherine-La Grande-Veazie Complex, consisting of soil groups that are deep and poorly to well drained, and resulting from alluvial and lacustrine deposits. These soil groups exist on the valley floor in and around the City. The surface layers of these soil groups are composed of loams, silt loams, and silty clay loams. The sublayers consist of silt loams, silty clay loams, and gravelly sands that change to gravelly silt loams, gravelly loam, sands, and gravel. The soils of this complex are suitable for cultivation of a variety of crops. However, these soils are subject to periodic flooding and fluctuating high water tables, which may limit their use.

The Gwinly-Anatone-Ukiah Complex is the second major soil complex, consisting of soil groups that are shallow and well drained. This complex is generally located on the ridge tops and hillsides to the east and south of the City. The soils are relatively thin and result from decomposition of the existing basalt bedrock. The soil layers of these groups tend to be very cobbly silt loam that range down to very cobbly silty clay loams and extremely cobbly clays, reaching bedrock at approximately 16 inches. Soils in this complex are not typically suitable for cultivation and have high runoff potential. With care, they are most suitable for managed grazing and wildlife habitat. The different soils located in the City of Union are shown on Figure 1-2. A more detailed description and general maps of these soil groups in the vicinity of the City are available in the Soil Survey of Union County Area, Oregon, published by the NRCS.

Air Quality

The study area is relatively free of air pollution. The fall field burning of agricultural lands creates some air pollution. These operations are controlled by the DEQ, and burning generally occurs only when the air is able to assimilate the smoke.

Traffic volume on State Highways 203 and 237, and throughout the community, is relatively low, producing an acceptable level of air pollution. The primary sources of air pollution are windblown dust, wood-burning fireplaces and stoves, and vehicular traffic.

The WWTF is located approximately one-half mile west of the developed City, which helps to mitigate any odor problems that occur.

Fish and Wildlife

Fish and wildlife are valuable resources throughout Union County. Many species of fish, upland game birds, waterfowl, terrestrial, and aquatic fur bearers exist in the area. Significant fish and wildlife habitat areas exist along Catherine Creek, both upstream and downstream of the City of Union. Riparian habitats are known to support an abundance of wildlife due to excellent environmental factors. Existing vegetation should be preserved where possible to preserve this habitat.

Water Resources

Hydrology

The City lies in the Catherine Creek drainage basin, a subbasin of the Grande Ronde Basin. Catherine Creek flows year-round; however, during the summer months, mainly August and September, the stream has extremely low flows. A summary of the flows in Catherine Creek, obtained from the Oregon Water Resources Department (OWRD) website, is included in Appendix A. Well logs obtained from the OWRD website for area wells show static water from two feet to seven feet below ground.

Wetlands

According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, there are freshwater emergent and freshwater forested/shrub wetlands in and around the City of Union. A freshwater forested/shrub wetland is described by the USFWS as a forested swamp or wetland shrub bog or wetland, and a freshwater emergent wetland is described as a herbaceous marsh, fen, swale and wet meadow. Area wetlands are shown on Figure 1-3.

Flood Hazards

Federal Emergency Management Agency (FEMA) floodplain map panels 410216 0428 B, 410223 0001 B, and 410216 0429 B provide a comprehensive overview of areas within the City limits and UGB. The southwest and the north portions of the City are Zone B, which corresponds to the area between the 100-year flood and the 500-year flood. The areas of the City adjacent to Catherine Creek and Little Creek are designated Zone A, which is the area of the 100-year flood event. The FEMA floodplain is shown on Figure 1-4.

Existing Water System

General

A brief description of the City's water system is included here for reference. The discussion addresses water supply and distribution. A complete discussion of the water system is contained in the 2004 City of Union Water System Master Plan and the 2011 Water System Master Plan Update by Anderson Perry & Associates, Inc.

Water Sources

Currently the City of Union obtains its water supply from two groundwater wells, Well No. 2 and Well No. 3. The City alternates its primary use between these two wells. Well No. 2 is located in the City’s maintenance yard near the intersection of Center Street and Gale Street. Well No. 3 is located on the hillside south of Highway 203 near the City limits and approximately 500 feet west of the reservoir.

Well No. 1 was removed from service due to several problems. Well No. 2 was constructed in 1983 and is a fully cased, 1,200-foot deep basalt well and is currently capable of providing flows up to approximately 1,800 gallons per minute (gpm). In order for the City to develop a backup water supply to Well No. 2, Well No. 3 was constructed in 1989. Well No. 3 is also a fully cased, 1,686-foot deep basalt well and is currently capable of providing flows of up to approximately 1,300 gpm.

Treatment

The City maintains a gas chlorination system capable of disinfecting water produced by either of the City's wells. The disinfection system is contained in a separate, ventilated chlorination room located in the Well No. 3 pump station. In the 2011 Water System Master Plan Update, the City indicated they would like to replace the existing gas chlorination system in the existing chlorination room in the Well No. 3 pump station with a sodium hypochlorite system due to safety concerns and regulatory requirements.

Water Rights

The City of Union holds three groundwater rights issued by the State of Oregon for its municipal water wells. Well No. 1, while not currently in use, has a water right for 0.446 cubic feet per second (cfs) (200 gpm), with a priority date of December 9, 1963. The water right for Well No. 2 is 4.01 cfs (1,800 gpm) and has a priority date of April 21, 1983. Well No. 3 has a water right of 5.57 cfs (2,500 gpm) and a priority date of October 12, 1989. The total combined water rights for the City's active wells, Well No. 2 and Well No. 3, are 9.58 cfs, or approximately 4,300 gpm. The current average capacity of the pumps installed in Wells No. 2 and 3 is approximately 1,780 gpm (3.97 cfs) and 1,265 gpm (2.82 cfs), respectively. The City of Union also holds a surface water right to Catherine Creek for the surface water diversion that once supplied the City's water. This water right is for 3.0 cfs (1,364 gpm) with a priority date of December 31, 1893.

Water Storage

The City of Union's municipal water storage consists of a single welded steel ground-level reservoir with a maximum capacity of approximately 750,000 gallons. The reservoir is located on the point of a ridge south of Highway 203 and east of the City limits. It was constructed in 1968 and is approximately 57 feet in diameter and 40 feet tall. The reservoir serves the City of Union by gravity flow.

Existing Water Distribution System

The City's distribution system main lines consist of approximately 102,000 feet of pipe ranging in size from 14 inches down to 3/4 inches in diameter. Of these pipes, approximately 35 percent are asbestos cement (AC), approximately 42 percent are polyvinyl chloride (PVC), with the remainder being composed of steel pipe. Since the early 1980s, high density polyethylene (HDPE) service lines have been installed, in addition to water meters.

The piping from the City's storage reservoir consists of 14-inch diameter AC supply line connecting to a 12-inch diameter steel/PVC distribution main line. Approximately 45 percent of the distribution mains are 6 inches in diameter and are composed of transite and PVC pipe. Of the remaining distribution mains, approximately 28 percent are composed of 4-inch diameter pipe or smaller.

It is estimated that approximately 76 percent of the City's existing water main lines were installed between 1968 and 2000 through various distribution system improvement projects. The remaining distribution piping may date back to the original construction or any improvements prior to 1952.

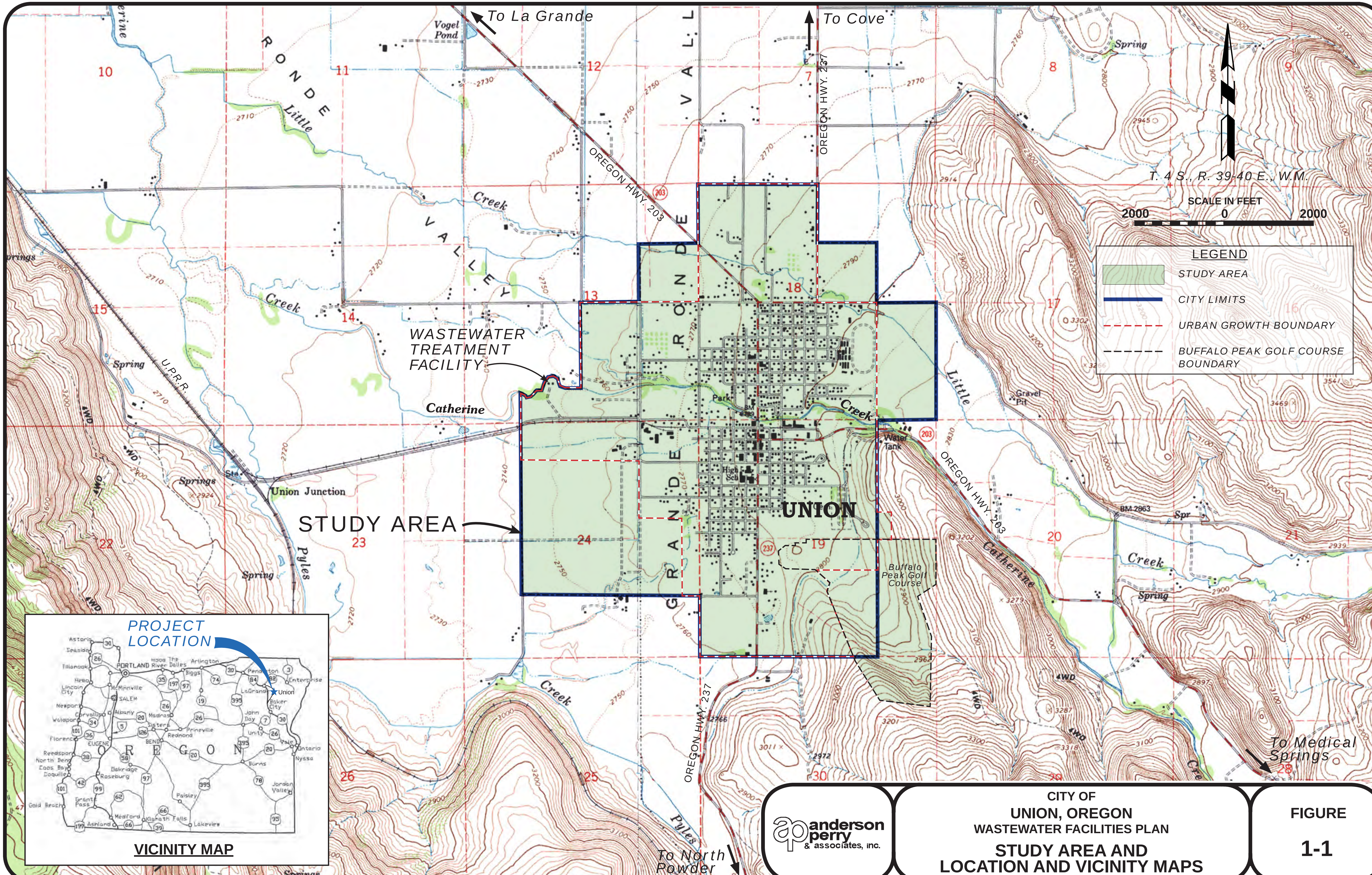
Land Use

City of Union Ordinance 337 governs land use. The current zoning in the City is shown on Figure 1-5. Five urban zones and four resource zones have been identified within the City limits: Residential, Industrial, General Commercial, Heavy Commercial, Commercial Amusement, Rural Residential, Farm Residential, Exclusive Farm Use, and Agricultural/Forest. Downtown Union consists of General Commercial and is surrounded by Residential, which makes up the majority of the City. Areas on the northeast and southwest corners of the City are Exclusive Farm Use. Industrial areas are located along an abandoned stretch of the Union Railroad of Oregon railroad track running east-west through the middle of the City. The abandoned mill site and the Eastern Oregon Agricultural Experimental Station constitute the majority of the industrial area.

Existing Wastewater System

The City of Union's WWTF and collection system were originally constructed in 1977. At that time, the community was well developed and relied on individual septic tanks and drainfields for wastewater disposal. In 1989, a rotating screen and a Parshall flume with an ultrasonic depth measuring device were added to the headworks. Major additions were completed in 2000. Since 2000, the collection system has been expanded several times to support new growth, including a subdivision on Century Drive. A general description of the wastewater system is provided hereafter.

The collection system is composed of approximately 90,000 lineal feet of gravity sewer pipe ranging from 6 inches to 14 inches in diameter, about 12,000 lineal feet of 4-inch and 10-inch pressure sewer pipe, one lift station, and manholes and cleanouts. The WWTF generally consists of headworks (screen, Parshall flume, and influent lift station), a primary clarifier, a submerged biological contactor, two rotating biological contactors, a secondary clarifier, primary and secondary anaerobic digesters, sludge drying beds, a chlorine contact basin, and effluent and impure water pumps. The treated effluent is discharged to Catherine Creek during the winter in accordance with the NPDES Permit and is pumped to the Buffalo Peak Golf Course during the summer. The treated effluent is stored in a pond at the golf course before being land-applied through an irrigation system to golf course turf. The WWTF and collection system are discussed in greater detail in Chapters 3 and 4.



CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
STUDY AREA AND
LOCATION AND VICINITY MAPS

anderson perry & associates, inc.

FIGURE
1-1

Job#482-38-020 Jul. 17, 2014 lbauer

N

0 300 600 1200 1800 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

SOILS MAP

FIGURE
1-2

Job# 482-38-020 Jul. 17, 2014 lbauer

U.S. Fish and Wildlife Service
National Wetlands Inventory

July 17, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

WETLANDS INVENTORY MAP

FIGURE 1-3

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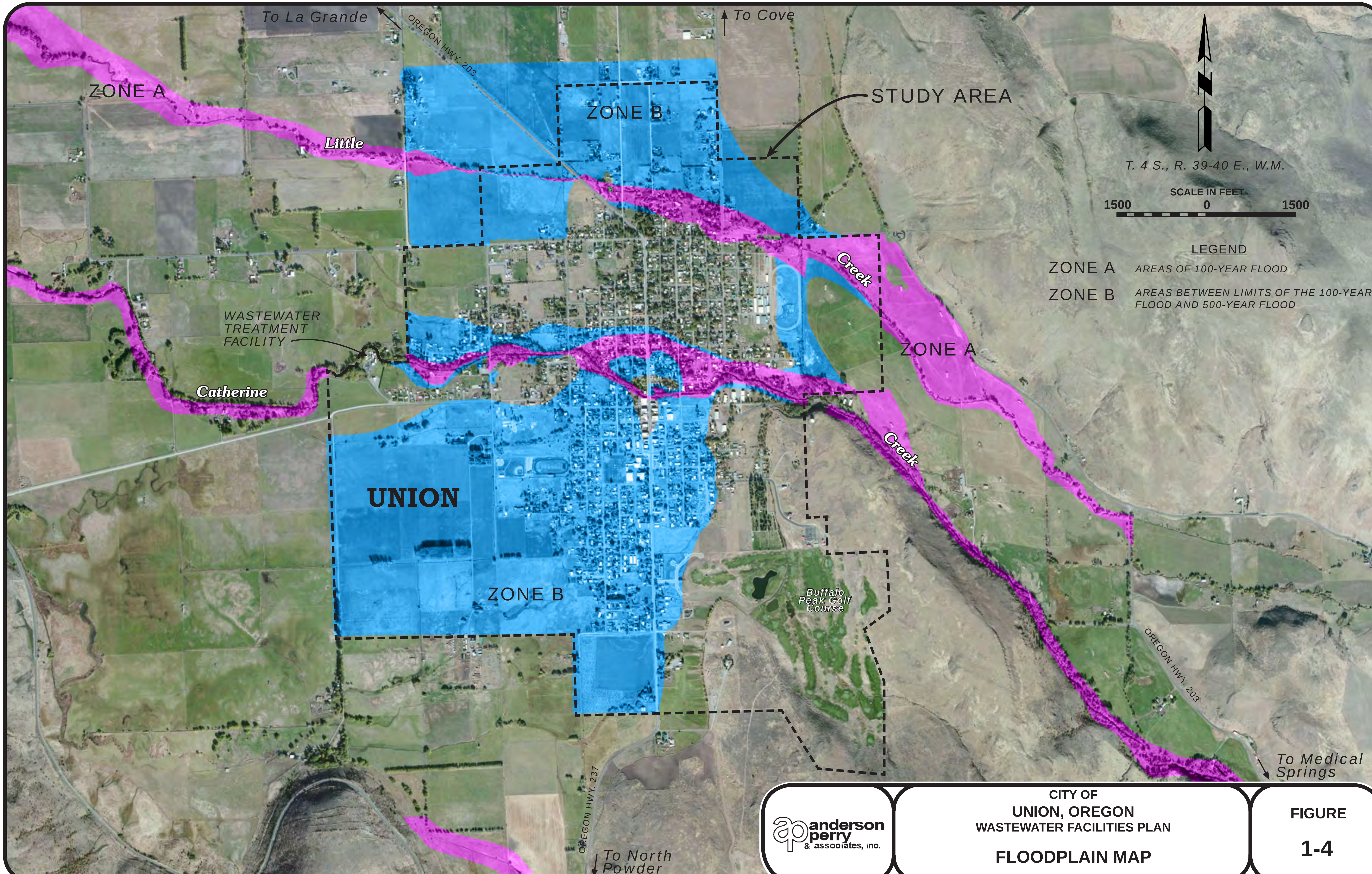

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

FLOODPLAIN MAP

FIGURE 1-4

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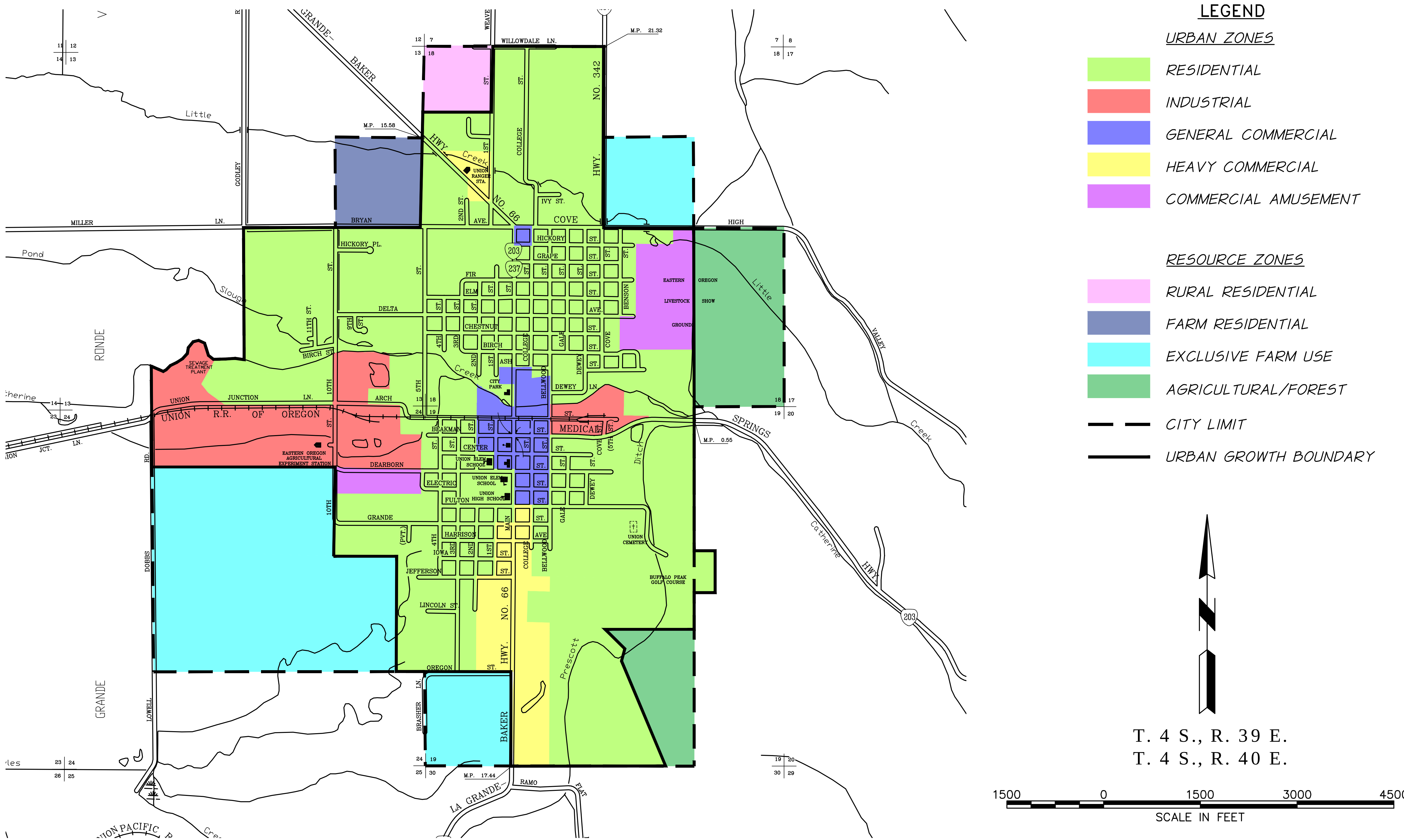

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ZONING MAP

FIGURE 1-5

Chapter 2 - Basic Planning and Design Data

General

This chapter presents the basic planning and design data necessary to evaluate the City of Union's existing wastewater collection, treatment, and disposal facilities. These data are used to determine the facilities' ability to serve the wastewater system needs of the City for the selected planning period, and form the basis for evaluating alternatives for required improvements. First, population information and year 2034 population projections for the City are presented. This is followed by a summary of the historical wastewater data and the year 2034 design criteria used for this Wastewater Facilities Plan (WWFP). Also, a discussion on treatment and regulatory agency requirements is provided.

Population

In order to estimate future wastewater system demands, population projections must be made. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates tempered by future expectations. Significant population fluctuations are typical in small communities, as demonstrated by the population history of the City of Union. The addition of a major business, industry, or recreational facility in the community can dramatically affect the population. This being the case, projecting increased population into the future is difficult based on the erratic nature of Union's population history. The large fluctuation in the City's population has been due, historically, to the instability of the timber industry.

The 2013 population of the City of Union is estimated to be 2,150. Past population trends for the City of Union, comparing data from 1960 through the present, have varied from a historic low of 1,490 in 1960, increasing to 2,062 in 1980, decreasing to 1,847 in 1990, and increasing to the current population. Historical populations for the City are discussed hereafter and shown on Chart 2-1.

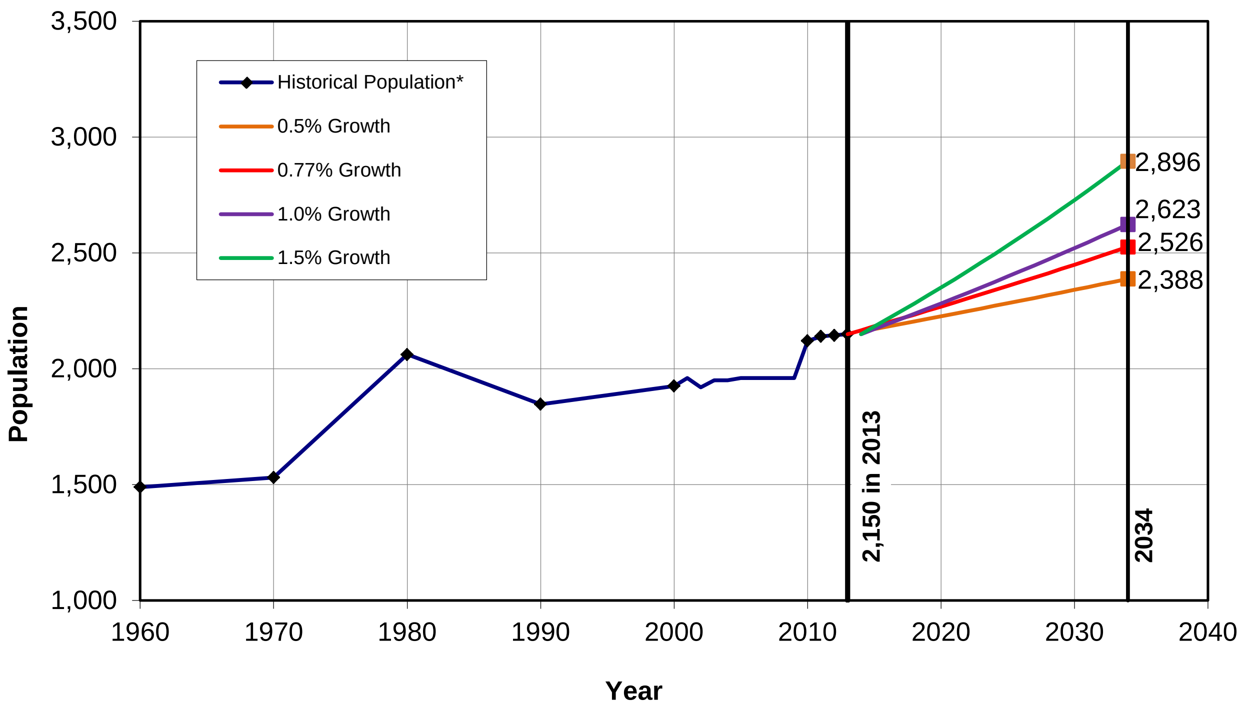
Population data for the City of Union were provided by the Center for Population Research and Census at Portland State University. This agency is the official source of population data available in Oregon between the official census data generated at the beginning of each decade. The University does not project population increases for individual cities within the state. In the 1997 update to the City's 1992 WWFP (Anderson Perry & Associates, Inc.), a year 2020 projected population of 3,000 was developed. This design population was determined by both the City's Strategic Plan Public Infrastructure Goals and the next highest process-limited capacity of the treatment plant after completion of proposed improvements. If realized, this design population would represent an average annual growth rate of 4.9 percent; however, based on historical data, this does not appear to accurately represent the population growth the City is experiencing.

In accordance with Oregon Revised Statutes (ORS) 195.025 and 195.036, Union County is responsible for establishing and maintaining population forecasts for the cities within its jurisdiction. The Department of Administrative Services' Office of Economic Analysis (OEA) is the main forecasting body for the State of Oregon and supplies population and employment projections for individual counties. OEA's 1997 Long Term Employment and Population Forecasts estimated an average annual growth rate in Union County of 0.39 percent for the 2000 to 2020 period. The County considered this estimate to be too low and, in cooperation with the State of Oregon's Land Conservation and Development Commission, prepared an independent population analysis and year 2020 forecast that was reviewed, revised, and adopted by ordinance. However, results of the forecast were appealed to the Land Use Board of Appeals where, after review, it was remanded to the County for revision. The County revised its forecast to coincide with OEA's new 2003 forecast and amended the ordinance in April 2003. The original Union County Population Analysis and 2020 Forecast was prepared by The Benkendorf Associates Corporation. The amended County forecast projected an average annual growth rate of 0.77 percent for the City of Union.

The population projections for the City as shown below (0.5, 0.77, 1.0, and 1.5 percent annual growth) would seem a realistic range of projections based on the data currently available.

CHART 2-1

Historical and Projected Population



** Population estimates from Portland State University's Center for Population Research and Census.*

Historical population information for the City of Union is as follows:

TABLE 2-1
Historical Population Data

Year	Population	Average Annual Growth/Decline Rate (%)[1]	Population Change
1960	1,490	--	--
1970	1,531	0.3	41
1980	2,062	3.0	531
1990	1,847	-1.1	-215
2000	1,926	0.4	79
2010	2,121	1.0	195
2011	2,140	0.9	19
2012	2,145	0.2	5
2013	2,150	0.2	5

[1] The time period between successive rows is variable. The average annual growth rate is calculated based on the time span between each successive population shown.

The average historical growth rate from 1960 to 2013 is 0.69 percent per year, which is close to the County's projection of 0.77 percent. The City Council of Union authorized a growth rate of 0.77 percent per year, which results in a projected population of 2,526 in the year 2034. For the purpose of this WWFP, the 2034 design population is rounded to 2,530. It should be recognized, however, that over the planning period of this study, the actual growth of the City of Union could either exceed or fall well below the projected design population.

Historical Wastewater Data

This section provides a summary of the historical wastewater quality data for the City of Union's wastewater treatment facility. Information provided in this section was obtained from the City's Discharge Monitoring Reports (DMRs). Some of the values were entered into the DMRs incorrectly. These values were discussed with the WWTF operator, and the values were corrected based on the operator's field notes. Influent flow values for April 2010 and March 2012 through September 2012 were inaccurate. These values were replaced with the corresponding effluent flow for the purposes of this WWFP.

A summary of the historical influent flows, including maximum daily flow, minimum daily flow, and the average monthly flow as estimated by the treatment plant operator and recorded on the DMRs, is shown on Figure 2-1. The recorded maximum daily flow, minimum daily flow, and average monthly flow were plotted for the period between January 2008 and December 2012. The year 2012 was the most recent complete year of data available when the analysis was performed. According to the data, the maximum daily flow occurred on May 16, 2011, and was 0.434 million gallons per day (MGD). The minimum daily flow occurred on July 4, 2008, and was 0.091 MGD. The average annual flow was 0.154 MGD during the same period, or about 72 gallons per capita per day (gpcd). The average monthly flows were used to create the water balances presented in Chapter 5, and the maximum daily flow was used in the evaluation of the Oregon Street Lift Station presented in Chapter 4.

Figure 2-2 summarizes historical influent and effluent five-day biochemical oxygen demand (BOD_5) concentrations as recorded on the DMRs during the period discussed above. As shown on Figure 2-2, the maximum, minimum, and average influent BOD_5 concentrations were 384 milligrams per liter (mg/L), 135 mg/L, and 267 mg/L, respectively. The maximum, minimum, and average effluent BOD_5

concentrations were 53 mg/L, 9 mg/L, and 20 mg/L, respectively. According to the DMR data, the wastewater treatment facility (WWTF) average BOD_5 mass loading was 330 lb/day and the facility removed an average of 92 percent of the BOD_5. Influent concentrations of BOD_5 and TSS were not sampled during July, August, and September of 2008 due to a misunderstanding of sampling requirements when effluent is discharged to the golf course ponds.

The historical influent and effluent total suspended solids (TSS) concentrations, as reported on the DMRs during the same period described above, are shown on Figure 2-3. As illustrated on the figure, the maximum, minimum, and average influent TSS concentrations were 450 mg/L, 40 mg/L, and 186 mg/L, respectively. The maximum, minimum, and average effluent TSS concentrations were 32 mg/L, 2 mg/L, and 7 mg/L, respectively. The WWTF's average TSS mass loading was approximately 229 pounds per day (lb/day). According to the data, the City's secondary wastewater facility achieved an average TSS removal of 96 percent, which is well above the required 85 percent monthly average.

Figure 2-4 provides a summary of the historical flow and loading data discussed above. These data have been analyzed for the purpose of establishing the future design criteria used in the evaluation of the WWTF effluent reuse alternatives presented in Chapter 5.

Table 2-2 shows a summary of the domestic influent flow analysis for specific flow components of interest. The flow components have been separated into dry weather flow and wet weather flow categories.

TABLE 2-2

Influent Flow Analysis Summary[1]

	2008	2009	2010	2011	2012
Dry Weather Flows (MGD) Six Low Wastewater Flow Months					
Dry Weather Average Flow[2]	0.136	0.146	0.138	0.145	0.138
Dry Weather Maximum Daily Flow[3]	0.217 (7/5)	0.188 (10/22)	0.170 (2/7)	0.171 (3/27)	0.180 (4/27)
Dry Weather Minimum Daily Flow[4]	0.091 (7/4)	0.118 (9/23)	0.119 (4/15)	0.121 (10/13)	0.114 (11/6)
Dry Weather Maximum Month Average Flow[5]	0.147 (Mar/May)	0.154 (Mar)	0.142 (Feb)	0.153 (Mar)	0.145 (Apr)
Wet Weather Flows (MGD) Six High Wastewater Flow Months					
Wet Weather Average Flow[2]	0.152	0.162	0.159	0.179	0.152
Wet Weather Maximum Daily Flow[3]	0.237 (6/23)	0.239 (5/29)	0.266 (6/6)	0.434 (5/16)	0.201 (7/16)
Wet Weather Minimum Daily Flow[4]	0.094 (6/28)	0.134 (12/2)	0.122 (11/5)	0.142 (12/16)	0.131 (1/30)
Wet Weather Maximum Month Average Flow[5]	0.161 (Jan)	0.167 (Jan, May, Dec)	0.194 (Jun)	0.206 (Jun)	0.156 (Jun)

[1] For April 2010 and March 2012 through September 2012, effluent flows were used due to inaccurate influent flow data.

[2] Average flow during six low or high wastewater flow months.

[3] Maximum daily flow during six low or high wastewater flow months. Refer to Table 2-3 for a definition of maximum daily flow.

[4] Minimum daily flow during six low or high wastewater flow months. Refer to Table 2-3 for a definition of minimum daily flow.

[5] Maximum month average flow during six low or high wastewater flow months.

Table 2-3 summarizes the City's DMR data. Included in the summary are minimum, maximum, and average monthly influent and effluent flows. Additionally, Table 2-3 presents the historical influent and effluent BOD_5, TSS concentration, and mass loading data.

TABLE 2-3

Summary of Historical Wastewater Data

	Influent	Effluent	
Flow Component			
Maximum Daily Flow (MGD)[1]		0.434	5/16/2011
Minimum Daily Flow (MGD)[2]		0.091	7/4/2008
Average Annual Flow (MGD)[3]		0.154	
Loading Component			
Maximum Average BOD_5 (mg/L)[4]	338	31	
Minimum Average BOD_5 (mg/L)[5]	191	12	
Average BOD_5 (mg/L)[6]	267	20	
Average BOD_5 (lb/day)[6]	330	26	
Maximum Average TSS (mg/L)[7]	314	24	
Minimum Average TSS (mg/L)[8]	117	3	
Average TSS (mg/L)[9]	186	7	
Average TSS (lb/day)[9]	229	8	

Flow components are based on the DMRs for the period of January 2008 to December 2012.

[1]Maximum daily flow is the maximum flow that occurred over a 24-hour period.

[2]Minimum daily flow is the minimum flow rate that occurred over a 24-hour period.

[3]Average annual flow (AAF) is the average flow rate occurring over a 24-hour period based on the total annual flow (i.e., total annual flow ÷ 365 days). The design AAF is the average of all of the average annual flows for each year analyzed.

[4]Maximum average BOD_5 is the maximum average monthly five-day biochemical oxygen demand (BOD) concentration.

[5]Minimum average BOD_5 is the minimum average monthly five-day BOD.

[6]Average BOD_5 is the average five-day BOD (concentration and mass flux).

[7]Maximum average TSS is the maximum average monthly total suspended solids.

[8]Minimum average TSS is the minimum average monthly total suspended solids.

[9]Average TSS is the average total suspended solids (concentration and mass flux).

The historical wastewater flows for the City of Union are lower than expected. Data collected from many domestic wastewater systems similar to Union's indicate that average annual flows usually range from 80 to 120 gpcd. The typical average annual flow is 100 gpcd. Union's average annual flow is approximately 72 gpcd. The lower than expected average annual per capita flow could indicate the City does not have a significant amount of infiltration and inflow (I/I) in the collection system. The average annual flow was evaluated by subtracting the average base flow from the average annual flow, which determines how much flow contribution may be attributed to I/I.

Historical BOD_5 and TSS mass loadings appear to be below average when compared with other domestic wastewater systems similar to Union's. Typical BOD_5 and TSS per capita contributions range from 0.15 to 0.25 lb/cap/day with a normal contribution of approximately 0.2 lb/cap/day. Union's BOD_5 and TSS per capita loadings are in the range of 0.15 lb/cap/day and 0.11 lb/cap/day, respectively. While BOD_5 loadings are close to average, TSS loadings are well below average. For design and evaluation purposes, Union's per capita mass loading for BOD_5 and TSS will be used.

Design Criteria

Figure 2-5 summarizes basic wastewater design criteria developed for this WWFP. Shown on Figure 2-5 are the existing and year 2034 design population, design flows, and expected future influent wastewater strength characteristics. This figure should be referred to during the review of subsequent chapters of this WWFP as it provides key information upon which wastewater system improvement alternatives were developed and evaluated.

Wastewater Flow Projections

The total future anticipated domestic wastewater flows (average annual, average dry weather, average wet weather, maximum monthly, and maximum daily) were projected by adding the projected average base flow to the respective estimated I/I components for each flow. The current average base flow is defined as the daily minimum flow recorded each year averaged over the five years of available data. Based on the data, the current average base flow is 0.113 MGD or about 53 gpcd. The year 2034 average base flow is estimated using the current per capita base flow of 53 gpcd applied to the projected design population of 2,530. The average contribution from I/I for each flow component (average annual, average dry weather, average wet weather, maximum monthly, and maximum daily) was estimated by taking the difference of each of the current total flow values and the current base flow (examples: average annual I/I contribution = current average annual flow - base flow = 0.154 MGD - 0.113 MGD = 0.041 MGD; average dry weather I/I contribution = current average dry weather flow - base flow = 0.141 MGD - 0.113 MGD = 0.028 MGD; etc.).

For projection purposes, it was assumed that the I/I flows currently being experienced in the system would remain constant throughout the 20-year planning period. Year 2034 I/I flows were not decreased to account for potential future reductions due to collection system improvements, because the nature of I/I corrective work in general is such that it is difficult to accurately predict future success.

Mass Loadings

The domestic design mass loadings (BOD_5, TSS, and total Kjeldahl nitrogen [TKN]) to the wastewater treatment facility were estimated using the design average annual per capita BOD_5, TSS, and TKN contributions (refer to Historical Wastewater Data earlier in this chapter) projected to the end of the 20-year planning period using the year 2034 design population of 2,530 (i.e., mass loading [BOD_5, TSS, or TKN] = contribution [BOD_5, TSS, or TKN], lb/cap/day x 2,530). Using the design mass loading of 0.15 lb/cap/day for BOD_5, 0.11 lb/cap/day for TSS, and 0.02 lb/cap/day for TKN yields a year 2034 domestic mass loading of 388 lb/day of BOD_5, 269 lb/day of TSS, and 60 lb/day of TKN.

Treatment and Regulatory Requirements

Liquid Treatment

The City's existing WWTF provides secondary treatment of the City's domestic wastewater. Discharge of treated effluent from the WWTF is regulated under a National Pollutant Discharge Elimination System (NPDES) Permit. The NPDES Permit (No. 101624), issued in 2004, is authorized and administered by the Oregon Department of Environmental Quality (DEQ), and the Permit expired on October 31, 2009. An application for renewal was made by the City to the DEQ on April 30, 2009. Although the Permit has expired, pursuant to Oregon Administrative Rules (OARs), Chapter 340, Division 45 (340-045-0040), the conditions outlined in the existing 2004 permit apply until a new permit is issued.

Current effluent limitations for the City of Union's WWTF are given in the City's 2004 NPDES Permit (refer to Appendix B for a copy of the existing NPDES Permit). For Treated Effluent Outfall 001 (discharge into Catherine Creek at river mile (RM) 16.8, which enters the Grande Ronde River at RM 144), limitations are based on the water quality standards for waters of the Grande Ronde Basin as established in OAR 340-041-0156, and the permitted facility average dry weather design flow of 0.365 MGD. Reclaimed Wastewater Outfall 002 (recycled water for irrigation of the golf course fairways), is regulated by "Recycled Water Use," OAR 340-055.

Solids Treatment

As required by the Clean Water Act Amendments of 1987, the U.S. Environmental Protection Agency (EPA) developed a regulation to protect public health and the environment from reasonably anticipated adverse effects of certain pollutants that might be present in municipal sewage biosolids. This regulation, *The Standards for the Use or Disposal of Sewage Biosolids* (Code of Federal Regulations [CFR], Title 40, Part 503), was published in the Federal Register (58 FR 9248 to 9404) on February 19, 1993, and became effective on March 22, 1993. The regulations that govern recycling and disposal of sewage biosolids in Oregon are contained in OAR 340-050 and follow 40 CFR, Part 503.

The provisions of the Part 503 Rule are consistent with EPA's policy of promoting beneficial uses of biosolids (refer to 49 FR 24358, June 12, 1984, for further information). Land application takes advantage of the soil conditioning and fertilizing properties of biosolids.

The Part 503 Rule includes five subparts: Subpart A - General Provisions, Subpart B - Requirements for Land Application, Subpart C - Surface Disposal, Subpart D - Pathogen and Vector Attraction Reduction, and Subpart E - Incineration. For each of the three use or disposal options (land application, surface disposal, and incineration), a Part 503 standard includes general requirements, pollutant limits, management practices, operational standards and requirements for frequency of monitoring, recordkeeping, and reporting. Since the City of Union currently beneficially uses their biosolids through land application, the only regulations pertaining to the City are Subparts A, B, and D, as Subparts C and E pertain to disposal and incineration of biosolids.

Part 503 separates biosolids into two classifications related to pathogen densities contained within the biosolids at the time of land application: Class A and Class B. Class A biosolids have much more stringent requirements related to pathogen density levels than do Class B biosolids. Biosolids meeting Class A requirements can be sold in bags or bulk and applied on public areas such as lawns and home gardens. Class B biosolids are restricted to bulk application to agricultural land, rangeland, forest, public contact sites, or reclamation sites. Appendix C of this WWFP contains excerpts from an EPA Guidance Document entitled *A Plain English Guide to the EPA Part 503 Biosolids Rule* (EPA/832/R-93/003), which more fully explains the Part 503 regulations. Appendix D includes the City's current DEQ-approved Biosolids Management Plan.

Other regulatory agency requirements specific to the feasible wastewater system improvements alternatives are discussed in subsequent chapters.

Future Regulations

The DEQ completed a preliminary Reasonable Potential Analysis (RPA) for the concentration of ammonia in the WWTF discharge into Catherine Creek. The RPA was based on ammonia data collected at the WWTF during 2013. Based on the RPA, the DEQ has provided anticipated ammonia limits that will likely be incorporated into the City's next NPDES Permit. The historical ammonia data and the ammonia limits are shown on Table 2-4. The ammonia limits depend on either fish spawning or rearing season. Although the WWTF is achieving 68 percent ammonia removal on average, it is still not able to meet the limits that are likely going to be imposed in the upcoming renewed permit.

TABLE 2-4
Ammonia Summary

	Ammonia Direct (as Nitrogen), mg/L			DEQ Proposed Limits, Rearing Season (June 16 - September 30)		DEQ Proposed Limits, Spawning Season (October 1 - June 15)		Proposed Ammonia Limit Exceeded (Yes/No)	
Date	**Influent**	**Effluent**	**Catherine Creek**	**mg/L Monthly**	**mg/L Daily**	**mg/L Monthly**	**mg/L Daily**	**Monthly**	**Daily**
November 26, 2012*		12.20		5.9	8.6	4.2	6.2	Yes	Yes
December 4, 2012*		12.30		5.9	8.6	4.2	6.2	Yes	Yes
December 25, 2012*		8.67		5.9	8.6	4.2	6.2	Yes	Yes
January 1, 2013*	25.60	9.45		5.9	8.6	4.2	6.2	Yes	Yes
January 9, 2013*	21.90	7.97		5.9	8.6	4.2	6.2	Yes	Yes
February 3, 2013*	24.10	8.59		5.9	8.6	4.2	6.2	Yes	Yes
February 3, 2013+	29.30	9.42		5.9	8.6	4.2	6.2	Yes	Yes
June 20, 2013+	19.90	12.70	0.04	5.9	8.6	4.2	6.2	Yes	Yes
June 24, 2013+'	34.80	10.30	0.04	5.9	8.6	4.2	6.2	Yes	Yes
July 2, 2013+	23.50	12.70	0.04	5.9	8.6	4.2	6.2	Yes	Yes
July 10, 2013+	35.30	11.40	0.04	5.9	8.6	4.2	6.2	Yes	Yes
July 13, 2013+	45.10	12.70	0.04	5.9	8.6	4.2	6.2	Yes	Yes
August 1, 2013+	27.90	8.30	0.04	5.9	8.6	4.2	6.2	Yes	Yes
August 21, 2013+	45.40	8.75	0.04	5.9	8.6	4.2	6.2	Yes	Yes
September 26, 2013+	43.80	6.81	0.04	5.9	8.6	4.2	6.2	Yes	Yes
Maximum	45.40	12.70	0.04						
Minimum	19.90	6.81	0.04						
Average	31.38	10.15	0.04						

All Catherine Creek samples taken were <0.04 mg/L.

*Samples from the dates denoted with * were processed by Neilson Research Corporation.*

Samples from the dates denoted with + were processed by Analytical Laboratories, Inc.

Design Capacity

The three components of a wastewater system (collection system, treatment system, and treated effluent discharge system) all have specific design capacities. The DEQ requires certain constraints to be met by the various system components to ensure appropriate measures are in place to protect public health and allow efficient operation of a wastewater system.

Collection System

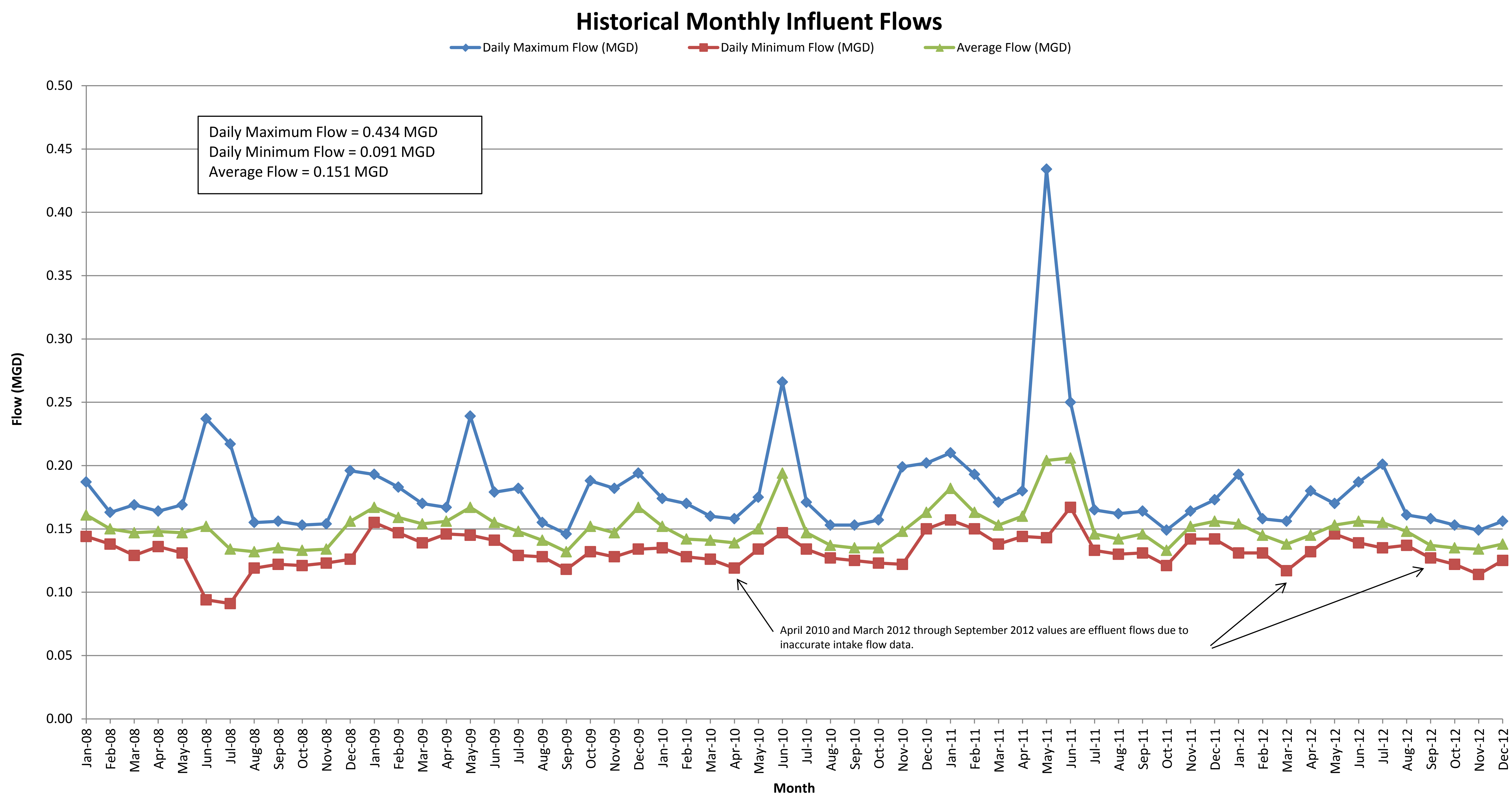
In general, a collection system's piping (sewer) is designed to flow full only under peak flow conditions. It is general practice to design sewer piping such that sufficient velocity is developed regularly to flush out any solids that may have been deposited during low flow periods. The usual practice is to design the slopes for gravity sanitary sewers to ensure a minimum velocity of 2 feet per second when flowing one-half full or full. In order to accomplish this, the minimum design slope for an 8-inch gravity sewer pipe is about 0.004 feet per foot. Additionally, it is desirable to design a gravity sewer to flow one-half full or less under average design flow conditions and not surcharge under peak flow conditions.

Other components of a collection system that must be designed in accordance with DEQ standards are wastewater pump stations. The *Oregon Standards for Design and Construction of Wastewater Pump Stations* (DEQ, May 2001) contain detailed requirements related to these facilities. The basic requirements of these standards are that the wastewater pump station must have the ability to pass the peak hourly flow rate with the largest pump out of service, have a secondary source of electrical power, and have a complete alarm system. The collection system is discussed in greater detail in Chapter 4.

Wastewater Treatment and Effluent Discharge

Wastewater treatment design capacity and conditions vary depending on the receiving water body or land area to which treated waste will be discharged. Therefore, wastewater treatment and effluent discharge design criteria are inherently linked.

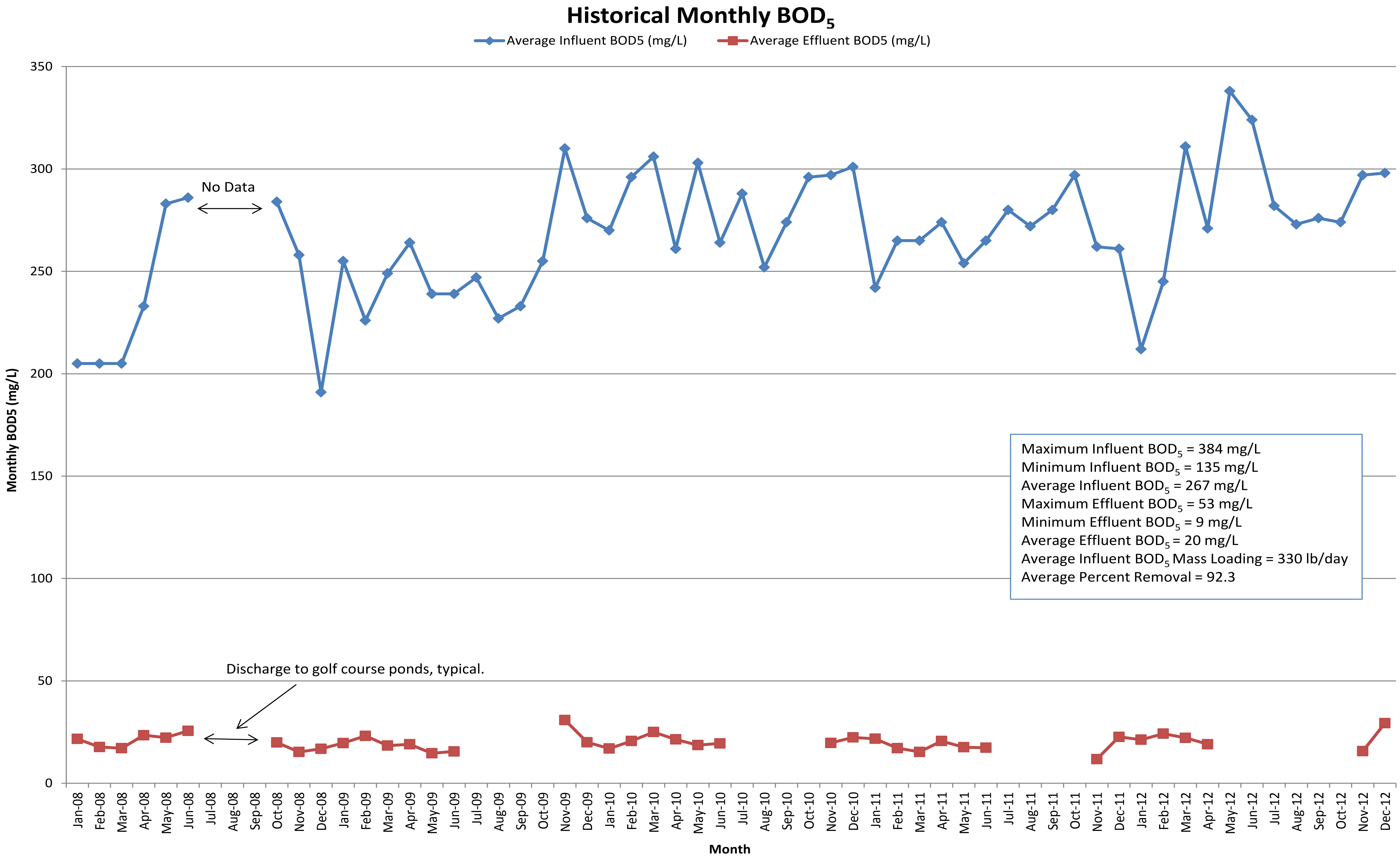
The treatment and monitoring requirements for use of recycled water (or water used for irrigation) are described in OAR 340-055. These OARs list the methods, procedures, and restrictions required for the use of recycled waters for beneficial uses. These OARs provide definitions of water quality-related terms, discuss policies and guidelines generally applicable across the state, and discuss minimum design criteria for waste treatment and control facilities.



anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL MONTHLY
INFLUENT FLOWS

FIGURE
2-1



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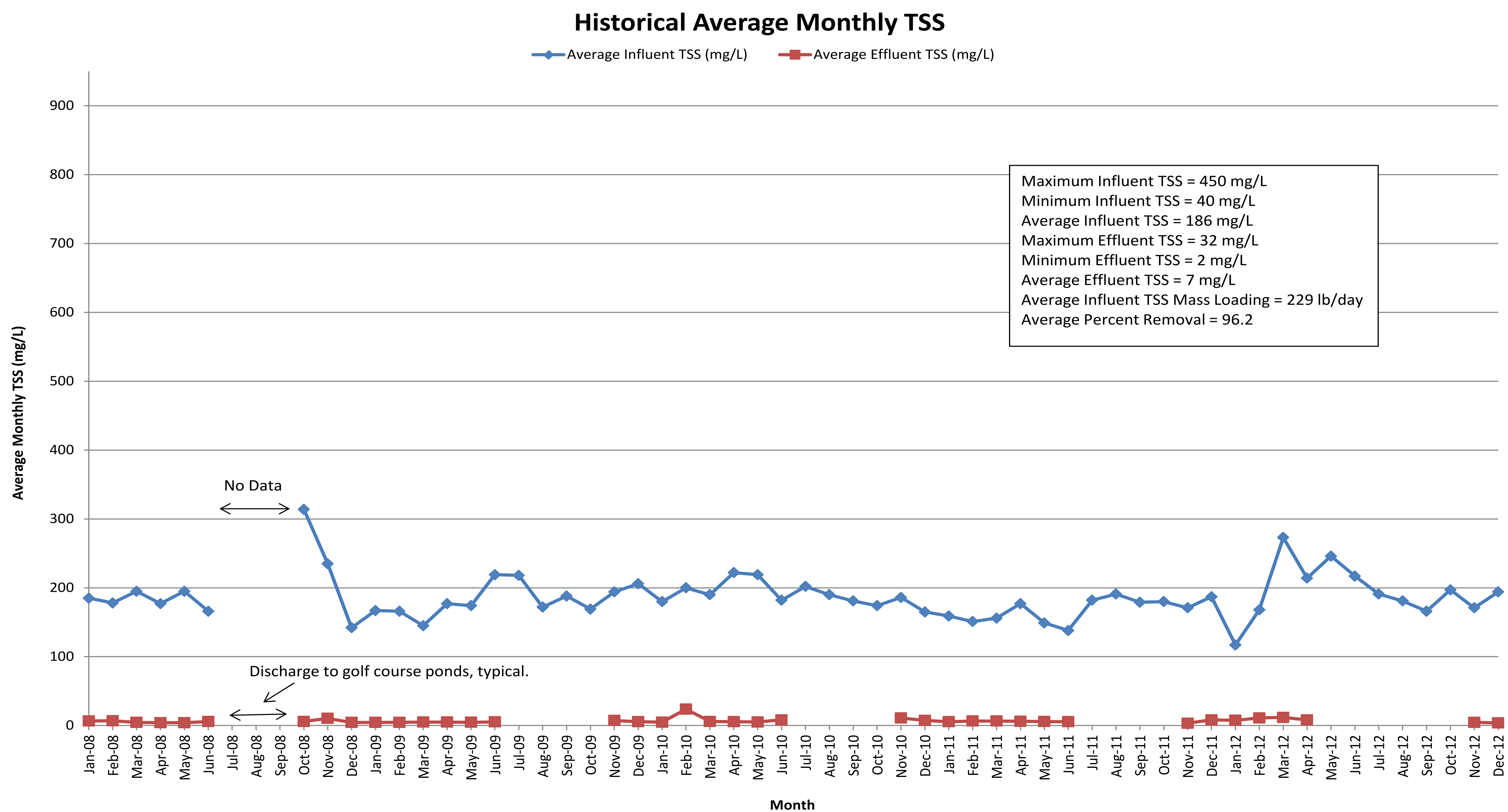
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL AVERAGE
MONTHLY BOD_5

FIGURE
2-2



anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
HISTORICAL AVERAGE
MONTHLY TSS

FIGURE
2-3

City of Union, Oregon
Summary of Historical Wastewater Data
January 2008 through December 2012

	Influent																Effluent						
Date	Daily Maximum Flow (MGD)	Daily Minimum Flow (MGD)	Average Flow (MGD)	Total Monthly Flow (mg)	Daily Maximum BOD_5 (mg/L)	Daily Minimum BOD_5 (mg/L)	Average BOD_5 (mg/L)	Daily Maximum BOD_5 Loading (lb/day)	Daily Minimum BOD_5 Loading (lb/day)	Average BOD_5 Loading (lb/day)	Daily Maximum TSS (mg/L)	Daily Minimum TSS (mg/L)	Average TSS (mg/L)	Daily Maximum TSS Loading (lb/day)	Daily Minimum TSS Loading (lb/day)	Average TSS Loading (lb/day)	Daily Maximum Temperature (°C)	Daily Minimum Temperature (°C)	Average Temperature (°C)	Daily Maximum Flow (MGD)	Daily Minimum Flow (MGD)	Average Flow (MGD)	Total Monthly Flow (mg)
Jan-08	0.187	0.144	0.161	4.999	269	141	205	393	193	282	247	134	185	325	184	253	10.10	7.0	8.5	0.205	0.153	0.172	5.332
Feb-08	0.163	0.138	0.150	4.358	225	186	205	261	234	250	194	151	178	239	190	218	11.30	7.7	9.5	0.246	0.140	0.171	4.945
Mar-08	0.169	0.129	0.147	4.571	242	179	205	315	213	247	217	178	195	268	211	233	11.20	9.1	10.3	0.165	0.132	0.147	4.557
Apr-08	0.164	0.136	0.148	4.450	275	193	233	434	234	287	198	154	177	248	197	217	12.30	9.0	10.9	0.178	0.137	0.154	4.610
May-08	0.169	0.131	0.147	4.564	311	260	283	374	395	343	227	166	195	288	186	238	15.30	10.9	13.1	0.178	0.138	0.156	4.844
Jun-08	0.237	0.094	0.152	4.549	311	258	286	434	353	382	186	153	166	254	183	222	15.60	12.3	13.8	0.185	0.139	0.160	4.810
Jul-08	0.217	0.091	0.134	4.154													17.20	14.8	15.8	0.189	0.148	0.165	5.121
Aug-08	0.155	0.119	0.132	4.103													18.30	15.9	16.9	0.174	0.136	0.154	4.776
Sep-08	0.156	0.122	0.135	4.051													17.30	15.2	16.2	0.201	0.140	0.160	4.785
Oct-08	0.153	0.121	0.133	4.109	290	275	284	322	284	305	317	307	314	357	325	337	17.30	12.8	14.3	0.218	0.072	0.139	4.317
Nov-08	0.154	0.123	0.134	4.109	291	227	258	321	266	287	315	194	235	347	225	261	14.10	11.3	13.0	0.166	0.124	0.144	4.324
Dec-08	0.196	0.126	0.156	4.824	250	162	191	277	186	238	203	111	142	230	136	178	13.20	7.6	10.6	0.192	0.136	0.164	5.072
Jan-09	0.193	0.155	0.167	5.163	282	214	255	402	315	357	186	133	167	251	195	234	11.80	7.0	9.4	0.211	0.161	0.175	5.418
Feb-09	0.183	0.147	0.159	4.458	278	205	226	352	260	294	176	144	166	246	179	217	10.80	8.2	9.4	0.216	0.150	0.169	4.731
Mar-09	0.170	0.139	0.154	4.771	267	236	249	334	276	313	194	49	145	256	57	185	11.00	8.3	9.8	0.185	0.148	0.162	5.033
Apr-09	0.167	0.146	0.156	4.665	300	231	264	391	305	341	216	153	177	263	204	228	12.60	9.6	11.1	0.172	0.148	0.160	4.788
May-09	0.239	0.145	0.167	5.177	262	223	239	364	292	320	201	137	174	305	176	235	14.50	10.9	12.7	0.201	0.155	0.171	5.305
Jun-09	0.179	0.141	0.155	4.652	262	207	239	329	262	302	374	131	219	465	166	275	15.80	14.0	14.8	0.189	0.148	0.165	4.947
Jul-09	0.182	0.129	0.148	4.576	250	243	247	331	266	292	228	209	218	284	225	257	18.30	15.4	16.8	0.210	0.149	0.172	5.321
Aug-09	0.155	0.128	0.141	4.381	241	198	227	279	228	262	189	142	172	225	163	198	18.70	16.6	17.8	0.179	0.144	0.167	5.190
Sep-09	0.146	0.118	0.132	3.961	262	194	233	295	216	255	223	164	188	251	171	207	19.30	16.1	17.7	0.235	0.138	0.160	4.789
Oct-09	0.188	0.132	0.152	4.720	326	208	255	381	264	327	206	127	169	242	161	216	16.80	13.0	15.3	0.194	0.135	0.158	4.887
Nov-09	0.182	0.128	0.147	4.400	334	285	310	401	342	376	214	185	194	257	224	236	14.40	11.0	12.8	0.170	0.128	0.149	4.472
Dec-09	0.194	0.134	0.167	5.178	345	219	276	544	318	401	311	145	206	490	198	297	13.30	9.0	11.1	0.194	0.133	0.161	4.984
Jan-10	0.174	0.135	0.152	4.717	292	241	270	370	282	339	208	145	180	267	200	225	11.80	8.6	10.6	0.171	0.135	0.150	4.656
Feb-10	0.170	0.128	0.142	10.858	332	276	296	354	308	334	227	179	200	243	201	225	11.40	9.3	10.5	0.154	0.128	0.130	3.898
Mar-10	0.160	0.126	0.141	4.376	342	289	306	380	331	350	232	157	190	273	189	217	12.00	10.1	11.0	0.148	0.118	0.133	4.133
Apr-10	0.158	0.119	0.139	3.802	288	225	261	343	251	300	395	134	222	481	150	259	13.20	9.9	11.8	0.158	0.119	0.139	4.179
May-10	0.175	0.134	0.150	4.638	379	264	303	478	320	370	271	176	219	341	222	266	14.50	10.8	12.5	0.167	0.128	0.145	4.508
Jun-10	0.266	0.147	0.194	5.821	312	220	264	424	301	385	223	147	182	306	201	268	15.20	13.0	14.1	0.262	0.122	0.184	5.529
Jul-10	0.171	0.134	0.147	4.551	343	224	288	397	319	358	255	160	202	305	204	253	17.50	14.5	16.0	0.184	0.138	0.158	4.903
Aug-10	0.153	0.127	0.137	4.253	273	223	252	319	254	283	242	142	190	283	162	214	18.20	16.6	17.3	0.163	0.135	0.146	4.526
Sep-10	0.153	0.125	0.135	4.042	353	224	274	368	239	301	231	147	181	241	161	198	18.00	15.6	16.9	0.159	0.134	0.145	4.359
Oct-10	0.157	0.123	0.135	4.199	349	254	296	393	275	331	219	145	174	247	157	194	17.30	13.6	15.7	0.170	0.124	0.145	4.490
Nov-10	0.199	0.122	0.148	4.437	335	278	297	436	287	347	229	143	186	296	183	215	15.40	9.9	13.2	0.227	0.123	0.149	4.469
Dec-10	0.202	0.150	0.163	5.063	323	284	301	407	396	400	216	88	165	297	111	220	13.20	1.8	11.2	0.203	0.148	0.164	5.094
Jan-11	0.210	0.157	0.182	5.635	291	197	242	449	334	373	173	142	159	268	219	244	11.60	8.2	10.1	0.207	0.143	0.172	5.346
Feb-11	0.193	0.150	0.163	4.558	286	251	265	363	331	347	166	137	151	223	183	198	19.90	8.3	10.4	0.173	0.140	0.151	4.241
Mar-11	0.171	0.138	0.153	4.736	292	226	265	409	303	348	174	127	156	234	171	204	11.60	9.7	10.5	0.179	0.136	0.156	4.827
Apr-11	0.180	0.144	0.160	4.797	294	241	274	405	326	375	191	154	177	268	208	242	11.80	9.3	10.7	0.193	0.150	0.166	4.991
May-11	0.434	0.143	0.204	6.310	298	208	254	502	356	417	181	79	149	344	175	240	13.20	10.5	11.8	0.468	0.140	0.203	6.281
Jun-11	0.250	0.167	0.206	6.180	286	223	265	525	379	443	169	109	138	251	206	229	14.90	12.0	13.3	0.313	0.172	0.224	6.727
Jul-11	0.165	0.133	0.146	4.528	309	236	280	386	293	346	192	171	182	226	209	221	17.10	13.9	15.5	0.178	0.138	0.158	4.904
Aug-11	0.162	0.130	0.142	4.409	291	250	272	359	288	327	219	166	191	259	201	229	18.10	16.3	17.1	0.192	0.140	0.155	4.812
Sep-11	0.164	0.131	0.146	4.371	303	266	280	380	297	330	203	162	179	222	191	210	18.10	15.4	16.6	0.179	0.132	0.159	4.758
Oct-11	0.149	0.121	0.133	4.119	337	270	297	373	279	326	225	97	180	250	113	195	17.50	13.6	15.3	0.157	0.110	0.139	4.310
Nov-11	0.164	0.142	0.152	4.561	275	250	262	351	298	330	205	143	171	251	191	214	13.80	10.6	12.2	0.215	0.080	0.143	4.287
Dec-11	0.173	0.142	0.156	4.847	295	210	261	394	269	342	203	157	187	262	213	244	12.70	8.3	10.5	0.227	0.117	0.162	5.019
Jan-12	0.193	0.131	0.154	4.763	273	135	212	326	173	260	191	40	117	241	61	142	11.20	8.7	10.1	0.178	0.099	0.150	4.659
Feb-12	0.158	0.131	0.145	4.201	257	229	245	324	288	302	179	147	168	215	191	206	11.90	8.6	10.0	0.159	0.135	0.143	4.158
Mar-12	0.156	0.117	0.138	3.651	347	267	311	385	310	351	418	153	273	464	177	307	11.60	7.8	10.4	0.156	0.117	0.138	4.290
Apr-12	0.180	0.132	0.145	3.273	208	213	271	298	172	235	257	162	214	231	131	186	13.70	9.4	11.9	0.180	0.132	0.145	4.346
May-12	0.170	0.146	0.153	4.517	384	286	338	494	334	418	450	112	246	593	149	307	14.30	11.4	12.7	0.170	0.146	0.153	4.740
Jun-12	0.187	0.139	0.156	4.674	379	296	324	468	368	415	253	171	217	308	211	279	15.80	12.9	14.2	0.187	0.139	0.156	6.114
Jul-12	0.201	0.135	0.155	4.780	305	252	282	385	317	356	223	159	191	275	172	226	17.90	15.0	16.6	0.201	0.135	0.155	4.805
Aug-12	0.161	0.137	0.148	4.156	313	239	273	379	293	334	204	146	181	247	179	222	18.70	15.6	17.3	0.161	0.137	0.148	4.577
Sep-12	0.158	0.127	0.137	5.342	377	230	276	452	255	315	178	154	166	197	175	188	18.00	15.8	16.9	0.158	0.127	0.137	4.104
Oct-12	0.153	0.122	0.135	4.185	323	219	274	340	243	293	228	171	197	240	190	211	16.90	12.5	14.8	0.153	0.122	0.135	4.177
Nov-12	0.149	0.114	0.134	4.024	347	261	297	411	272	322	205	121	171	208	134	183	14.90	10.2	13.1	0.155	0.115	0.129	3.877
Dec-12	0.156	0.125	0.138	4.276	327	274	298	371	302	339	215	156	194	256	174	221	12.90	7.1	10.8	0.141	0.113	0.131	4.047
Maximum	0.434	0.167	0.206	10.858	384	296	338	544	396	443	450	307	314	593	325	337	19.90	16.6	17.8	0.468	0.172	0.224	6.727
Minimum	0.146	0.091	0.132	3.273	208	135	191	261	172	235	166	40	117	197	57	142	10.10	1.8	8.5	0.141	0.072	0.129	3.877
Average	0.181	0.132	0.151	4.677	302	233	267	381	287	330	229	147	186	284	181	229	14.77	11.3	13.1	0.192	0.133	0.156	4.775

Notes: Some values entered into the Discharge Monitoring Reports incorrectly were replaced with correct values based on a telephone conversation with Ralph Riomondo, City of Union Wastewater Operator, January 15, 2014.

Influent flow values for April 2010 and March 2012 through September 2012 were inaccurate and were replaced with the corresponding effluent flow for the purpose of this WWFP.

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF HISTORICAL WASTEWATER DATA

FIGURE 2-4

City of Union, Oregon
Summary of Historical Wastewater Data
January 2008 through December 2012

Effluent																									
Daily Maximum BOD_5 (mg/L)	Daily Minimum BOD_5 (mg/L)	Average BOD_5 (mg/L)	BOD_5 Percent Removal	Daily Maximum BOD_5 Loading (lb/day)	Daily Minimum BOD_5 Loading (lb/day)	Average BOD_5 Loading (lb/day)	Daily Maximum TSS (mg/L)	Daily Minimum TSS (mg/L)	Average TSS (mg/L)	TSS Percent Removal	Daily Maximum TSS Loading (lb/day)	Daily Minimum TSS Loading (lb/day)	Average TSS Loading (lb/day)	Daily Maximum pH	Daily Minimum pH	Average Total Chlorine Used (gal)	Daily Maximum Total Chlorine Residual (percent)	Daily Minimum Total Chlorine Residual (percent)	Average Total Chlorine Residual (percent)	Daily Maximum Sodium Bisulfite (lb)	Daily Minimum Sodium Bisulfite (lb)	Average Sodium Bisulfite (lb)	Daily Maximum Sodium Thiosulfite (lb)	Daily Minimum Sodium Thiosulfate (lb)	Average Sodium Thiosulfate (lb)
23.0	18.4	21.7	89.4	33.62	25.68	30.37	8.50	5.50	6.60	96.4	11.2	7.94	9.19	7.59	7.25	14	26	11	18	26	11	18			
20.6	14.2	17.7	91.4	29.50	18.65	24.28	8.50	5.00	7.00	96.1	11.6	7.17	9.53	7.47	7.18	13	23	10	16	23	10	16			
19.6	14.0	17.1	91.7	23.92	15.60	20.33	5.50	3.00	4.50	97.7	6.3	3.65	5.38	7.45	7.20	12	0.03	0	0.01	17	11	14			
37.5	13.0	23.5	89.9	46.88	15.10	28.87	5.00	3.00	4.20	97.6	6.0	4.00	5.13	7.47	7.13	12	0.02	0	0	20	9	14			
27.6	16.0	22.3	92.1	34.31	21.50	28.45	5.50	3.50	4.20	97.8	7.5	4.67	5.53	7.38	6.96	14	0.07	0	0.01	18	7	14			
29.9	23.4	25.6	91.0	40.40	29.82	33.40	8.50	4.50	5.80	96.5	10.9	5.70	7.54	7.30	5.58	13	0.06	0	0.01	18	8	14			
														7.10	6.90	14									
														7.11	6.82	14									
														7.30	6.91	15									
22.3	17.9	20.0	93.0	27.18	19.12	23.81	7.50	4.50	6.00	98.1	8.4	4.80	7.18	7.17	6.76	13	30	7	17	30	7	17			
18.5	11.2	15.3	94.1	20.68	14.06	18.01	25.50	4.00	10.40	95.6	31.9	4.97	12.59	7.29	7.04	13	0.03	0	0.01	22	12	18			
20.0	13.6	16.9	91.2	28.13	19.26	22.22	6.00	4.00	4.50	96.8	9.2	4.77	6.02	7.30	7.09	12	0.05	0	0.01	23	14	19			
21.7	16.3	19.6	92.3	31.90	25.30	28.35	7.00	1.50	4.50	97.3	9.8	2.33	6.41	7.36	7.13	12	0.06	0	0.02	21	11	17			
30.6	18.9	23.1	89.8	40.78	25.37	31.56	6.00	4.00	4.70	97.2	8.3	5.60	6.49	7.41	7.11	12	0.03	0	0.01	13	10	17			
26.3	14.4	18.4	92.6	34.60	19.26	24.85	6.50	4.00	5.00	96.6	9.1	4.67	6.59	7.32	7.00	12	0.03	0	0	19	12	16			
26.4	12.9	19.1	92.8	33.30	15.96	24.99	7.00	4.00	5.10	97.1	9.8	4.94	6.78	7.39	7.07	11	0.04	0	0.01	22	12	15			
16.3	13.4	14.7	93.9	25.41	18.47	20.74	5.50	4.50	4.80	97.2	8.6	6.00	6.73	7.29	7.04	11	0.06	0	0.01	20	12	16			
16.5	14.6	15.6	93.5	20.93	17.97	19.90	7.00	4.00	5.30	97.6	9.3	5.60	7.08	7.47	6.90	13	0.05	0	0.02	19	11	15			
														7.35	6.90	18									
														7.30	7.04	17									
														7.50	7.21	14									
														7.72	7.38	13	0.06	0.03	0.05	26	22	24			
53.3	19.2	30.9	90.0	62.28	22..13	36.79	13.50	4.00	7.40	96.2	15.8	5.17	8.55	7.74	7.39	14	0.07	0	0.02	24	14	18			
30.5	16.0	20.0	92.7	74.57	20.00	33.18	7.00	4.00	5.60	97.3	18.9	5.74	10.48	7.85	7.27	14	0.06	0	0.02	26	17	21			
20.7	15.3	17.0	93.7	27.38	18.73	21.59	5.50	3.00	4.90	97.3	7.2	3.98	6.14	7.54	7.27	13	0.05	0	0.02				26	12	20
28.2	13.8	20.6	93.0	28.18	13.79	20.63	31.96	15.64	23.82	88.1	7.0	3.00	5.40	7.52	7.26	13	0.05	0	0.02				22	15	19
28.6	22.7	25.0	91.6	31.00	25.16	27.85	7.50	5.00	6.00	97.0	8.6	5.25	6.65	7.47	7.11	12	0.03	0	0.02				22	14	18
22.1	19.9	21.4	93.0	26.42	23.50	24.81	7.50	3.00	5.50	97.1	9.1	3.25	6.47	7.33	6.89	12	0.06	0	0.02				24	12	19
20.9	17.3	18.6	93.9	26.00	19.85	22.40	7.00	3.00	5.20	97.6	8.6	3.45	6.46	7.21	6.90	13	0.05	0	0.01				26	16	20
35.5	12.4	19.5	92.6	50.94	17.96	26.50	13.00	5.50	8.20	95.5	18.7	7.63	10.99	7.13	6.60	15	0.03	0	0.01				42	11	24
														6.87	6.60	13									
														8.70	6.63	13									
														6.91	6.55	14									
														7.10	6.60	14									
24.7	14.9	19.7	93.4	32.93	16.52	24.02	18.00	5.00	10.90	94.1	20.6	6.21	12.83	7.21	6.86	12	0.06	0	0.02				35	13	23
26.6	19.8	22.4	92.6	34.99	26.71	30.44	9.50	6.50	7.50	95.5	12.9	8.67	10.19	7.28	6.80	12	0.72	0	0.03				24	8	18
26.6	16.6	21.7	91.0	39.98	24.18	32.00	7.00	4.00	5.60	96.5	10.3	5.34	8.30	7.85	6.82	11	8	0	0.27				24	13	18
19.0	16.4	17.2	93.5	23.08	19.17	20.40	10.00	4.50	6.60	95.6	11.8	5.25	7.88	7.91	6.82	10									
18.5	12.0	15.3	94.2	26.19	16.44	20.62	8.00	4.00	6.60	95.8	11.9	4.97	8.98	7.28	6.94	11	0.07	0	0.02				24	5	16
26.2	17.8	20.6	92.5	35.86	22.31	27.72	6.50	5.50	6.20	96.5	9.3	7.52	8.36	7.32	6.87	12	0.03	0	0.01				26	10	17
27.0	11.6	17.6	93.1	32.37	19.29	27.50	8.00	3.00	5.80	96.1	13.1	6.66	9.00	7.51	6.73	13	0.06	0	0.01				44	16	24
19.0	15.8	17.4	93.4	39.23	22.65	30.94	6.00	5.00	5.50	96.0	10.3	8.61	9.47	6.90	6.50	14	0.07	0	0.02				30	17	25
														6.86	6.51	14									
														7.20	6.26	15									
														6.82	6.47	14									
														7.06	6.49	12									
14.1	9.2	11.8	95.5	16.80	10.95	13.58	4.20	2.70	3.40	98.0	5.0	3.18	3.92	6.97	6.63	12	0.05	0	0.01				38	10	23
25.0	21.3	22.7	91.3	32.93	25.88	28.88	10.60	5.80	8.30	95.6	12.3	7.06	10.50	7.18	6.78	13	0.05	0	0.01				46	15	27
29.7	15.7	21.3	90.0	41.31	21.35	28.63	13.70	4.50	7.60	91.7	17.0	6.12	10.04	7.12	6.79	13	0.04	0	0.01				28	12	21
32.6	19.4	24.2	90.1	38.11	21.98	29.18	15.30	7.60	11.10	93.4	17.9	8.62	13.52	7.25	6.85	11	0.04	0	0.01				24	16	21
28.7	17.1	22.2	92.9	32.10	19.75	24.69	19.30	5.70	11.80	95.7	21.4	6.61	13.10	7.22	6.82	13	0.07	0	0.02				29	18	23
24.5	11.4	19.1	93.0	27.01	13.03	21.53	10.50	6.30	8.10	96.2	12.2	7.09	9.18	7.38	6.79	13	0.05	0	0.01				36	11	25
														7.10	6.47	15									
														6.85	6.55	17									
														7.08	6.40	19									
														6.99	6.42	15									
														7.11	6.76	17									
														7.12	6.77	19									
19.9	13.0	15.7	94.7	21.00	14.50	17.00	5.00	4.00	4.67	97.3	4.9	4.59	4.76	7.22	6.74	16	0.03	0	0.01				52	14	26
38.0	23.9	29.4	90.1	43.10	24.78	32.12	6.00	2.00	3.80	98.0	6.8	2.07	4.14	7.25	6.25	16	0.06	0	0.01				35	20	28
53.3	23.9	30.9	95.5	74.57	29.82	36.79	31.96	15.64	23.82	98.1	31.9	8.67	13.52	8.70	7.39	19	30	11	18	30	22	24	52	20	28
14.1	9.2	11.8	89.4	16.80	10.95	13.58	4.20	1.50	3.40	88.1	4.9	2.07	3.92	6.82	5.58	10	0	0	0	13	7	14	22	5	16
25.6	16.0	20.0	92.3	33.73	19.99	25.72	9.49	4.57	6.74	96.2	11.5	5.46	8.04	7.31	6.83	14	2	1	1	22	12	17	31	13	22

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
SUMMARY OF HISTORICAL
WASTEWATER DATA

FIGURE
2-4
Cont.

City of Union, Oregon
Summary of Historical Wastewater Data
January 2008 through December 2012

	Effluent																	
Date	Daily Maximum Total Ammonia Nitrogen	Daily Minimum Total Ammonia Nitrogen	Average Total Ammonia Nitrogen	Daily Maximum E.coli Coliform (CFU/100 ml)	Daily Minimum E. coli Coliform (CFU/100 ml)	Average E. coli Coliform (CFU/100 ml)	Daily Maximum Fecal Coliform (CFU/100 ml)	Daily Minimum Fecal Coliform (CFU/100 ml)	Average Fecal Coliform (CFU/100 ml)	Daily Maximum Total Coliform (CFU/100 ml)	Daily Minimum Total Coliform (CFU/100 ml)	Average Total Coliform (CFU/100 ml)	Daily Maximum Receiving Stream, Stream Flow (cfs)	Daily Minimum Receiving Stream, Stream Flow (cfs)	Average Receiving Stream, Stream Flow (cfs)	Daily Maximum Receiving Stream, Temperature (°F)	Daily Minimum Receiving Stream, Temperature (°F)	Average Receiving Stream, Temperature (°F)
Jan-08				1.19	0.0	0.24	3	0	2				397.1	19.6	92.2	33.3	32.7	33.2
Feb-08				1.77	0.0	0.44	126	0	33				139.5	30.3	71.9	40.2	33.2	34.9
Mar-08				1.56	0.0	0.64	25	1	9				74.3	27.1	54.9	42.0	35.0	39.0
Apr-08				2.91	0.0	0.78	16	0	8				225.7	43.8	107.5	46.6	35.9	41.8
May-08				2.63	0.0	1.05	42	1	18				1,656.0	155.9	613.2	45.9	41.0	43.7
Jun-08				1.00	0.0	0.25	5	0	1				768.5	271.3	511.7	52.9	42.6	47.3
Jul-08				1.00	0.0	0.75	7	3	5				452.9	15.5	130.6	58.1	52.2	55.5
Aug-08				1.00	0.0	0.25	7	0	4				29.2	8.5	16.1	65.4	57.3	60.8
Sep-08				3.83	0.0	1.94	80	0	36				43.8	9.1	15.3	58.7	49.7	54.3
Oct-08				1.00	0.0	0.40	14	0	6				64.8	13.4	22.5	56.7	39.9	46.1
Nov-08				1.41	0.0	0.35	32	0	13				240.0	23.1	56.4	48.7	34.5	40.8
Dec-08				1.19	0.0	0.64	26	3	12				341.1	39.9	141.9	42.0	33.2	34.9
Jan-09				1.00	0.0	0.50	19	2	8	1.0	0.0	0.50	872.3	58.7	318.7	34.8	33.2	33.4
Feb-09				1.41	0.0	0.60	26	3	14	5.0	0.0	1.75	547.0	24.1	106.2	41.3	33.2	35.7
Mar-09				1.19	0.0	0.44	23	2	8	4.0	0.0	1.20	167.5	60.4	99.5	42.9	33.6	38.2
Apr-09				1.00	0.0	0.25	7	0	3	1.0	0.0	0.25	652.6	96.3	275.8	45.8	38.5	42.2
May-09				1.00	0.0	0.25	7	0	4	1.0	0.0	0.25	857.0	211.9	494.1	51.3	40.6	44.6
Jun-09				1.57	0.0	0.78	34	1	13	7.0	0.0	2.60	1,537.0	96.3	372.6	27.0	46.0	50.5
Jul-09				1.00	0.0	0.25	13	2	5	2.0	0.0	0.50	98.2	1.2	37.3	66.2	18.0	58.5
Aug-09				1.68	0.0	0.42	28	0	8	7.0	0.0	1.75	78.1	0.1	18.9	68.1	56.7	62.3
Sep-09				1.00	0.0	0.25	6	0	2	3.0	0.0	0.75	88.2	0.8	9.2	66.0	49.1	58.4
Oct-09				0.00	0.0	0.00	1	0	1				54.0	9.6	24.0	51.6	37.3	44.9
Nov-09				2.11	0.0	0.53	135	0	36	10.0	0.0	2.50	52.5	17.9	30.1	46.5	33.7	38.1
Dec-09				1.19	0.0	0.24	18	0	4	5.0	0.0	1.00	368.5	26.1	139.8	35.0	33.2	33.3
Jan-10				1.19	0.0	0.80	17	1	7	4.0	0.0	1.50	205.2	31.4	70.9	39.0	22.2	35.3
Feb-10				1.31	0.0	0.58	10	1	5	3.0	0.0	1.25	45.2	14.1	34.5	41.7	33.8	38.1
Mar-10				1.19	0.0	0.24	16	0	5	4.0	0.0	1.00	85.9	22.2	54.3	48.5	35.0	40.2
Apr-10				0.00	0.0	0.00	2	0	1				712.6	45.2	212.1	47.0	35.0	42.5
May-10				1.00	0.0	0.50	3	1	2	1.0	0.0	0.50	950.7	189.0	381.9	46.9	39.4	43.8
Jun-10				1.32	0.0	0.66	18	0	7	1.3	0.0	0.66	2,008.0	270.1	687.5	55.7	44.3	48.0
Jul-10				0.00	0.0	0.00	5	0	2				289.9	8.0	90.0	60.9	51.4	57.1
Aug-10				4.61	0.0	1.15	86	0	22	19.0	0.0	4.75	12.7	2.9	6.7	64.1	54.1	60.5
Sep-10				1.00	0.0	0.40	14	0	3	1.0	0.0	0.40	78.1	3.5	10.7	59.6	51.9	56.1
Oct-10				1.00	0.0	0.25	3	0	2	1.0	0.0	0.25	55.5	7.9	20.1	56.9	42.9	49.2
Nov-10				0.00	0.0	0.00	13	0	4				164.6	49.5	80.2	49.5	33.3	39.3
Dec-10				1.41	0.0	1.00	39	0	16	7.0	0.0	3.20	258.5	58.7	113.6	38.4	33.1	35.0
Jan-11				0.00	0.0	0.00	20	0	7				1,247.0	100.6	410.4	40.2	33.2	35.0
Feb-11				1.00	0.0	0.75	18	1	8	2.0	0.0	1.00	124.0	72.5	97.3			
Mar-11				9.96	0.0	2.28	152	0	33	42.0	0.0	9.40	350.1	72.5	134.8	43.3	35.2	39.8
Apr-11				2.91	0.0	1.31	42	5	18	12.0	0.0	5.00	639.7	182.7	288.4	44.2	38.3	41.8
May-11				2.78	0.0	0.70	41	0	11	12.0	0.0	3.00	2,173.0	208.5	793.4	49.8	41.6	43.9
Jun-11				5.01	0.0	1.27	74	0	18	21.0	0.0	5.00	1,423.0	740.3	979.9	50.1	43.1	46.0
Jul-11				1.00	0.0	0.50	8	0	4	2.0	0.0	0.75	733.0	114.3	337.8	56.8	45.5	52.4
Aug-11				5.24	0.0	1.25	98	0	21	23.0	0.0	4.80	94.1	5.7	40.9	62.7	56.5	59.2
Sep-11				2.63	0.0	0.96	29	0	10	11.0	0.0	3.50	30.3	0.0	16.2	62.1	53.2	57.5
Oct-11				2.21	0.0	1.05	32	4	13	10.0	0.0	3.00	109.6	8.5	54.5	55.6	39.9	48.1
Nov-11				3.56	0.0	1.17	17	1	8	15.0	0.0	4.20	124.0	62.0	92.8	42.6	33.4	35.8
Dec-11				5.70	0.0	1.82	102	0	28	27.0	0.0	8.50	402.0	121.6	257.4	33.5	33.0	33.2
Jan-12				3.72	0.0	1.43	39	0	15	15.0	0.0	4.50	565.3	62.0	155.4	38.0	33.2	34.3
Feb-12				6.31	0.0	1.46	102	0	22	28.0	0.0	6.00	258.2	55.5	95.0	39.7	33.5	35.9
Mar-12				44.00	3.0	25.00	27	9	17	101.3	3.1	44.85	306.4	80.0	168.2	44.0	34.7	39.9
Apr-12				36.00	1.0	16.33	3	1	2	62.4	1.0	39.13	2,109.0	215.3	643.3	47.3	37.7	42.9
May-12				2.00	1.0	1.33	166	4	67	2.0	1.0	1.33	1,353.0	319.2	555.4	49.0	37.7	44.9
Jun-12				17.00	3.0	9.00	17	2	7	20.7	7.5	13.67	365.0	107.0	198.7			
Jul-12				2.00	2.0	2.00	16	16	16	8.0	8.0	8.00	117.0	2.9	40.3	16.2	14.5	15.4
Aug-12				3.20	3.2	3.20	2	2	2	6.4	6.4	6.40	5.0	1.4	2.9	16.3	11.4	14.9
Sep-12				21.20	1.0	11.10	66	1	23	5.0	1.0	3.00	3.6	0.9	2.4	14.2	11.2	12.6
Oct-12				27.10	2.0	20.00	32	3	14	21.0	2.0	15.75				13.0	0.7	6.5
Nov-12				7.00	2.0	4.50	6	5	6	7.5	2.0	4.75	65.0	32.0	41.4	9.0	0.5	5.3
Dec-12	12.8	12.3	12.6	35.20	1.0	18.10	88	8	48	37.1	37.1	37.10	91.0	31.0	48.1	6.4	0.0	2.2
Maximum	12.8	12.3	12.6	44.00	3.2	25.00	166	16	67	101.3	37.1	44.85	2,173.0	740.3	979.9	68.1	57.3	62.3
Minimum	12.8	12.3	12.6	0.00	0.0	0.00	1	0	1	1.0	0.0	0.25	3.6	0.0	2.4	6.4	0.0	2.2
Average	12.8	12.3	12.6	4.92	0.3	2.41	35	1	12	13.5	1.6	6.03	463.7	77.3	186.1	45.0	35.9	40.8

City of Union, Oregon
Summary of Historical Wastewater Data
January 2008 through December 2012

	Solids											Aerobic Primary Digester				Aerobic Secondary Digester		
Date	Maximum Acres Applied	Minimum Acres Applied	Average Acres Applied	Maximum Quantity Land Applied (gal)	Minimum Quantity Land Applied (gal)	Average Quantity Land Applied (gal)	Maximum Septage Received (gal)	Minimum Septage Received (gal)	Average Septage Received (gal)	TS to Digester	Percent Volatile Solids Reduced	Total Solids	Temperature	pH	DO	Temperature	pH	DO
Jan-08																		
Feb-08																		
Mar-08																		
Apr-08										4.48	44.40	1.58				19.8	7.11	1.67
May-08																		
Jun-08																		
Jul-08																		
Aug-08																		
Sep-08				30,400	30,400	30,400				4.99	39.28	1.61				18.7	6.96	1.37
Oct-08																		
Nov-08				8	8	8				5.09	39.37	1.61				16.8	7.09	1.26
Dec-08																		
Jan-09																		
Feb-09	4.9	2.1	3.5	26,600	11,400	19,000				4.00	42.60	1.19				14.7	7.08	1.21
Mar-09																		
Apr-09																		
May-09																		
Jun-09																		
Jul-09	4.2	1.4	2.6	22,800	7,600	14,250				4.43	42.47	1.39				24.4	6.63	1.21
Aug-09																		
Sep-09																		
Oct-09																		
Nov-09																		
Dec-09																		
Jan-10																		
Feb-10	4.9	4.9	4.9	56,600	26,600	26,600				4.90								
Mar-10	9.1	2.8	6.0	49,400	15,200	32,300												
Apr-10																		
May-10										8.70								
Jun-10																		
Jul-10	5.6	1.4	3.6	30,400	7,600	19,760				4.41	40.11	1.41				25.6	6.81	0.63
Aug-10																		
Sep-10																		
Oct-10																		
Nov-10																		
Dec-10																		
Jan-11							2,000	1,000	1,489									
Feb-11																		
Mar-11																		
Apr-11																		
May-11	8.0	1.4	3.6	30,400	7,600	15,200				6.10	40.88	1.40				18.8	7.17	0.98
Jun-11																		
Jul-11	7.0	3.5	4.7	38,000	19,000	25,333												
Aug-11																		
Sep-11	4.9	2.1	3.1	26,600	11,400	16,720				6.11	39.35	1.45	32.1	7.0	0.67	32.1	6.98	0.67
Oct-11																		
Nov-11																		
Dec-11	5.6	5.6	5.6	30,400	30,400	30,400												
Jan-12	5.0	3.0	4.0	19,000	11,400	15,200												
Feb-12																		
Mar-12																		
Apr-12																		
May-12	4.2	4.2	4.2	22,800	22,800	22,800												
Jun-12	7.0	7.0	7.0	38,000	38,000	38,000												
Jul-12																		
Aug-12																		
Sep-12																		
Oct-12																		
Nov-12	9.1	9.1	9.1	49,400	49,400	49,400												
Dec-12																		
Maximum	9.1	9.1	9.1	56,600	49,400	49,400	2,000	1,000	1,489	8.70	44.40	1.61	32.1	7.0	0.67	32.1	7.17	1.67
Minimum	4.2	1.4	2.6	8	8	8	2,000	1,000	1,489	4.00	39.28	1.19	32.1	7.0	0.67	14.7	6.63	0.63
Average	6.1	3.7	4.8	31,387	19,254	23,691	2,000	1,000	1,489	5.32	41.06	1.46	32.1	7.0	0.67	21.4	6.98	1.13

	Reclaimed Water				Effluent Golf Ponds		
Date	Maximum Quantity Irrigated (in./acre)	Minimum Quantity Irrigated (in./acre)	Average Quantity Irrigated (in./acre)	Average Percent Effluent to Fresh	Maximum Depth (gal)	Minimum Depth (gal)	Average Depth (gal)
Jan-08					9.2	9.0	9.1
Feb-08					9.1	9.0	9.1
Mar-08					9.3	9.1	9.2
Apr-08					9.2	9.0	9.1
May-08					9.5	8.8	9.1
Jun-08					9.6	8.8	9.2
Jul-08	1.739	0.003	0.277	0.399	9.6	8.5	9.2
Aug-08	0.385	0.000	0.198	0.305	9.6	7.8	8.8
Sep-08	0.390	0.000	0.121	0.225	8.5	7.2	7.7
Oct-08	0.195	0.000	0.012	0.033	10.1	8.0	9.5
Nov-08					9.8	9.0	9.4
Dec-08					8.9	8.2	8.5
Jan-09					7.9	7.6	7.7
Feb-09					7.5	6.9	7.2
Mar-09					9.5	6.9	8.2
Apr-09					9.2	8.0	8.7
May-09					9.5	8.8	9.2
Jun-09					9.0	8.2	8.6
Jul-09	0.312	0.000	0.224	0.388	9.1	7.8	8.6
Aug-09					10.4	6.8	8.2
Sep-09	0.302	0.000	0.153	0.378	8.9	6.4	7.1
Oct-09					8.8	6.3	7.6
Nov-09					7.1	6.6	6.9
Dec-09					7.1	6.9	7.0
Jan-10					7.0	6.9	7.0
Feb-10					6.8	6.5	6.7
Mar-10	0.010	0.010	0.010		8.3	5.9	7.0
Apr-10					8.6	8.3	8.5
May-10					8.9	8.7	8.8
Jun-10					9.2	8.9	9.0
Jul-10	0.293	0.000	0.226	0.441	8.3	7.6	8.1
Aug-10	0.487	0.006	0.205	0.296	8.7	8.5	8.6
Sep-10	0.275	0.000	0.109	0.185	8.5	7.8	8.2
Oct-10	0.878	0.000	0.125	0.142	8.3	7.8	8.1
Nov-10					8.0	7.7	7.8
Dec-10					7.5	6.9	7.2
Jan-11					7.6	7.4	7.5
Feb-11					7.4	7.3	7.4
Mar-11					7.3	7.1	7.2
Apr-11					7.1	6.7	6.9
May-11					8.0	6.9	7.5
Jun-11					11.1	8.9	10.0
Jul-11	0.441	0.000	0.211	0.352	9.8	8.6	9.1
Aug-11	0.271	0.000	0.191	0.440	7.0	6.2	6.6
Sep-11	0.283	0.000	0.137	0.371	8.2	7.8	8.0
Oct-11	0.138	0.000	0.016	0.065	8.9	8.1	8.5
Nov-11					9.0	8.9	8.9
Dec-11					8.8	8.5	8.7
Jan-12					8.5	8.3	8.4
Feb-12					8.6	8.5	8.6
Mar-12					8.7	8.6	8.7
Apr-12					8.5	7.9	8.1
May-12	0.459	0.000	0.129	0.198	8.0	7.6	7.8
Jun-12	0.266	0.000	0.097	0.184	9.4	8.8	9.1
Jul-12	0.374	0.000	0.222	0.344			
Aug-12	0.327	0.117	0.209	0.466	6.8	6.3	6.5
Sep-12	0.432	0.000	0.139	0.206	7.4	7.1	7.3
Oct-12	0.230	0.000	0.021	0.036	7.1	6.7	6.9
Nov-12					7.6	7.2	7.5
Dec-12					8.0	7.9	8.0
Maximum	1.739	0.117	0.277	0.466	11.1	9.1	10.0
Minimum	0.010	0.000	0.010	0.033	6.8	5.9	6.5
Average	0.404	0.006	0.144	0.273	8.5	7.8	8.2

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CITY OF
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WASTEWATER FACILITIES PLAN
SUMMARY OF HISTORICAL WASTEWATER DATA

FIGURE 2-4 Cont.

Preliminary Design Criteria

	EXISTING 2014 [1]		FUTURE 2034 [4]	
	I/I [2]	Total [3]	I/I [5]	Total [6]
Population		2,150 [7]		2,530
Average Base Flow (ABF), MGD[8]	----	0.113	----	0.133
Per Capita Flow, gpcd	----	53	----	53
Average Annual Flow (AAF), MGD	0.041	0.154	0.041	0.174
Per Capita Flow, gpcd	19	72	16	69
Average Dry Weather Flow (ADWF), MGD	0.028	0.141 [9]	0.028	0.161
Per Capita Flow, gpcd	13	66	11	64
Average Wet Weather Flow (AWWF), MGD	0.048	0.161 [9]	0.048	0.181
Per Capita, gpcd	22	75	19	72
Maximum Month Flow (MMF), MGD	0.093	0.206	0.093	0.226
Per Capita, gpcd	43	96	37	89
Maximum Daily Flow (MDF), MGD	0.321	0.434	0.321	0.454
Per Capita, gpcd	149	202	127	179
Peak Hour Flow (PHF), MGD	----	0.693 [10]	----	0.783
Per Capita, gpcd	----	322	----	309
Average Influent BOD_5, mg/L	----	267	----	267
lb/day	----	330	----	388
lb/capita/day	----	0.153	----	0.153
Average Influent TSS, mg/L	----	186	----	186
lb/day	----	229	----	269
lb/capita/day	----	0.107	----	0.107
Average Influent TKN[11], mg/L	----	40	----	41
lb/day	----	51 [12]	----	60
lb/capita/day	----	0.024	----	0.024

1 Existing 2014 column based on a review of previous five years of historical data.
2 The average contribution from infiltration and inflow (I/I) for each flow component (AAF, ADWF, AWWF, MMF, and MDF) was estimated by taking the difference of each of the current total flow values and the current base flow (example: average annual I/I contribution = current AAF - ABF = 0.154 MGD - 0.113 MGD = 0.041 MGD).
3 Existing total flows and mass loads are based on historical plant operating data (i.e., Discharge Monitoring Reports).
4 Population projected using a 0.77 percent growth rate for the City of Union based on the 2013 population.
5 For projection purposes, it was assumed that the I/I flows currently being experienced in the system will remain constant throughout the planning period.
6 Future total flow is estimated by taking the sum of the future ABF and I/I (example: AAF = 0.113 MGD + 0.041 MGD = 0.174 MGD).
7 Source: Portland State University, July 1, 2013, Certified Estimate.
8 ABF is defined as the daily minimum flow recorded each year averaged over the five years of available data.
9 ADWF and AWWF calculated from Table 2-2 data.
10 Based on an assumed factor of 4.5 times the AAF.
11 Total Kjeldahl Nitrogen (organic nitrogen and ammonia nitrogen). Assumed concentration based on typical domestic wastewater influent values.
12 Mass loading estimated using AAF.

BOD_5 = 5-day biochemical oxygen demand
gpcd = gallons per capita per day
lb/day = pounds per day
mg/L = milligrams per liter
MGD = million gallons per day
TKN = Total Kjeldahl Nitrogen
TSS = total suspended solids

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CITY OF
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WASTEWATER FACILITIES PLAN

DESIGN CRITERIA

FIGURE 2-5

Chapter 3 - Existing Wastewater Treatment Facility Description and Evaluation

Introduction

This chapter provides an overview of the existing wastewater treatment facility (WWTF) components and treatment process. This chapter also contains an evaluation of the WWTF to serve the 20-year population design capacity, meet anticipated National Pollutant Discharge Elimination System (NPDES) Permit limits, and comply with anticipated regulatory requirements.

Existing Wastewater Treatment Facility

Background

The City of Union's original mechanical WWTF was constructed in 1977. Union's collection system and original lift station were also constructed in 1977. A discussion of the collection system and the Oregon Street Lift Station is contained in Chapter 4. The 1977 WWTF consisted of a preliminary treatment system (headworks) with comminutor, primary and secondary clarifiers, rotating biological contactors (RBCs), aerobic digester, and chlorine disinfection.

Several minor updates were implemented in 1989. These updates were needed to correct erratic meter readings at the headworks and remove inorganic materials from the wastewater flow. The updates added a new Parshall flume, ultrasonic flowmeter, and a rotating screen. The rotating screen proved to be too fine and required a coarser screen to allow larger biological particles to pass. A spray bar was added to prevent screen blinding from organic materials.

A full-scale treatment plant construction and rehabilitation project took place in 1999 through 2001. The reconstruction activities modified the headworks, RBCs, chlorine contact basin, blower and sludge pumping room, control building, and aerobic digester. Several components were rehabilitated as part of the project, including the headworks, RBCs, and primary and secondary clarifiers. The project also added several process components: submerged biological contactor (SBC), effluent filter, chlorine contact basin, effluent pump station, impure water pump station, aerobic digester, sludge drying beds, and a building containing the blowers, generator, and electrical controls. Figure 3-1 provides an aerial photograph of the existing WWTF, and Figure 3-2 provides a site plan of the existing WWTF.

A wastewater effluent reuse system was completed in conjunction with the year 2000 wastewater system improvements project. The wastewater effluent reuse facility transfers treated wastewater effluent to the Buffalo Peak Golf Course for utilization as irrigation water. The wastewater effluent reuse facility is composed of an effluent pump station (located at the WWTF), approximately 9,600 feet of 10-inch forcemain effluent transmission line, and a liquid storage/flow equalization pond and irrigation pump station (both located at the golf course). The recycled effluent is subsequently distributed onto the golf course through a dedicated sprinkler system in strict compliance with

Oregon Administrative Rule 340-055. Components of the wastewater reuse system are described later in this chapter. Approximately 64 acres of the golf course are irrigated using the treated effluent. Approximately 124 acres at the golf course are available for irrigation.

2000-2020 Wastewater Treatment Facility Design Capacity

The capacity of the WWTF with the year 2000 improvements was designed to meet the needs of approximately 3,000 people. The following table summarizes the main design parameters.

TABLE 3-1

Years 2000-2020 Design Capacity

Flows		Loadings	
Average flow	0.345 MGD	Average BOD_5	630 lb/day
Average dry weather flow	0.302 MGD	Peak BOD_5	717 lb/day
Average wet weather flow	0.807 MGD	Average TSS loading	630 lb/day
Peak hour flow	1.10 MGD	Peak TSS loading	717 lb/day

BOD_5 = Five-day biochemical oxygen demand

lb/day = Pounds per day

MGD = Million gallons per day

TSS = Total suspended solids

Figure 2-5 in Chapter 2 projects a population of 2,530 people, an average flow of 133,000 gallons per day (gpd), and an average BOD_5 loading of 388 lb/day at the end of the 20-year planning horizon covered by this Wastewater Facilities Plan (WWFP). All projected loadings are below the WWTF treatment capacity. However, the WWTF was designed to reliably meet or exceed known and anticipated regulatory requirements in effect during the year 2000 design phase.

Since 2000, new regulations have been imposed, and the City of Union's NPDES Permit renewal is expected to include ammonia limits. Preliminary analyses, based on unofficial but expected ammonia limits, show that Union's WWTF cannot meet the anticipated ammonia limitations in its present configuration. This deficiency can be dealt with by adding treatment components to the WWTF or by completely removing effluent discharge to Catherine Creek. Removing effluent flow from Catherine Creek and discharging the WWTF effluent in an alternate manner, such as land application, removes the NPDES permitting process and the associated ammonia limit. Alternatives to treat WWTF effluent ammonia or removing effluent flow from Catherine Creek are discussed in Chapter 5.

Existing Wastewater Treatment Facility Overview

The City of Unions' existing mechanical WWTF provides secondary treatment of the City's domestic wastewater. Tertiary treatment is available from the effluent travelling bridge rapid sand filter; however, this filter has been off line for several years and is not currently operational. The WWTF generally consists of a preliminary treatment system, primary clarification, secondary biological treatment system, secondary clarification, aerobic sludge digestion system, sludge drying beds, liquid hypochlorite (chlorine) disinfection, dechlorination, and outfall to Catherine Creek during the winter months or to the golf course for storage and land application during the summer months.

In general, the WWTF separates solids from liquids and treats the separated components through a sludge treatment and biological treatment process. Wastewater flows through the headworks to a primary clarifier where the screened influent flow is clarified. Separated solids are wasted to the aerobic digesters, and primary effluent proceeds to the SBC/RBC system for biological treatment. Flow proceeds from the SBC/RBC to the secondary clarifier. Solids removed during secondary clarification are returned to the headworks, and secondary effluent is discharged through the chlorine contact chamber to Catherine Creek or to the Buffalo Peak Golf Course for irrigation. Sludge (solids) accumulates in the aerobic digesters. Liquid (called supernatant) separates from the solids portion of the sludge during treatment in the aerobic digesters. Supernatant is returned to the headworks while treated sludge is discharged to drying beds or to a sludge transportation truck for application on active agricultural land.

The following paragraphs describe the WWTF buildings and system components and provide a brief explanation of their functions in the overall system. An evaluation of major components follows in the Wastewater Treatment Facility Process Evaluation section of this chapter. Figure 3-3 provides a process schematic diagram of the existing WWTF.

Wastewater Treatment Facility Building Descriptions

The Union WWTF utilizes three main buildings to house treatment system components and a fourth building for repairs and storage.

1. The headworks building is constructed of concrete and houses the influent composite sampler, 6-inch Parshall flume, mechanical fine screen, manual bar screen, and influent pumps.

2. The control building was constructed in multiple stages over many years using various construction techniques. A large portion of the building was constructed using concrete masonry units (concrete blocks). The control building houses the WWTF office and lavatory, electrical room, laboratory, dechlorination room, sodium hypochlorite room, and sludge pumping room.

   In addition to the main components listed above, the control building contains personal protective equipment, the Right-to-Know station with Material Safety Data Sheets, and an emergency shower and eyewash station. The control building also contains the human machine interface (HMI) for the telemetry system and provides a central location for alarms.

3. The blower/generator/electrical building was constructed with split face concrete masonry units and houses the SBC blowers, digester blowers, master control center (MCC), plant backup generator, and associated items.

4. The maintenance building was constructed using a structural steel frame covered with raised-rib metal siding. This building is used for equipment repair, tool storage, and parts storage.

Preliminary Treatment (Headworks)

Wastewater flows into Union's WWTF headworks through a 14-inch diameter asbestos cement pipe. The headworks consist of a mechanical fine screen and bar rack, Parshall flume, composite sampler, and influent pumps. Wastewater flows through the mechanical fine screen, which collects rags, sticks, and other inorganic objects for landfill disposal. Wastewater then enters the influent pumps through a Parshall flume that meters the flow. At this point in the treatment system, a flow-paced composite sampler collects a raw influent sample. The wastewater collects in a wetwell to be pumped into the headworks outfall structure, where it flows by gravity to the primary clarifier. A plan view of the headworks is shown on Figure 3-4.

Screens

Entering the headworks, the influent channel turns 90 degrees and becomes the screening channel containing the mechanical fine screen. The mechanical fine screen is a Lakeside Equipment "Micro Strainer" screen with effective 1/4-inch openings. The wastewater first passes through the screen openings, where the inorganic materials are collected. The solids are then removed from the screen basket by a screw conveyor. While in this conveyor, screenings are washed, compacted, and dewatered before they are deposited in a container for disposal.

The operation of the conveyor is controlled automatically by water elevation in front of the screen and by a timer. An ultrasonic sensor is installed on the upstream side. The sensor actuates the conveyor operation when the wastewater level reaches a set elevation. This elevation may be adjusted in the sensor. The operation is also interlocked with a 24-hour programmable timer that allows a cleaning cycle to be performed at a set time, regardless of water elevation.

A bar screen with 1-inch openings is located in the screening channel of the headworks outfall structure. The bar screen provides temporary backup screening of inorganic items entering the WWTF when the mechanical fine screen is off line. The bar screen requires manual cleaning (usually with a rake) and manual screenings disposal.

Parshall Flume

The 6-inch Parshall flume is a controlled constriction in the wastewater influent flow channel. Wastewater backs up behind the constriction so the depth is proportional to the flow. By measuring the depth at a given point, the influent flow can be determined. The influent flow measurement can be read manually or automatically; however, the flow is normally read automatically with an ultrasonic sensor and associated electronics.

The ultrasonic sensor is mounted above the Parshall flume channel a fixed distance upstream from the flume throat. The sensor measures the variation in flume flow depth and continuously transmits a signal to a flow monitor located in the headworks sampler room. The flowmeter calculates, records, and totalizes the influent flow and echoes this information to the programmable logic controller (PLC) panel.

Composite Influent and Effluent Samplers

The composite influent sampler is located in the headworks sampler room. It draws influent samples through a suction tube installed in the influent channel upstream from the Parshall flume. The refrigerated sampler has a flexible program that allows control of sample size and manual, time-paced, or flow-paced sampling. Variable sampling capabilities are needed to obtain composite samples in compliance with the NPDES Permit.

The effluent composite sampler is located on the west side of the effluent pump station. Samples are collected from the bottom of the effluent pump station before final discharge. The effluent composite sampler is the same brand, model, and type as the influent sampler and has the same capabilities.

Influent Pumping

The screened and metered wastewater flows into the influent lift station wetwell. Influent Pumps No. 1 and No. 2 pump from this wetwell and discharge into the headworks outfall structure. Each influent pump is a 7.5 horsepower (Hp) Gorman Rupp self-priming centrifugal pump with an operating range of 200 to 600 gallons per minute (gpm). Each pump motor is explosion-proof and equipped with a variable frequency drive (VFD).

The influent pumps function as a duplex system to maintain a flow equal to the headworks inflow. The lead pump starts when rising wetwell levels reach a depth equaling 75 percent of the wetwell operating range. The rising wetwell level then causes the VFD on the lead pump to increase the pump’s speed in linear proportion to the rise in the wetwell level until the pump is operating at a flow rate equal to the inflow. If the wetwell level continues to rise, the pump speed will continue to increase to match the inflow until the pump’s maximum speed and discharge capacity are reached. If the wetwell level exceeds 100 percent of the pump's operating range and is increasing, the lag pump starts. The lag pump’s VFD will also increase the pump’s speed linearly to match rising wetwell levels until both pumps are operating at a flow rate equal to the inflow.

The lag pump’s maximum speed and discharge are restricted to a specific set point of approximately one-third that of the lead pump. Restricting the lag pump’s discharge prevents hydraulic overloading of the primary clarifier and potential spills.

As inflow decreases, the VFDs for both pumps decrease their speeds in linear proportion to the decrease in wetwell level. The lag pump reaches its minimum speed and stops pumping when the wetwell depth returns to approximately 88 percent of the wetwell operating range. The lead pump continues to decrease its speed and discharge capacity to match the decrease in wetwell depth until the wetwell level drops to 50 percent of the wetwell operating range.

At this point, the lead pump is operating at its minimum pump speed and discharge capacity and continues pumping until the depth in the wetwell drops to approximately 15 percent of the wetwell operating range. The lead pump then stops and the lead/lag designation between the two pumps switches for the following pump cycle. If wastewater flows do not vary sufficiently to provide acceptable pump cycling, the lead/lag function can be programmed to switch pumps every 24 hours.

A level-indicating pressure sensor is used to sense the wetwell level and provide pump sequencing and control. Two float switches are also used to provide high and low water alarms. If the alarms are triggered, the control system’s autodialer will notify selected personnel for response. In addition to the VFD control, each pump has a Hand-Off-Auto switch, with fixed high and low pump speeds, for manual dewatering of the influent lift station wetwell.

Primary and Secondary Treatment

Clarifiers

The plant has two clarifiers, one primary and one secondary. Wastewater flows from the headworks to the primary clarifier. The primary clarifier provides primary sedimentation treatment (clarification) and removes readily settleable solids and floating materials, effectively reducing the suspended solids and BOD_5 content. The primary clarifier also removes scum from the wastewater. Solids and scum removed in the primary clarification process are wasted to the aerobic digesters. The years' 2000-2020 clarifier design parameters are listed on Table 3-2. The design parameters exceed the requirements represented by the year 2034 projected flow and solid loadings, making the clarifiers adequate over the time frame represented by this WWFP and the current NPDES Permit requirements. Anticipated NPDES Permit ammonia limits will not affect clarifier adequacy or function. A comprehensive evaluation of the clarifiers is contained in the Wastewater Treatment Facility Process Evaluation section of this chapter. Figures 3-5 and 3-6 provide illustrations of the clarifiers.

TABLE 3-2

Clarifier Design Parameters for the Years 2000-2020

Primary Clarifier	
Diameter (ft)	24
Side Water Depth (ft)	10
Effective Surface Area (ft^2)	450
Volume (gallons)	33,820
Overflow Rate at 0.345 MGD (gpd/ft^2)	765
Detention Time at 0.345 MGD (hours)	2.4
Dry Solids Loading at Total Average Combined Loading (lb/day/ft^2)	1.5
Secondary Clarifier	
Diameter (ft)	28
Side Water Depth (ft)	14
Effective Surface Area (ft^2)	615
Volume (gallons)	64,400
Overflow Rate at 0.345 MGD (gpd/ft^2)	560
Overall Detention Time at 0.345 MGD (hours)	4.5
Dry Solids Loading at Average Sludge Loading (lb/day/ft^2)	0.49

Effluent from the primary clarifier flows to the SBC/RBC for biological treatment. Treated effluent subsequently flows to the secondary clarifier to further clarify the effluent and remove settleable solids (humus) created through the SBC/RBC treatment process, floatable material, and scum. Settleable solids from the secondary clarifier treatment process are returned to the headworks and scum is combined with the primary clarifier's scum and wasted in the aerobic digester.

Each clarifier is equipped with a mechanical rotating mechanism that moves sludge to the center of the clarifier basins with plow-type scrapers. The sludge then flows into the center of the clarifier and into the feed well. The feed well provides an environment of limited agitation that helps create settleable floc and directs the flow toward the bottom center of the clarifier.

A skimmer, installed on the drive shaft of each clarifier's rotating mechanism, collects scum and floatables from the surface of the wastewater and moves the material to the outside edge of the basins. At the end of each revolution, the skimmer empties into the scum trough. Scum is then wasted to the aerobic digesters. Scum baffles prevent scum from flowing over the effluent weirs. The clarified effluent leaves either clarifier by flowing under the scum baffle and over a steel ring containing V-notch weirs, into an effluent launder which is circumferential to the clarifier.

In summary, the clarifiers provide quiescent conditions so incoming solids will settle to the bottom of the tanks. In each clarifier, the settled sludge is collected by a rotating scraper mechanism to a center sludge hopper. The secondary sludge is wasted by gravity to the influent pump station wetwell where it is combined with screened plant influent and pumped to the primary clarifier. The combined primary and secondary sludge collected in the primary clarifier is periodically wasted to the aerobic digesters.

Biological Contactors and Biological Treatment Description

Submerged Biological Contactor

Effluent from the primary clarifier flows into the SBC unit. The SBC consists of a 12-1/2-foot diameter, 25-foot long, 3-stage shaft containing plastic media. The SBC shaft is installed in a rectangular concrete tank and is supported on both ends by submerged bearing assemblies. The plastic media rotates slowly in the tank. Approximately 85 percent of the media surface is submerged. The portion of the media at the center of the SBC (core media) is submerged at all times. Only the outer portion of the media is alternately exposed to the atmosphere and submerged in the wastewater. Figures 3-7 and 3-8 show the SBC units. Table 3-3 summarizes the SBC design parameters for the years 2000-2020.

TABLE 3-3
SBC Design Parameters for the Years 2000-2020

Number of Units	1
Shaft	1
Stages	3
Media Surface Area (sq. ft.)	
Stage 1	74,200
Stage 2	33,200
Stage 3	33,200
Total Media Surface Area	**140,600**
Drive	Air
Air Requirement (Drive and Process) Standard Cubic Feet per Minute (scfm)	155
Average Organic Loading (or First Stage)* (lb. $SBOD_5$/1,000 sq. ft./day)	3.41
Average Hydraulic Loading (gpd/sq. ft.)	2.5

**Assumes 20 percent removal of BOD_5 in the primary clarifier, 50 percent of SBC influent BOD_5 is soluble ($SBOD_5$) = 252 pounds of $SBOD_5$ in influent.*

The SBC process is aerobic. To prevent anaerobic conditions, oxygen must be provided to the submerged organisms on the core media. Oxygen is provided by releasing low pressure air from headers located below the media. Low pressure air does double duty by also rotating the SBC. Air cups attached to the outside edge of the media trap some of the released air. The captured air produces a buoyant force that rotates the SBC. The rising air bubbles and the emergence of media out of the water creates shearing forces on the fixed-film biomass, causing loosely-held, excess biomass to slough off into the mixed liquor. This sloughed biomass settles for removal in the secondary clarifier.

Rotating Biological Contactors

In addition to the SBC there are two RBC units at the WWTF. Effluent from the SBC flows into RBC No. 1 and effluent from RBC No. 1 flows in series to RBC No. 2. Effluent from the RBC units flows into the secondary clarifier. Each RBC unit consists of a shaft containing plastic media. Each RBC shaft is installed in a rectangular concrete tank and is supported on both ends by bearing assemblies. Unlike the SBC, the RBC units are mechanically driven utilizing a 5 Hp electric motor and chain drive assembly. The wastewater within the RBC tanks does not receive aeration because the units are roughly 40 percent submerged. Atmospheric aeration of the biomass occurs as the shafts rotate through the wastewater and into the air. Capacity of the RBC units can be increased by providing air flow to the submerged portion of the media. The RBC facility has been constructed with the necessary aeration piping to allow for the addition of aeration equipment when needed. Figure 3-9 shows the RBCs. Table 3-4 summarizes the RBC design parameters for the years 2000-2020.

TABLE 3-4

RBC Design Parameters for the Years 2000-2020

Number of Units	2
Shaft Each	1
Configuration	Series
Media Surface Area Each (Soft) (sq. ft.)	56,000
Drive	Mechanical
Hp	5
Average Hydraulic Loading (RBC No. 1) (gpd/sq. ft.)	3.1
Average Organic Loading (RBC No. 1)* (lb. $SBOD_5$/1,000 sq. ft./day)	0.77

**Assumes 83 percent removal of $SBOD_5$ through SBC, or 15 milligrams per liter (mg/L) $SBOD_5$ concentration in influent to RBC No. 1.*

Blowers

Air is provided to the SBC via two variable speed positive displacement blowers (one duty, one standby) located in the blower room of the blower/generator/electrical building, as shown on Figure 3-10. Each blower is provided with a 10 Hp inverter duty electric motor and rated at 220 scfm at 7 pounds per square inch (psi) while rotating at 3,450 rotations per minute. VFDs allow the air flow to be adjusted to match demand.

Control of the blowers can be accomplished automatically or manually. With the switch in the Auto position, the status of each blower will be controlled by the PLC. A mass flowmeter, located on the main discharge header, monitors the air flow rate to the SBC. The PLC subsequently adjusts the blower speed to maintain a set point air flow rate as determined by the mass flowmeter. The PLC also provides automatic alternation of the blowers for purposes of monitoring similar run times and to equalize blower unit wear. Manual blower operation is accomplished by overriding the automatic system at the control panel with the Hand-Off-Auto switch.

Covers

To protect the shaft media and biological growth from direct sunlight exposure, inclement weather conditions, and vandalism, the SBC and RBCs are covered. The covers consist of structural fiberglass reinforced plastic (FRP). The covers are equipped with hinged access ports and doors to allow the operator to view the media and service the shaft drives. There are no reported deficiencies with the FRP covers.

Tertiary Treatment

Effluent Filter

Although currently off line, a travelling bridge rapid sand filter can be utilized for tertiary treatment of the WWTF effluent. The travelling bridge rapid sand filter is designed to polish effluent from the secondary clarifier before disinfection. The additional filtering step reduces

TSS in the wastewater, which in turn reduces chlorine demand and increases disinfection effectiveness.

The travelling bridge rapid sand filter is housed in a concrete tank. The travelling bridge portion of the filter system, together with the sand media, occupies the filter basin, which occupies the main central portion of the filter. A filter influent channel flanks the filter basin on the upstream side, and an effluent channel flanks the filter on the downstream side. The influent and effluent channels have a clear space of 3 feet and continue along the full length (19 feet) of the filter basin. The central filter basin is 12 feet wide, 19 feet long, and 5 feet deep. The wastewater is normally 3 feet deep.

The overall width of the travelling bridge rapid sand filter is 22 feet, and the overall length is 25 feet 8 inches. The larger overall area is needed to contain walkways and ancillary equipment.

The filter is protected from weather and debris from neighboring trees by a FRP roof/enclosure that is similar in design to the RBC and SBC covers.

Fourteen individual cells form the filtration area. Each cell is separated by stainless steel sheets containing sand filter media. Each cell has porous underdrain plates that support the sand filter media and ensure even distribution of backwash (hydraulic cleaning of media) water.

As flow containing suspended solids is applied to the filter, the solids are deposited on the uppermost surface of the media, forming a mat. As the mat forms, it creates a barrier that contributes to solids removal by straining solids from the water. Most solids removal occurs in the mat.

As solids are removed and form the mat, the permeability of the sand filter media decreases. The permeability rate is measured by comparing the water level in the filter compartment to the effluent channel. When the headloss through the sand filter media increases to a predetermined point, a backwash cycle of the sand filter media begins.

During the backwash cycle, the travelling bridge moves down the length of the tank, draws backwash water from the effluent channel, and pumps it through the filtrate ports in reverse flow. Each cell is backwashed individually to minimize the variation in wastewater flow through the filter and subsequent wastewater treatment processes. The effluent filter design parameters are evaluated in the Wastewater Treatment Facility Process Evaluation section of this chapter. Table 3-5 summarizes the effluent filter design parameters for the years 2000-2020.

TABLE 3-5
Effluent Filter Design Parameters for the Years 2000-2020

Type of Filter	Travelling Bridge Rapid Sand
Number of Units	1
Size	12 feet wide by 15 feet long (180 ft^2)
Hydraulic Loading	
At Design Average Annual Flow	1.3 gpm/ft^2
At Design Average Wet Weather Flow	1.5 gpm/ft^2
At Design Peak Wet Weather Flow	3.1 gpm/ft^2
At Design Peak Hour Flow	4.2 gpm/ft^2

Disinfection

Chlorine Disinfection System

Disinfection is needed to inactivate harmful bacteria found in the effluent before it is discharged into Catherine Creek or reused at the golf course for irrigation. Twelve percent solution sodium hypochlorite, delivered in 55-gallon drums, is used as the disinfection chemical. The disinfection system consists of a chemical feed system and the chlorine contact basin facility.

The chemical feed system supplies sodium hypochlorite via a manifold to the suction side of two flow-proportional motor-driven metering pumps (only one metering pump works at a time) that pump the solution to the sodium hypochlorite injection point(s). A valve vault located just southeast of the effluent filter provides control of the sodium hypochlorite injection points. Sodium hypochlorite solution can be directed to the manhole just downstream of the secondary clarifier, to the effluent box of the effluent filter, or to both at the same time. If the effluent filter is off line, sodium hypochlorite injection occurs at the manhole only.

After chlorination, the wastewater flows into the chlorine contact basins. The chlorine contact basins consist of three serpentine concrete tanks that provide the Oregon Department of Environmental Quality (DEQ)-required chlorine contact time. The tanks are equipped with wooden baffle walls that create narrow channels within the tank. Each basin is sloped to a drain to facilitate draining and cleaning and each basin can be isolated independently for maintenance and cleaning.

The chlorinated wastewater flows through the channels of the basins and over the weir gates. After flowing over the weir gates, the wastewater flows into the effluent pump station wetwell, where it is directed over a 90-degree V-notch weir, dechlorinated with sodium bisulfite, and discharged through the outfall and into Catherine Creek, or pumped to the Buffalo Peak Golf Course for beneficial reuse. Effluent pumped to the golf course is not dechlorinated because the chlorination process helps control microbial growth in the golf course 10-inch effluent supply forcemain. Table 3-6 summarizes the chlorine treatment design parameters for the years 2000-2020.

TABLE 3-6

Chlorine Treatment Design Parameters for the Years 2000-2020

Hypochlorite Storage Tanks	
Number of Tanks	2
Volume of Each Tank (gallons)	50
Dosing Pump	
Number of Pumps	2
Capacity of Pump (gallons per hour [gph])	5.0
Type of Pumps	Motor-driven diaphragm metering four-pulley belt drive
Chlorine Contact Basins	
Number of Basins	3
Minimum Volume (All Three Basins in Service)	17,800 gallons
Maximum Volume (All Three Basins in Service)	23,150 gallons
Detention Time (All Three Basins in Service)	1.2 hours at average annual design flow
Detention Time (All Three Basins in Service)	0.4 hour at peak hour design flow

The chlorine contact basins require periodic cleaning to achieve maximum disinfection efficiency. Cleaning frequency depends on effluent quality and weather. Lower effluent quality and hotter temperatures promote conditions of rapid solids accumulation and algae growth. Generally the chlorine contact basin(s) should be cleaned every other week but at least monthly. Additional cleaning may be needed during the hottest months.

Dechlorination System

This section describes the dechlorination system. Chlorine can be toxic to aquatic animals and organisms at relatively low concentrations. Dechlorination is needed to neutralize chlorine and is the final wastewater treatment step before discharging to Catherine Creek.

General

The dechlorination system is located in a dedicated dechlorination room in the control building. The dechlorination system equipment consists of metering pumps, tank, scale, associated valves, tubing, and fittings. The dechlorination system delivers a controlled dose of reducing chemical to the treated chlorinated wastewater, effectively removing the chlorine residual and consequential harmful effects to aquatic life forms. Table 3-7 summarizes the dechlorination system design criteria for the years 2000-2020.

TABLE 3-7

Dechlorination System Design Criteria for the Years 2000-2020

Bisulfite Storage Tanks*	
Number of Tanks	1
Volume of Tank (gallons)	50
Dosing Pump	
Number of Pumps	2
Capacity of Pump (gph)	0.45
Type of Pump	Solenoid-driven diaphragm metering flow-paced via 4-20 mA input from the effluent flowmeter

**The 2000 upgrade project used sodium bisulfite as the dechlorination chemical. This has been changed to sodium thiosulfate for improved operator safety.*

Operation

Sodium thiosulfate is delivered in granular form and contained in a 55-gallon polyethylene drum. The WWTF operator transfers the appropriate amount of sodium thiosulfate to a plastic 50-gallon tank and adds warm water to dissolve the granules. Once dissolved, the operator meters the sodium thiosulfate solution to the discharge point in the chlorine contact chamber (emergency effluent pump wetwell) where it is injected into the wastewater outfall stream with two flow proportional solenoid-driven metering pumps and mixed with an air diffuser. Only one of the two pumps operates at any one time. The air rate in the air diffuser is adjustable by use of a 1-inch ball valve located at the dechlorination chamber. The Wastewater Treatment Facility Process Evaluation section of this chapter contains a discussion of operation effectiveness.

Effluent Pump Station and Forcemain

Wastewater flows from the chlorine contact chamber to a multipurpose effluent pump station. The effluent pump station accommodates both gravity flows and pumped flows to Catherine Creek as well as pumped flows to Buffalo Peak Golf Course. Figure 3-11 illustrates the effluent pump station.

When discharging flows to Catherine Creek, wastewater effluent flows via gravity out of the chlorine contact basin into the effluent pump station wetwell, over a V-notch weir gate, into the emergency effluent pump station wetwell, and through the outfall to Catherine Creek. If Catherine Creek has high flows from spring runoff or a storm event (100-year flood) such that the elevation of Catherine Creek prevents gravity discharge from the WWTF, an emergency effluent pump can be utilized to ensure positive flow from the WWTF to Catherine Creek.

The emergency effluent pump is a vertical axial flow (propeller) type. The pump has a 3 Hp motor, a rated capacity of 750 gpm at 3.2 feet of total dynamic head (TDH), and an 8-inch discharge. The discharge pipe connects to the 8-inch gravity outfall and has been equipped with a check valve to prevent backflow from Catherine Creek into the pump basin when the emergency effluent pump operates.

It should be noted that the effluent emergency pump is completely separate from the Buffalo Peak Golf Course pump system that is also housed in the effluent pump station.

The effluent pump station also contains three pumps that pump treated wastewater effluent via a 10-inch forcemain to an effluent storage pond at the golf course. All three effluent pumps are the vertical turbine type. Pumps No. 1 and No. 2 are two-stage pumps with 7.5 Hp motors, 4-inch discharges, and a hydraulic capacity of 250 gpm at 75 feet of TDH. Pumps No. 1 and No. 2 are normally operated automatically through a PLC and VFD. The PLC and VFD work together to ensure the pumping rate equals the inflow rate such that a steady stream is supplied to the golf course while also making sure the wetwell does not overflow.

Pump No. 3 works similarly to Pumps No. 1 and No. 2. Pump No. 3 is a two-stage unit equipped with a 30 Hp motor, an 8-inch discharge, and a hydraulic capacity of 750 gpm at 120 feet TDH. Pump No. 3 is designed to accommodate peak flows and provide backup for Pumps No. 1 and No. 2 combined. Pump No. 3 is not run with a VFD. Instead, a soft-start motor control mechanism has been added to Pump No. 3 that allows the pump motor to slowly ramp up to its full operating speed.

All three effluent pumps connect to a common 10-inch effluent manifold header pipe and are equipped with individual cushion-type check valves and isolation butterfly valves. The check valves prevent backflow from the forcemain into the pump, and the isolation butterfly valves allow the effluent pump station to remain in service during maintenance events. Flow from the effluent pump station is measured with a 10-inch electromagnetic flowmeter. The treated wastewater flows from the effluent pump station to the effluent storage pond at Buffalo Peak Golf Course via approximately 9,800 lineal feet of 10-inch, pressure class 200 polyvinyl chloride (PVC) piping. The forcemain is shown on Figure 3-12.

Golf Course Effluent Reuse System Description

The Buffalo Peak Golf Course effluent reuse system stores the treated wastewater from the WWTF in a 2.6-acre effluent storage pond. The pond is used to provide equalization and operating storage for treated wastewater. Water can enter the effluent storage pond from three potential sources: treated wastewater from the WWTF, fresh water from the Prescott Ditch, or a tie-in to the City’s municipal water system (to be used for emergency purposes only). An irrigation pump station is located at the south edge of the effluent storage pond; see Figure 3-13. The irrigation pump station building houses two skid-mounted, packaged, electronically-controlled pump stations. The vertical turbine pump station is used for those portions of the golf course irrigated with treated wastewater. A separate horizontal centrifugal pump station is utilized for those portions of the golf course irrigated with fresh water.

The vertical turbine pump station utilizes three pumps ranging from 5 Hp to 75 Hp to meet the wide range of potential flow and pressure conditions in the irrigation system. The packaged pump station is designed to sense pressure and flow. As valves and sprinkler heads throughout the irrigation system are opened and closed, the pump station varies which pump operates to maintain adequate pressure and flow. Rather than using VFDs, the packaged pump station operates the motors at full speed then uses automatically-controlled valves to adjust flow rate and pressure.

The irrigation system for the Buffalo Peak Golf Course consists of PVC pipe of varying diameters, valves, controllers, and sprinkler heads to distribute the treated wastewater to golf course tees, fairways, greens, and rough. System-wide control and monitoring of the golf course irrigation system is performed using a Toro Model Touchnet central controller mounted in the maintenance building near the clubhouse.

An irrigation booster pump station is located approximately 2,000 feet southeast of the irrigation pump station between the hole 13 tee complex and hole 17 tee complex. This booster pump station serves to maintain adequate flow and pressure to those portions of the irrigation system located in the higher elevations of the golf course.

Approximately 60 acres are irrigated at Buffalo Peak Golf Course with the treated wastewater system. Approximately 29 acres are irrigated with the freshwater system. Because the City of Union's treated wastewater provides only a portion of the needed irrigation water, supplemental water comes from Prescott Ditch, which is fed by Catherine Creek approximately one-half mile from the golf course. The City acquired water rights on the Prescott Ditch during the golf course land purchase. The water rights were then converted to a municipal water right, which allows the City to utilize Prescott Ditch water anywhere on the golf course.

Sludge Handling System

Aerobic digesters and associated components make up the sludge handling system. The sludge handling system stores, stabilizes, and reduces the volume of solids produced during the wastewater treatment process. Solids include primary and secondary sludge. Primary sludge comes from the primary clarifier. Secondary sludge comes from the secondary treatment process (SBC, RBC, and secondary clarifier). Scum and floatables are collected and removed in both clarifiers. The aerobic digesters are designed to stabilize solids and minimize odors, flies, and other nuisances from occurring when sludge is placed in the sludge drying beds for drying and pathogen bacteria reduction. The following discussions provide a conceptual overview of the sludge treatment process and descriptions of the sludge treatment components.

Basic Principles

Sludge wasted from the treatment system must receive additional stabilization and dewatering before final disposal at an approved land application site in accordance with the 2005 Biosolids Management Plan (see Appendix D). Figure 3-14 provides a schematic diagram of the solids handling system. Three pumps, located in the sludge pumping room of the control building, are used to transfer sludge throughout the WWTF. As shown on Figure 3-14, the pumps are called the centrifugal (auxiliary) pump, centrifugal sludge pump, and double-disk pump. Any of the three pumps can be utilized to move sludge between any of the major WWTF components. For example, any of the three pumps can move sludge from the primary clarifier to the digesters or drying beds. During normal operation, combined thickened waste sludge is pumped from the primary clarifier by a double-disk sludge pump to the aerobic digester system for stabilization and storage. Once stabilized, the sludge is pumped to either the sludge drying beds or the truck fill station using an auxiliary centrifugal non-clog sludge pump. Figure 3-14 shows a plan and section of the sludge pumping room showing the sludge pumps and associated piping and valves.

Aerobic Digesters

The aerobic digester system stores, stabilizes, and reduces the waste sludge solids volume produced by the wastewater treatment process. Aerobic digestion is essentially a completely mixed activated sludge system. In the presence of excess oxygen, aerobic bacteria metabolize organic material from the feed sludge into carbon dioxide, water, and new bacteria cells. As the bacterial population increases and the available food supply decreases, the bacteria begin to consume their own cellular matter. This is known as the endogenous growth phase. An aerobic digester is designed and operated in such a way that endogenous decay or bacterial self-destruction occurs at a faster rate than bacterial growth. This is accomplished by maintaining a bacterial mass in the aerobic digester that is very large in comparison to the food supply in the waste sludge feed.

Union's aerobic digester system consists of two separate aerobic digester cells (as shown on Figure 3-15) that are designed to operate in series. The system can be operated in parallel, although this is not recommended. The aerobic digester cells are referred to as the primary aerobic digester and secondary aerobic digester in the following discussion. In 2011, an access manhole was added to the south side of the primary digester to aid cleaning and maintenance work.

Sludge solids concentration (volume reduction) is accomplished by settling and removal of the clear supernatant. The primary and secondary aerobic digesters are equipped with decant pipes for clear supernatant removal. Oxygen and mixing in each aerobic digester is provided by a fine bubble aeration system that operates effectively over a wide range of liquid levels. The years' 2000-2020 sludge treatment design criteria are presented on Table 3-8.

The major components of the aerobic digestion system include:

- Primary aerobic digester
- Secondary aerobic digester
- Fine bubble aeration system (each cell)
- Aerobic digester fill piping (each cell)
- Sludge withdrawal piping (each cell)
- Primary aerobic digester gravity overflow pipe (transfers sludge from the primary aerobic digester to the secondary aerobic digester via gravity)
- Supernatant withdrawal piping (each cell)
- Sludge pumping room providing access to valves and pumps
- Aerobic digester blowers and associated air piping

TABLE 3-8
Sludge Treatment Design Criteria for the Years 2000-2020

Aerobic Digesters	
Number of Aerobic Digesters	2
Maximum Total Volume (gallons)	157,000
Minimum Total Volume (gallons)	118,000
Volume of Primary Digester (gallons)	
Maximum	92,000
Minimum	76,000
Volume of Secondary Digester (gallons)	
Maximum	65,000
Minimum	42,000
Average Combined Thickened Sludge Feed Rate to Digesters (gpd)	2,255
Volume to be Wasted from Digesters (gpd)	1,930
Mean Cell Residence Time (MCRT) (days) at Average Feed Rate to Digester	70
Minimum Volatile Suspended Solids Destruction (%)	38
Sludge Pumps	
Combined Thickened Sludge Pump	
Number of Pumps	1
Capacity	Variable, maximum 100 gpm, 20 feet TDH, and 4.5 percent solids
Horsepower	5, inverter duty motor
Type of Pump	Penn Valley double-disk positive displacement type
Control	VFD, timed start/stop
Discharge (inches)	4
Waste Digested Pump (Auxiliary)	
Number of Pumps	1
Capacity	Unknown
Horsepower	15
Type of Pump	Cornell centrifugal, non-clog
Sludge Drying Beds	
Number of Beds	4
Size of Each Bed (sq. ft.)	2,400
Total Bed Area (sq. ft.)	9,600
Average Solids Loading Rate (pounds of dry solids/ sq. ft./ year)	18
Type of Beds	Asphalt paved

Operation and Process Control

During normal operation, waste sludge from the primary clarifier is pumped through the sludge pump to the primary aerobic digester. As fresh sludge is pumped into the tank, the displaced liquid from the primary aerobic digester is transferred to the secondary aerobic digester for further stabilization. Air from the aerobic digester blowers located in the blower room of the blower/generator/electrical building is supplied to the aerobic digesters through a fine bubble diffuser grid located in the bottom of each cell.

The important parameters necessary to maintain an aerobic digestion system are dissolved oxygen (DO), percent total solids, percent total volatile solids, and pH. DO levels in each of the aerobic digester cells should be maintained between 1 and 2 mg/L. DO concentrations less than 1 mg/L can cause odor problems and decreased digester efficiency. Higher DO levels (3 mg/L and above) can produce a mixed liquor with poor settling qualities and excessive pH drop. The DO concentration in the aerobic digesters is adjusted by increasing or decreasing the amount of air supplied.

Supernatant Removal (Decanting)

Each aerobic digester cell is equipped with a variable level supernatant draw-off pipe. The supernatant removal pipe is attached to a swivel joint and is raised and lowered with a hand-operated winch mounted to the wall of each aerobic digester. To remove supernatant, the aeration blowers must be turned off. After allowing sufficient time for settling, the decant pipe is lowered into the clear supernatant zone. The optimal level for the decant pipe intake is just below the liquid surface. The supernatant withdrawal operation must be monitored to keep the decant pipe within the clear supernatant zone and to stop the decanting by raising the pipe after all the relatively clear liquid has been removed.

The aerobic digester supernatant is returned to the influent pump station wetwell via a 4-inch drain pipe. Aerobic digester supernatant is usually relatively low in BOD and suspended solids, and the loading on the treatment system resulting from supernatant return is not significant in relation to overall plant loadings. Supernatant should be monitored periodically to determine which operating conditions produce the best supernatant and to help anticipate potential problems.

Aerobic Digester Aeration System

The aerobic digester system includes a fine air bubble aeration system that provides air and mixing to the aerobic digester contents. The aeration blowers are either operated continuously or cycled on and off. The DO level is the principal parameter used to control the aeration system in each aerobic digester. DO levels are adjusted by changing the air blower run time.

Foam and unpleasant odors present challenges to the aerobic digester system. A discussion of foam issues, DO levels, and actions to correct low DO levels and foam is presented in the Wastewater Treatment Facility Process Evaluation section of this chapter.

Sludge Dewatering and Disposal

After sludge has been adequately stabilized in the aerobic digesters, it can be pumped to the sludge drying beds for dewatering or to the sludge truck for disposal in liquid form. The sludge disposal site was approved by the DEQ on October 30, 1992. The approval is found in the City's 2005 Biosolids Management Plan (see Appendix D).

Sludge Drying Beds

Four sludge drying beds reduce the volume of stabilized sludge to facilitate handling for removal to the disposal site. Each drying bed is equipped with decanting gates to return clear liquid from the drying beds after settling back to the headworks. The operator doses the sludge drying beds in sequence, so sludge is dried and removed before sludge is added to the drying beds. Diligent, careful dosing and drying bed cycling prevents odors and vector attraction. If unpleasant odors develop, the operator will turn or spread out the sludge to accelerate the drying process. Figure 3-2 shows the sludge drying beds.

Sludge Truck Fill

Stabilized sludge is also removed in liquid form. A sludge truck fill station, located adjacent to the control building, accepts stabilized liquid sludge for disposal.

Blower Facilities

The blower room, located in the blower/generator/electrical building, contains the aerobic digester blowers and the RBC/SBC blowers. The aerobic digester blowers supply the air to satisfy the aerobic digester mixing and stabilization requirements. The RBC/SBC blowers provide air to the SBC for maintaining the biological treatment process and driving the shaft.

Aerobic Digester Blowers

Aerobic digester Blowers No. 1 through No. 3 supply air to the aerobic digesters through the aeration piping and diffuser assemblies. Each blower is a Sutorbilt rotary lobe, positive displacement, with VFD, and belt-driven by an electric motor. Refer to Table 3-9 for the aerobic digester blowers design criteria.

Each blower takes air suction through an air filter located on the intake silencer. The filters remove dust and particulate from the inlet air to prevent the aerobic digester’s diffusers from clogging and protects the blowers from wear and damage.

The air filtering material is replaceable. When new, the pressure loss across the filters will approximate 1/2 inch of water column. This pressure loss increases as dust is trapped. The filtering material should be replaced when the pressure loss reaches 6 inches of water column.

After the air has been filtered, it flows through an inlet silencer, is compressed by the blower, and discharged through an exhaust silencer. Personal noise reducing equipment is not required for short-term exposure if the blowers and silencers are operating properly, but should be used when long-term exposure is expected. The design sound levels for the blowers are lower than the Occupational Safety and Health Administration limits requiring hearing protection.

Following the exhaust silencers, air flows through the main discharge header. Each aerobic digester has a dedicated air line from the main discharge header that provides air to each aerobic digester independently. Individual, dedicated air lines ensure correct air dosing rates to each aerobic digester. Each air supply line is equipped with a mass air flowmeter that measures the total blower output to each aerobic digester and controls, through an operator-adjustable set point, the blower speed and air output. The automatic air flow system can be overridden and operated manually if needed. The blowers are interconnected through a 6-inch header that allows Blower No. 3 to service the RBC/SBCs if needed.

Rotating Biological Contactor/Submerged Biological Contactor Blowers

RBC/SBC Blowers No. 4 and No. 5 currently supply air to the SBC. Piping has been provided to allow future connection to supply air to the RBC, if needed. Each blower is a Sutorbilt rotary, positive displacement, with VFD, and belt-driven by an electric motor. Refer to Table 3-9 for the design criteria of the RBC/SBC blowers.

As with the aerobic digester blowers, air flows through a main discharge header to a 6-inch air supply line to the SBC. The supply line is equipped with a mass air flowmeter. Like the aerobic digester blowers, the mass air flowmeter controls the speed and output of the RBC/SBC blower through an operator-adjustable set point located on the operator interface panel.

TABLE 3-9

Digester Blowers and RBC/SBC Design Criteria for the Years 2000-2020

Digester Blowers	
Number of Blowers	2
Capacity of Each Blower (scfm)	260
Horsepower Each Blower (scfm)	25
Type of Blower	Sutorbilt rotary lobe, positive displacement, with VFD, and belt-driven electric motor
RBC/SBC Blowers	
Number of Blowers	2
Capacity (scfm)	220
Horsepower	10
Type of Blower	Sutorbilt rotary lobe, positive displacement, with VFD, and belt-driven electric motor

Potable Water System

Potable water is obtained from the City's domestic water system. Potable water is used in the WWTF control building for drinking water, laboratory service sinks, restroom, hypochlorination water treatment system, and one exterior hose bib. Potable water running through a reduced pressure (RP) backflow prevention device supplies water to the sodium thiosulfate system (dechlorinating system). This is the only active water system backflow preventer on the potable water system. The RP backflow prevention device must be tested annually by a certified backflow prevention technician.

Impure Water System

The impure water system consists of the impure water pumps and all necessary appurtenances to complete the system. Impure water is obtained from the final treatment plant effluent after it has been chlorinated and cycled through the chlorine contact basin. A hose bib in the sludge pumping room is equipped with a vacuum break anti-siphon device to provide non-potable water for spraying down the room. This hose bib is labeled "Water Unsafe."

The impure water pump station has two pumps plumbed in parallel. The pumps operate singly or in combination. Each pump has a capacity of 50 gpm against a TDH of 155 feet. Each pump motor is controlled by a VFD. The impure water pumps work with a hydro pneumatic pressure tank that maintains system pressure. This pressure is adjustable between 50 and 90 psi.

The system operates under automatic control as follows: The speed and number of pumps running are adjusted to maintain 75 psi. The flow range of one pump is between 10 and 50 gpm. As the demand for impure water increases to the upper limit of the first pump, the lag pump starts. The speed of both pumps is varied, at the same rate, to maintain the system pressure and satisfy demand. Supply is decreased in reverse order as demand decreases.

All controls are programmed into a PLC. All set points are operator accessible and adjustable. High and low pressures activate the corresponding alarm.

A Hand-Off-Auto selector switch is provided at the pump panel to select the mode of pump operation. In the Hand position, each pump runs continuously with the speed varied manually at the VFD. In the Auto position, the pumps operate automatically as described above.

Impure water is utilized within the plant for hose bibs, spray nozzles on the mechanical screen, and raw sewage wetwell sensor flush water.

TABLE 3-10

Impure Water System Design Criteria for the Years 2000-2020

Number of Pumps	2
Pump Capacity, gpm	50
Total Dynamic Head, ft.	155
Operating Pressure, psi	50 to 90

Natural Gas System

Natural gas is supplied from a City-wide gas distribution system operated by Avista Utilities to the maintenance building, the blower/generator/electrical building, and the control building for the gas-fired heaters and furnaces.

Electrical System

Oregon Trail Electric Cooperative (OTEC) provides electrical power to the WWTF. Power comes from pole-mounted transformers and enters the WWTF at the power entry point on the rear of the blower/generator/electrical building. The main switchboard is located on the corresponding inside wall in the electric room. The plant electrical system consists of the main switchboard, distribution switchboard, automatic transfer switch (ATS), standby generator, MCC, motors, VFDs, panelboards, transformers, control panels, motor controls, PLCs, alarms, devices, and light fixtures.

OTEC provides service to the main switchboard at 480/277 volts, 3-phase, 4-wire wye through a 600 ampere main circuit breaker. During normal operation, the main circuit breaker provides power to the primary distribution panel (MCC1). The operator has added a second main circuit breaker to separate the WWTF electrical system such that if one of the main circuit breakers trips, at least half of the WWTF remains functional.

Standby power is provided by a 250 kilowatt, 480 volt, 3-phase, 4-wire diesel (Isuzu) engine-driven generator. The generator is sized to supply power to the entire plant. If the generator becomes overloaded, an algorithm is in place to remove system demand components until the overload condition is corrected. The generator is connected to the alternate power side of the ATS through a 600 ampere circuit breaker. The ATS connects normal power from the electric utility company to MCC1 and the rest of the distribution panels during normal operation. The ATS starts the generator and switches to standby power during a utility power outage. Circuit breakers have been coordinated so the circuit breaker closest to the fault will trip first and isolate the fault, allowing the rest of the distribution system to continue operating.

Alarm, Monitoring, and Telemetry System

Union's WWTF has an extensive telemetry system that monitors the Oregon Street Lift Station and critical WWTF components. The telemetry system can be accessed through an HMI and can be bypassed and operated manually. The telemetry system is actively maintained with periodic improvements, including video, carbon monoxide, and fire monitors in selected critical areas. When a monitored parameter stops working within specification, an alarm is triggered. The alarm contacts the on-call operator, who must acknowledge the alarm. If the operator does not acknowledge the alarm, the telemetry system automatically dials alternative numbers in sequence until it receives an acknowledgement.

Wastewater Treatment Facility Process Evaluation

The unit process evaluation was undertaken to determine the adequacy of existing mechanical WWTF components to meet the current and future wastewater processing needs of the City of Union. The evaluation is based on published and commonly accepted design criteria related to each unit. The design criteria shown on Figure 2-5 in Chapter 2 have been used to evaluate hydraulic and process adequacy as appropriate for the component being evaluated.

Building Evaluation

The WWTF buildings are described in the Existing Wastewater Treatment Facility Overview section of this chapter. As previously discussed, there are four main buildings in the City's WWTF: the headworks building, control building, blower/generator/electrical building, and maintenance building.

Each building was visually inspected for deterioration, leaks, finish, general condition, and function. All four buildings have been constructed, or reconstructed, using durable low maintenance materials such as concrete, concrete masonry units (block), or steel with raised-rib roofing and siding where needed. All four buildings appear to be in good repair, and each building is used for its designated purpose.

Challenges exist with the control and maintenance buildings. The control building predates the WWTF and has received multiple modifications. Modifications to date have been necessary to accommodate ongoing equipment changes and safety considerations. For example, a doorway was enlarged to allow a forklift to move chemicals. This improved operator safety from the viewpoint of chemical exposure and lifting hazards.

Challenges with the maintenance building are inherent to the use of the building. It is common for several repair projects to be in progress simultaneously. Additionally, it is necessary to stock pipe and other parts for common repairs in the maintenance building. Additional pipe racks are needed to improve organization and equipment access.

Preliminary Treatment (Headworks)

As shown on Figure 2-5, the headworks currently receives an average annual flow (AAF) of 0.154 MGD. The AAF is projected to increase to 0.174 MGD by 2034. Peak hour flow (PHF) is currently estimated at 0.693 MGD based on commonly utilized peaking factors and is projected to increase to 0.783 MGD by 2034.

Screens

As previously described, initial preliminary treatment is achieved through a mechanical fine screen. The mechanical fine screen has a rated hydraulic capacity of 1.1 MGD. Since the rated capacity exceeds the 2034 peak hour projected loading of 0.783 MGD, the mechanical screen is considered hydraulically adequate for the 20-year time frame represented by this planning study.

While there is no immediate need to replace or modify the mechanical screen, the operator reports that because the screen accumulates debris before cycling, influent backs up in the 14-inch diameter influent pipe and causes clogging. Clogging usually occurs at 18-month intervals. This deficiency can be alleviated by cleaning the influent line annually.

Parshall Flume

The 6-inch Parshall flume has a maximum hydraulic rated capacity of 2.5 MGD, which exceeds the projected peak hour loading of 0.783 MGD in the year 2034. The Parshall flume is considered hydraulically adequate for the planning period represented by this WWFP.

Operationally, the Parshall flume is affected by the mechanical screen cycles. As the mechanical fine screen collects debris, wastewater collects in front of the screen. When the mechanical fine screen cycles, wastewater backed up by the screen surges into the Parshall flume, causing elevated flow readings. This flow surging effect can be minimized by reducing the cleaning cycle trigger depth of the screen. Although the instantaneous flows are influenced by screen operations, the totalized flow should provide an accurate total 24-hour influent volume. No modifications are immediately necessary to the Parshall flume.

Composite Influent and Effluent Samplers

The composite influent and effluent samplers are identical and have the following capabilities:

- Sample collection capacity of 10 liters and sampling range from 10 to 9,990 milliliters.

Composite samples are normally collected during 8- or 24-hour time frames. Neither current nor projected flows will exceed the samplers' performance capacity. The composite samplers are adequate for the time represented by this WWFP. Periodic maintenance will be necessary to keep the samplers functioning and in reliable working order.

Influent Pumping

Influent pumping is accomplished with two Gorman Rupp 7.5 Hp pumps. Each pump is rated at 0.864 MGD when operating in lead mode. The combined (lead and lag) capacity is 1.15 MGD, making the pumps hydraulically adequate for the projected flows to the WWTF during the 20-year study period. A two-pump system provides redundancy, and the ability to switch pumps from lag to lead provides system flexibility.

Although hydraulically and operationally adequate, and the operator reported that very few repairs have been needed, the influent pumps have been in operation much longer than their expected design life and may need to be replaced in the near future. The Implementation Plan presented in Chapter 5 outlines the schedule for replacement.

Primary and Secondary Treatment

Clarifiers

Two clarifiers are in service at the Union WWTF. The primary clarifier treats primary sludge, while the secondary clarifier treats secondary sludge. Both clarifiers have been analyzed for conformance with industry standard ratings and found to be hydraulically and operationally adequate. The following table provides a summary of the 2014 and 2034 projected loadings and the associated overflow rates for each clarifier.

TABLE 3-11

Clarifier Hydraulic Evaluation Summary

	2014	2034	Standard Accepted Values
PRIMARY CLARIFIER			
Average Annual Flow	0.154 MGD	0.174 MGD	
Estimated Overflow Rate	342 gal/sq. ft./day	387 gal/sq. ft./day	800 to 1,200 gal/sq. ft./day[1]
Peak Hour Flow	0.693 MGD	0.783 MGD	
Estimated Overflow Rate	1,540 gal/sq. ft./day	1,740 gal/sq. ft./day	2,000 to 3,000 gal/sq. ft./day[1]
SECONDARY CLARIFIER			
Average Annual Flow	0.154 MGD	0.174 MGD	
Estimated Overflow Rate	250 gal/sq. ft./day	283 gal/sq. ft./day	400 to 800 gal/sq. ft.[2]
Peak Hour Flow	0.693 MGD	0.783 MGD	
Estimated Overflow Rate	1,126 gal/sq. ft./day	1,273 gal/sq. ft./day	1,000 to 1,200 gal/sq. ft.[2]

Notes:

[1] Metcalf & Eddy, 3rd Edition, page 475.

[2] Metcalf & Eddy, 3rd Edition, Table 10-12, page 588.

gal/sq. ft./day = Gallons per square foot per day

Both clarifiers show overflow rates that are well within industry standards for AAF. The primary clarifier shows an overflow rate that meets industry standards during PHF, while the secondary clarifier’s overflow rate will not exceed the estimated peak hour overflow rate recommendation until the end of the 20-year study period.

Additional parameters were checked to evaluate the clarifiers. These parameters are listed on Table 3-12.

TABLE 3-12
Physical Properties of Primary and Secondary Clarifiers

	Estimated Flow Rates*	Hydraulic Retention Time (Hours)	Standard Accepted Values
PRIMARY CLARIFIER Volume: 33,870 Gallons			
Average Annual Flow - 2014	0.154 MGD	5.2	1.5 to 2.5 Hours at AAF[1]
Average Annual Flow - 2034	0.174 MGD	4.7	
Peak Hour Flow - 2014	0.693 MGD	1.2	
Peak Hour Flow - 2034	0.783 MGD	1.0	
SECONDARY CLARIFIER Volume: 64,400 Gallons			
Average Annual Flow - 2014	0.154 MGD	10	1.5 to 2.5[2]
Average Annual Flow - 2034	0.174 MGD	8.87	
Peak Hour Flow - 2014	0.693 MGD	2.2	
Peak Hour Flow - 2034	0.783 MGD	1.9	
PHYSICAL PROPERTIES	**Actual (Feet)**	**Recommended (Feet)**	**Source**
PRIMARY CLARIFIER			
Depth	10	10 to 15	Metcalf & Eddy, 3rd Edition, Table 9-8, page 477.
Width	24	10 to 200	
SECONDARY CLARIFIER			
Depth	14	10 to 15	Metcalf & Eddy, 3rd Edition, Table 10-12, page 588.
Width	28	Not Listed	

**See Figure 2-5.*
[1] *Metcalf & Eddy, 3rd Edition, page 473.*
[2] *Metcalf & Eddy, 4th Edition, page 398.*

Overall, the primary and secondary clarifiers appear to be within industry standards for physical size and hydraulic loading. Mechanical problems with the clarifiers have been minimal and little maintenance has been required. Visual inspections of the exposed portions of the clarifiers did not reveal deterioration of either the concrete tank or the mechanical components. Component repairs have been scheduled for 2020 and are included in the Implementation Plan presented in Chapter 5.

Biological Contactors and Biological Treatment Evaluation

The biological contactors were evaluated for hydraulic loading, hydraulic retention time, and organic loading. The evaluation utilized historic BOD_5 loads and compared them to standard accepted values. The following table summarizes the evaluation.

TABLE 3-13

Biological Contactor Treatment

	2014	2034	Standard Accepted Values
HYDRAULIC LOADING			
Average Annual Flow	0.610 gal/sq. ft.	0.689 gal/sq. ft.	0.75 to 2.0 gal/sq. ft.[1]
Peak Hour Flow	2.74 gal/sq. ft.	3.09 gal/sq. ft.	
HYDRAULIC RETENTION TIME			
Average Annual Flow	5.75 Hours	5.08 Hours	1.5 to 4 Hours[2]
Peak Hour Flow	1.27 Hours	1.13 Hours	
ORGANIC LOADING (Treatment Level - Secondary[2])			
Average Annual Flow	1.05 lb/1,000 sq. ft./Day	1.2 lb/1,000 sq. ft./Day	2.0 to 3.5 per 1,000 sq. ft. per day

[1] *Metcalf & Eddy, 3rd Edition, page 632.*

[2] *Metcalf & Eddy, 3rd Edition, Table 10-17, page 632.*

Notes:

Media area RBC equals 112,000 sq. ft.

Media area of SBC equals 252,600 sq. ft.

Evaluation based on combined surface area of 364,000 sq. ft.

Average Annual Flow 2014 = 154,000 gpd.

Average Annual Flow 2034 = 174,000 gpd.

Peak Hour Flow 2014 = 693,000 gpd.

Peak Hour Flow 2034 = 783,000 gpd.

The biological contactor evaluation showed adequate hydraulic loading capacity for the 2014 AAF and 2034 AAF, slightly exceeding the hydraulic loading standard values for PHF in 2014 and 2034. Hydraulic retention time is adequate for AAF in 2014 and 2034, but is slightly less than standard accepted values for PHF in 2014 and 2034. Even though hydraulic loading and hydraulic retention times do not match standard accepted values at PHF, no distress has been observed on the WWTF and monitoring results comply with permitted limits. The biological contactors are considered adequate for general conditions. Additional biological contactor capacity may become necessary if effluent BOD_5 values begin exceeding the permitted limits.

Historically, the biological contactor system has successfully maintained BOD_5 (organic loading) levels below the NPDES Permit required levels, as shown on Figure 2-4 in Chapter 2. However, it is anticipated that the renewed NPDES Permit will contain ammonia limits. Biological contactors have been shown to reduce ammonia in wastewater, and the test data in Chapter 2 show that the biological contactor system can reduce the influent ammonia from about 31 mg/L to 10 mg/L (average of the available data set [see Table 2-4 in Chapter 2]). This equates to an ammonia reduction of approximately 67 percent. To achieve further ammonia reduction necessary to meet the anticipated DEQ mandate, the reduction must be reliably increased to 87 percent. The current available equipment cannot reduce ammonia levels by this percentage. Alternative 2 in Chapter 5 evaluates additional biological contactor capacity necessary to treat wastewater for the anticipated NPDES Permit ammonia limits.

Operationally the SBC and RBC units have functioned well within their design parameters. Although the RBC was installed as part of the original WWTF in 1977 and it has exceeded its design life of 20 years, it should be noted that the RBC was refurbished in 2000 as part of the WWTF upgrades. A bearing was recently replaced on the RBC to ensure continued operation. No operational problems were reported for the SBC. It is anticipated that the SBC and RBC units will remain operational through 2034 with routine maintenance.

Submerged Biological Contactor Blowers

The SBC blowers have a rated capacity of 220 scfm each, exceeding the SBC drive and process air requirements of 155 scfm. The SBC blowers provide the prescribed air requirements and have adequate redundancy in the form of two separate blowers. The blowers are adequate for current and projected loading. The blowers were installed as part of the 2000 wastewater system improvements project and appear to be functioning properly. Replacement of the blowers with more efficient blowers is included in the Implementation Plan.

Covers

The SBC and RBC are covered with FRP structures. A visual inspection of the covers showed there is little to no deterioration and all components are functioning satisfactorily. There are no immediate maintenance needs associated with the covers.

Tertiary Treatment

Effluent Filter

As previously described, the travelling bridge rapid sand filter is off line. The design parameters show that the travelling bridge rapid sand filter (effluent filter) can treat wastewater from 1.3 gpm/sq. ft. to 4.2 gpm/sq. ft. The equivalent daily flow capacity becomes 337,000 gpd at 1.3 gpm and 1,000,000 gpd at 4.2 gpm. The current AAF equals 154,000 gpd, and the projected 2034 PHF is 783,000 gpd. If the travelling bridge rapid sand filter were on line, it could accommodate the projected range of flow. The travelling bridge rapid sand filter cannot be evaluated for actual effectiveness to reduce chlorine demand in the effluent because there is no site-specific testing data associated with this installation.

If the City desires to return the travelling bridge rapid sand filter to service, the media, pumps, drives, general plumbing, drains, electrical, and other associated equipment would require servicing and verification that all components work separately and as complete units. Depending on the level of deterioration experienced while dormant, it is anticipated that one to two weeks would be required to verify that each component was operational, make any repairs, test, and return to full service. A visual observation of the travelling bridge rapid sand filter also revealed that, over time, leaves and other items have migrated into the filter area. It is, therefore, likely that the filter media would require removal and replacement.

The travelling bridge rapid sand filter is covered with an FRP enclosure. A visual inspection of the enclosure showed that it is in good condition with little to no deterioration.

Disinfection

Chlorine Disinfection System

To check the chlorination system's hydraulic capacity and chlorine contact time adequacy, the chlorine system was evaluated by comparing AAF to the available chlorine contact chamber volume. The evaluation assumes that PHF does not control the chlorine contact chamber volume requirement (chlorine dosing increases in proportion to flow to provide PHF disinfection) and that the largest of the three chlorine contact chambers is off line. The resulting net chlorine contact chamber available to treat effluent ranges from 11,700 gallons to 15,200 gallons, depending on the depth of liquid in the chamber. At the 2014 AAF rate of 154,000 gpd, and assuming the least available chlorine contact chamber volume available of 11,700 gallons, the chlorine contact time is estimated at 1.8 hours. The 2034 AAF is projected as 174,000 gpd. Assuming 11,700 gallons of chlorine contact chamber available volume, the chlorine contact time is approximately 97 minutes, or 1.6 hours. Although industry standards call for 15 to 45 minutes of contact time, the State of Oregon requires 60 minutes. Since the chlorine contact time of 1.8 and 1.6 hours exceeds the industry standard requirement and State of Oregon standard, the chlorine contact time is adequate at the 2014 and 2034 AAF.

The chlorine contact chambers were also evaluated to determine the length to width ratios. The original chlorine contact chamber is 2.5 feet wide and 72 feet long. The result is a 29:1 length to width ratio. The chlorine contact chamber installed during the 2000 wastewater system improvements project is 2.5 feet wide and 48 feet long. The resulting length to width ratio equals 19:1. Industry standards consider a length to width ratio of 10:1 adequate. Both chlorine contact chambers provide a length to width ratio within industry standard requirements.

The chlorine dosing portion of the chlorination system was also evaluated. Historically chlorine has been dosed from 11 to 21 gpd through Encore 700 diaphragm metering pumps. Increased feed rates up to 317 gph are available through the pumps. Figure 2-4 shows there are no violations of coliform limits. The chlorination feed portion of the system is considered adequate based on current and projected flows and capacity and laboratory test results. Physical components of the chlorine contact basins were visually inspected. A slide gate does not properly seal in the chlorine contact basin. Additionally, some chemical erosion of the concrete has occurred in localized areas. Both represent relatively minor maintenance items. The slide gate and eroded concrete should be repaired in conjunction with regularly scheduled plant maintenance.

Dechlorination System

The dechlorination chemical (sodium thiosulfate) is dissolved into liquid form and dosed to the effluent outfall vault through a dedicated pump. Sodium thiosulfate is dosed from 20 to 35 pounds per day.

As shown on Figure 2-4, the dechlorination system reliably reduces effluent chlorine residuals below the NPDES permitted limits of 0.07 percent per day and 0.03 percent per month. The sodium thiosulfate dosing rate can be adjusted to accommodate projected 2034 flows. The chemical dosing portion of the dechlorination system is adequate for current flows and flows projected through 2034.

Operationally, the dechlorination system was originally designed to receive air flow from a continuation of the aerobic digester's air system. Foaming issues in the digesters require the air blowers to be turned off periodically, resulting in intermittent air flow to the dechlorination mixing system. This deficiency has been corrected by extending an air line from the SBC to the dechlorination system. A permanent retrofit is needed to ensure the air line (currently above ground) is properly protected. The resultant system will be able to obtain air flow from either the aerobic digester air supply or the SBC air supply, effectively improving redundancy and reliability. It should be noted that if the City chooses to implement a wastewater treatment alternative that removes effluent flow to Catherine Creek, the dechlorination system will not be needed. Connecting the dechlorination system to the SBC air system has been tentatively included in the Implementation Plan for 2017-18.

Effluent Pump Station and Forcemain Evaluation

The effluent pump station contains four pumps. Three pumps transfer effluent flows to the golf course during the growing season. The fourth pump is an emergency effluent pump that provides positive head needed to discharge effluent during high flow events in Catherine Creek. High flows are commonly experienced in the spring months during snowmelt and storm events.

All four pumps have been evaluated in respect to their design capacity. The three golf course pumps have been evaluated for adequacy to pump effluent to the golf course.

Hydraulic Evaluation

The 2014 AAF equals 154,000 gpd, which equates to 107 gpm. Either of the smaller (250 gpm) effluent pumps can provide this flow capacity. The 2034 AAF is estimated at 174,000 gpd, or 121 gpm. Either of the 250 gpm pumps can accommodate the projected 2034 AAF.

The 2014 PHF equals 693,000 gpd (see Figure 2-5), which equals 481 gpm. The PHF requires both 250 gpm pumps to function to accommodate the projected flow. Both 250 gpm pumps are equipped with VFD controls and can run efficiently in this design range.

The 2034 PHF is projected to be 783,000 gpd, or 544 gpm. This rate exceeds the total capacity of the two 250 gpm pumps. Once the capacity of the 250 gpm pumps is exceeded, the 750 gpm pump is automatically switched on. The 750 gpm capacity exceeds the 544 gpm projected capacity. Therefore, the effluent pump station has adequate hydraulic capacity to transfer effluent from the WWTF to the golf course irrigation pond at the 2014 AAF and PHF and projected 2034 AAF and PHF.

The fourth (emergency effluent) pump functions separately from the golf course effluent pumps. The emergency effluent pump is rated at 750 gpm with 3.2 feet TDH. The rated capacity exceeds the 2014 and projected 2034 flows described above and is considered adequate.

To complete the analysis, the effluent velocity in the forcemain was estimated for the PHF projected to 2034. This velocity, neglecting losses from friction and elevation is approximately 2.2 feet per second, which is less than half of the standard accepted allowable velocity for 10-inch pipe. The existing WWTF effluent pump station and forcemain have sufficient capacity to accommodate projected 2034 flows to the golf course.

The effluent storage pond has 5 million gallons (MG) of normal operating storage and an additional 3.6 MG of emergency storage. This provides an estimated 20 days of emergency storage at the projected 2034 average annual flow of 0.174 MGD. The emergency storage was built into the pond for times when the irrigation pump station or other components of the irrigation system may be inoperable. The estimated emergency storage volume will be adequate for the 2034 design flows.

The golf course effluent reuse system can utilize approximately 42.75 MG per year when irrigating the 60 acres. The WWTF currently provides approximately 30 MG per year to the golf course. Based on the 2034 projected flows, the WWTF would provide approximately 36 MG per year to the golf course. The difference between the treated water supplied by the WWTF and the 42.75 MG per year required to irrigate the effluent reuse irrigation area is made up by fresh water supplied by Prescott Ditch. The effluent reuse system at Buffalo Peak Golf Course has the capacity to land-apply the treated effluent provided by the WWTF through the year 2034 based on the current NPDES Permit operating constraints.

The effluent reuse system at Buffalo Peak Golf Course appears to be in good working condition. There have not been reported problems with treated effluent pumps or the irrigation system.

Aerobic Digesters

Aerobic digestion provides a mechanism for oxidation of BOD_5, volatile solids (VS), and pathogen reduction. Parameters used to measure the aerobic digesters' treatment capacity include digester tank material, system volume, hydraulic resident time, air mixing and oxygenation, and MCRT. The aerobic digesters are constructed with reinforced concrete. The original digester is considered an in-ground tank, while the newer digester is considered an aboveground tank. The concrete mass provides a relatively stable temperature for sludge processing.

The digesters are operated in series. Volume analysis is based on the combined volume of both digesters. The minimum combined digester volume is approximately 118,000 gallons, and the maximum volume is approximately 157,000 gallons. The average hydraulic retention time and MCRT are calculated by dividing the volume available by the projected daily sludge loading. The projected sludge loading to Union's digesters at AAF is estimated as 1,390 gpd. The resulting MCRT is 113 days in the primary digester and 85 days in the secondary digester. Temperature-dependent industry standards call for 15 to 20 days MCRT at 20°C. Union's MCRT is adequate.

Operationally, the aerobic digesters have pervasive odor and foaming problems. The odor issues seem to stem from the inability to aerate and reliably provide the needed DO levels in the digesters. When air flow is applied to the aerobic digesters at a rate high enough to mix sludge and entrain sufficient air to support the biomass, excessive foaming results. To avoid an overflow, air then has to be turned off. Without air flow, the biomass needed to break down sludge cannot survive, and more odor and foaming results. By remedying the foaming problem, the DO content is depleted, which, in turn, reduces the biomass. Without a healthy biomass, odors and foaming persist.

The City is working to rectify the odor and foaming problems, and is completing the first step toward a sound engineering solution by adding sensors that measure DO, temperature, and pH. Once sufficient data have been collected, a cost-effective solution can be designed. Potential solutions include adding mechanical mixers to reduce the required air volume, adding a biofilter to neutralize odors, adding a water mister to reduce foam, possible lime addition, and changing from fine bubble diffusers to coarse bubble diffusers. Estimates for mechanical mixing and a biofilter are provided at the end of Chapter 5 and are summarized in the Implementation Plan, also in Chapter 5.

Sludge mixing and oxygenation to reduce BOD_5 and VS are provided by up to three rotary lobe blowers. Each blower provides up to 260 scfm of air flow at standard atmospheric conditions. The total available air flow is approximately 780 scfm. Mixing requires approximately 20 to 30 scfm per 1,000 cubic feet (CF) of digester volume. At this rate, the primary digester requires 200 to 370 scfm for mixing and the secondary digester requires about 110 to 260 scfm. The total worst-case mixing air requirement equals approximately 630 scfm. Since the available air flow (780 cfm) exceeds the anticipated maximum demand, the available mixing air is considered adequate. The 2034 VS production to be treated in the digester was estimated at 313 pounds per day, approximately 40 percent from the primary digester and 60 percent from the secondary digester. The oxygen required to digest the volatile solids = 1.9 pounds of oxygen per pound VS per day. At this estimated rate, 595 pounds of oxygen per day are required. Air at standard atmosphere and pressure contains approximately 21 percent oxygen, equaling 0.0169 pound of oxygen per CF. To satisfy the required digestion process, the daily air demand works out to approximately 35,000 standard cubic feet per day or 24 scfm. This is assuming 100 percent reduction in VS; however, actual reduction rates are between 40 and 50 percent, so the required 24 scfm of oxygen is conservative. Since mixing requires 630 scfm, exceeding 24 scfm, the mixing air requirement controls and the digestion air requirement is satisfied. The oxygen required to treat VS was estimated at 24 scfm. Since this requirement is about 12 percent of the lowest required primary digester's mixing air flow and approximately 22 percent of the secondary digester's mixing air flow requirement, the mixing air flow demand controls and the oxygen requirement for sludge treatment is acceptable.

Based on the evaluation described above, the WWTF has the ability to supply the required DO to the aerobic digesters. The foaming problems are preventing the adequate application of DO. Since the required oxygen cannot be applied, an odor problem has arisen.

Sludge Dewatering and Disposal

Sludge treated and stored in the aerobic digesters must be periodically removed and disposed of. The City currently uses two disposal options.

The first option decants sludge into an enclosed truck-mounted tank for transportation to a DEQ-approved land application site. The second option transfers sludge to the sludge drying beds. The sludge drying bed system is located in the southwest quadrant of the WWTF site. The 9,600 square foot sludge drying bed area is divided into four 2,400 square foot drying beds.

The design loading for the drying beds is 18 pounds of dry solids per square foot per year or 475 pounds of dry solids per day, approximating 172,800 pounds per year or 86.4 tons of dry solids per year. The following table summarizes five years of sludge disposal.

TABLE 3-14
Annual Sludge Disposal to Land Application Site as Reported to the Oregon Department of Environmental Quality

Year	Gallons	Dry Tons
2008	152,000	19.39
2009	95,000	9.5
2010	195,700	21.46
2011	235,600	24
2012	178,600	14.67
Total	**856,900**	**89.02**
Average	**171,380**	**17.8**

The disposal data show that the five-year average disposal rate is approximately 18 tons of dry solids. One drying bed can process approximately 21 tons of dry solids per year. The drying bed capacity exceeds the historical sludge disposal rates and shows that the drying bed capacity is adequate for the time frame represented by this WWFP.

From an operational point of view, sludge placed in a drying bed should be thoroughly dried and removed before additional solids are placed in the drying bed. Therefore, multiple drying bed units are needed for a successful operation without consideration of capacity. The Union WWTF has four drying bed cells and each has enough capacity to contain a year's worth of solids. The drying bed/sludge disposal system is adequate when measured against capacity and operational and regulatory requirements.

Septage

The City has been receiving septage on a trial basis to see if septage receipt and treatment is a viable option to generate revenue, and to assess the impact on the City's wastewater treatment system. Data are not yet sufficient to evaluate the impact of septage on the WWTF. Additionally, detailed analysis of a septage receiving station exceeds the scope of this project.

Telemetry and Alarms

The WWTF has an extensive monitoring and alarm system. The system monitors the main WWTF systems and the Oregon Street Lift Station. The system has recently been upgraded to include video monitors and carbon dioxide sensors. DO, pH, and temperature sensors are also being added to the aerobic digesters.

The telemetry system provides alarms, component monitoring, and limited equipment control. Alarms are initiated at the source and transmitted to the WWTF office. The automatic dialer calls the on-call operator. If a positive response is unavailable, the dialer continues through a prioritized list, ending with the Sheriff's Department. Components that are monitored include the headworks, clarifiers, air blowers, aerobic digesters, and chlorination system.

Operationally, the telemetry system works as intended and reliably sends alarms to the operator. Telemetry system expansions are made as needed and as newer technology becomes available and affordable.

Impure Water System

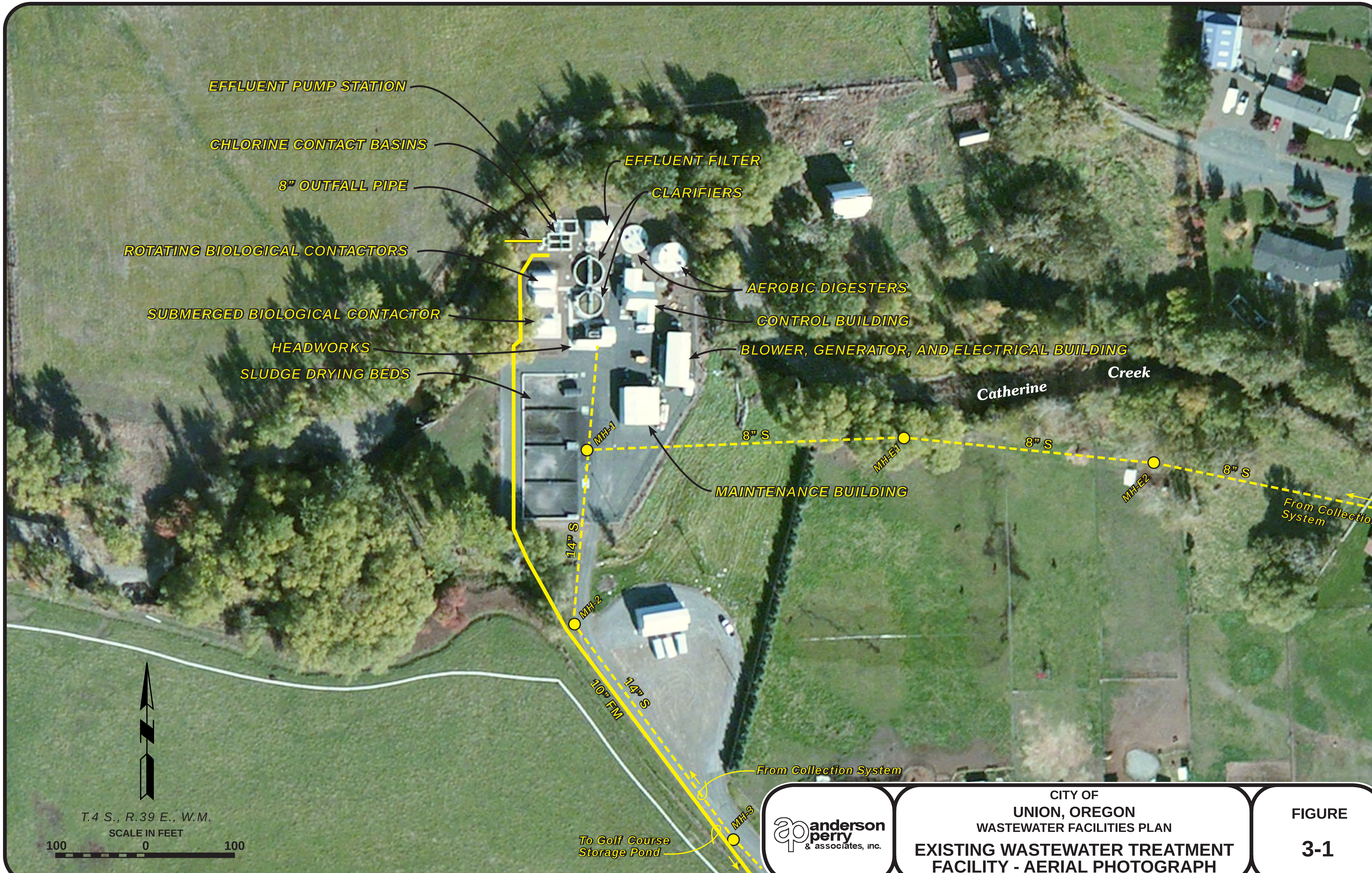
The impure water system utilizes effluent for WWTF washdown and cleaning. The system is located in the northwest section of the WWTF and is composed of two pumps inside a steel well casing. The two pumps have a design capacity of 50 gpm each against a TDH of 155 feet. The pumps are operated with a VFD and can produce 50 to 90 psi. These design parameters are adequate through the 20-year design period.

Operationally, one of the impure water pumps is not working and 70 psi is the greatest available pressure. As a result, the impure water system is not working adequately. Replacement pumps have been included in the Implementation Plan and are expected to be installed in 2015-16.

Summary

In summary, the City of Union's WWTF is in overall good physical condition. Hydraulic capacities to manage projected flow volumes are adequate for the time frame represented by this WWFP. The WWTF also has sufficient biological capacity to treat projected loadings for all currently regulated parameters. However, anticipated NPDES compliance parameters are expected to include ammonia. As currently configured, the WWTF cannot meet the expected limits. Chapter 5 provides alternatives with cost estimates to meet the expected ammonia limits.

Union's WWTF also has odor and foam issues associated with the aerobic digesters. Additional study is needed to determine the best and most cost-effective solution. The City is currently gathering data to aid identification of a sound solution. Preliminary solutions for odor and foam control with cost estimates are presented in Chapter 5 and are shown in the Implementation Plan.



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CITY OF
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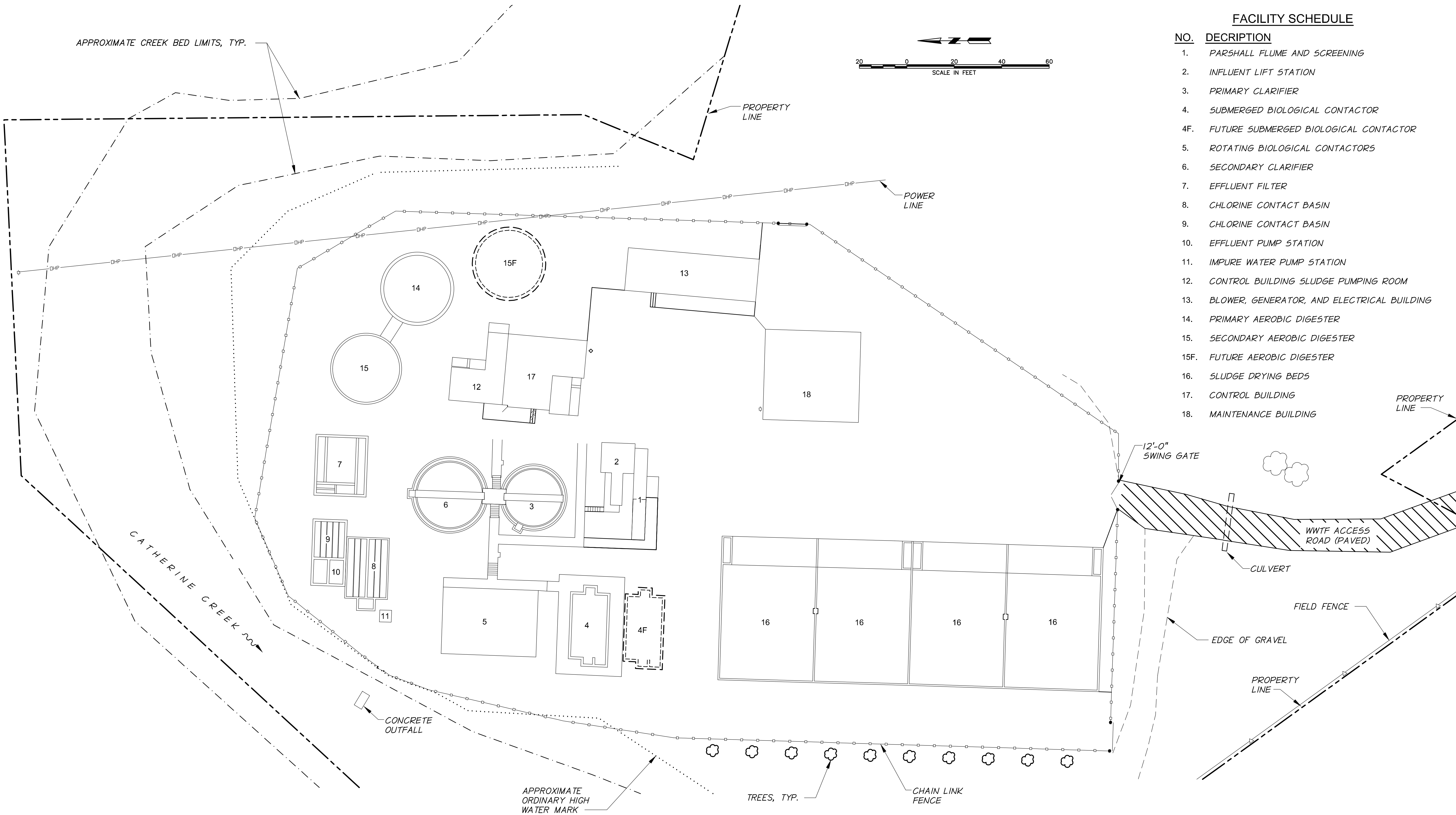
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER TREATMENT FACILITY - AERIAL PHOTOGRAPH

FIGURE 3-1

Job# 482-38-020 Nov. 14, 2014 lbauer



FACILITY SCHEDULE

NO.	DECRIPTION
1.	PARSHALL FLUME AND SCREENING
2.	INFLUENT LIFT STATION
3.	PRIMARY CLARIFIER
4.	SUBMERGED BIOLOGICAL CONTACTOR
4F.	FUTURE SUBMERGED BIOLOGICAL CONTACTOR
5.	ROTATING BIOLOGICAL CONTACTORS
6.	SECONDARY CLARIFIER
7.	EFFLUENT FILTER
8.	CHLORINE CONTACT BASIN
9.	CHLORINE CONTACT BASIN
10.	EFFLUENT PUMP STATION
11.	IMPURE WATER PUMP STATION
12.	CONTROL BUILDING SLUDGE PUMPING ROOM
13.	BLOWER, GENERATOR, AND ELECTRICAL BUILDING
14.	PRIMARY AEROBIC DIGESTER
15.	SECONDARY AEROBIC DIGESTER
15F.	FUTURE AEROBIC DIGESTER
16.	SLUDGE DRYING BEDS
17.	CONTROL BUILDING
18.	MAINTENANCE BUILDING

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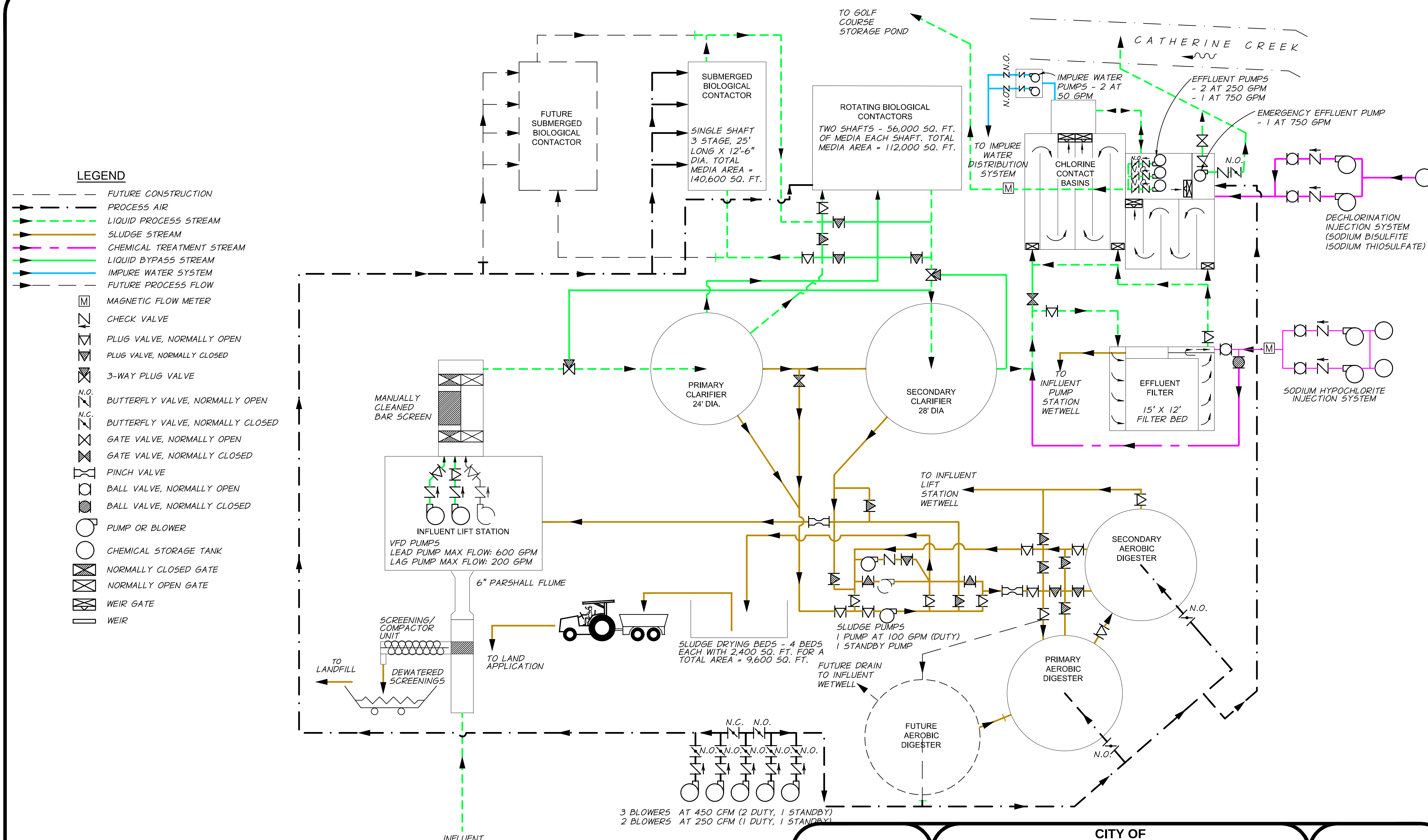
WASTEWATER FACILITIES PLAN

EXISTING TREATMENT FACILITY SITE PLAN

FIGURE 3-2

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 3-2.dwg, FIG 3-2, 3/16/2015 9:28:39 AM, prichardson



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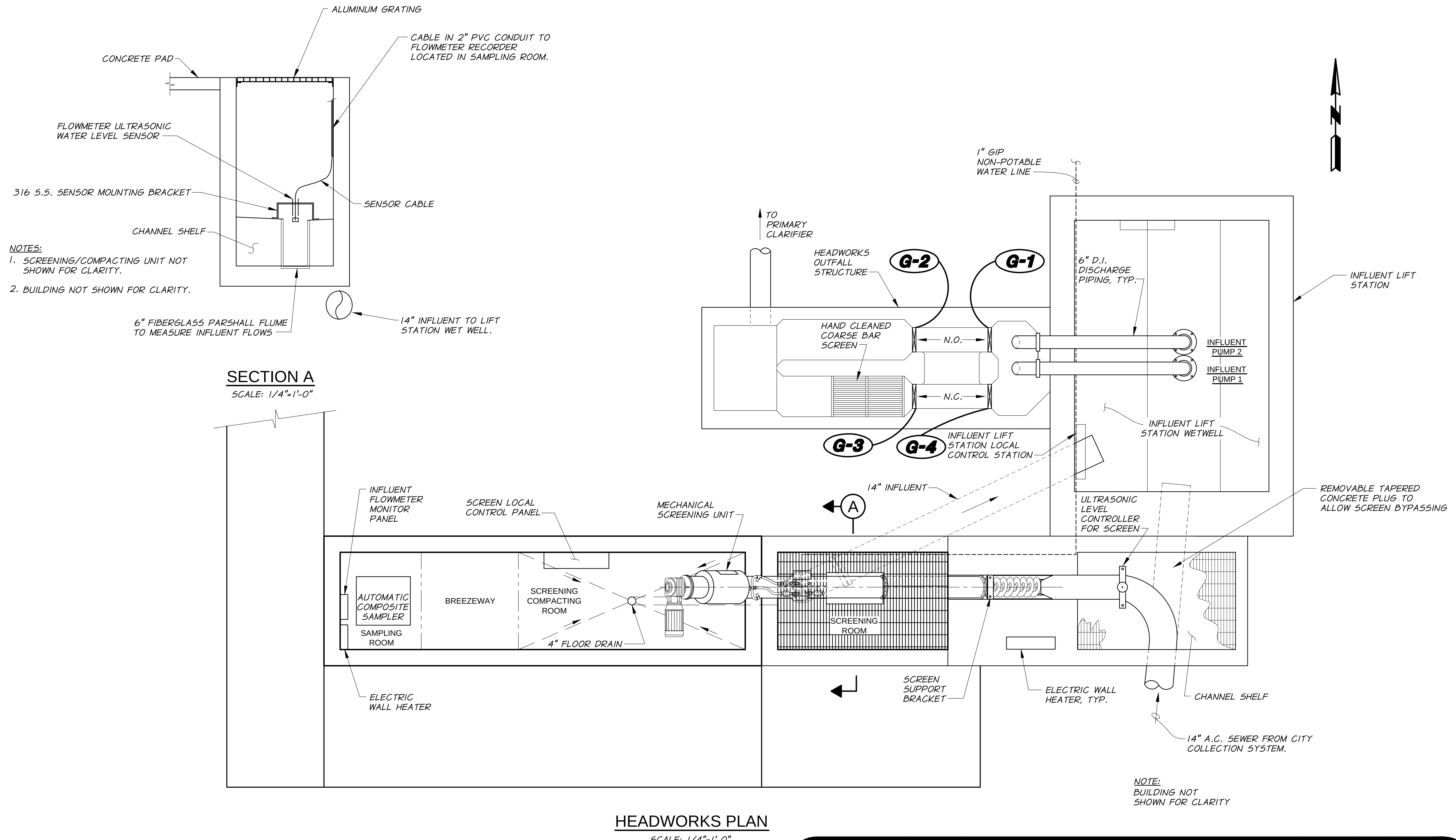
WASTEWATER FACILITIES PLAN

EXISTING TREATMENT FACILITY PROCESS SCHEMATIC

FIGURE 3-3



G-1,2,3&4 MANUALLY OPERATED SLIDE GATE

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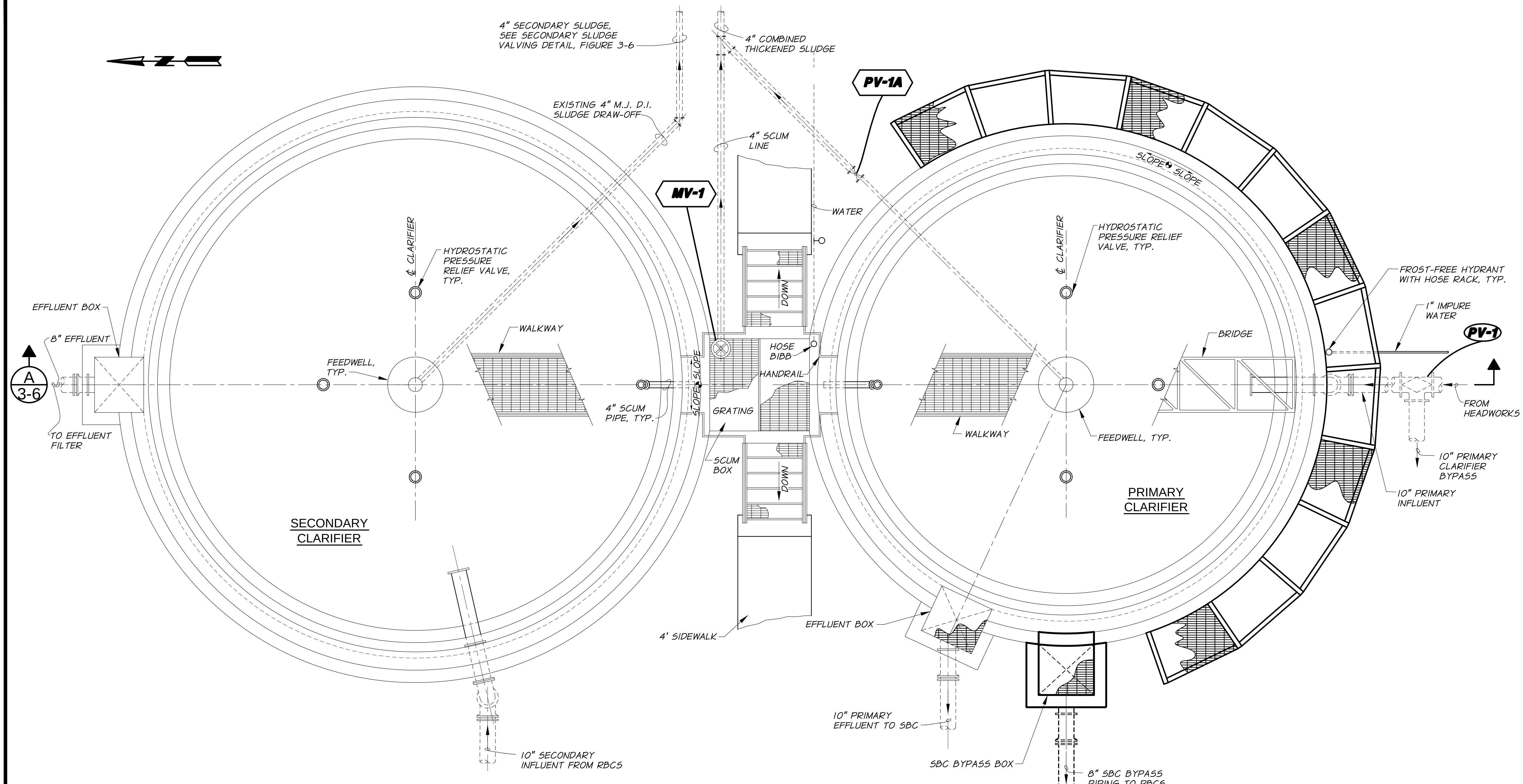
WASTEWATER FACILITIES PLAN

HEADWORKS PLAN

FIGURE
3-4

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 3-4.dwg, FIG 3-4, 3/16/2015 9:36:55 AM, prichardson



VALVE SCHEDULE

PV-1	10" 3-WAY PLUG VALVE
PV-1A	4" PLUG VALVE
MV-1	4" MUD VALVE

LEGEND

XX	NUMBER IDICATED COORESPONDS WITH THE NUMBER STAMPED ON CONCRETE VALVE BOX COLLAR
XX-XX	VALVE WAS NOT LABELED. NUMBER INDICATED IS FOR PROCESS DESCRIPTION PURPOSES

PRIMARY AND SECONDARY CLARIFIERS - PLAN

SCALE: 3/16"=1'-0"

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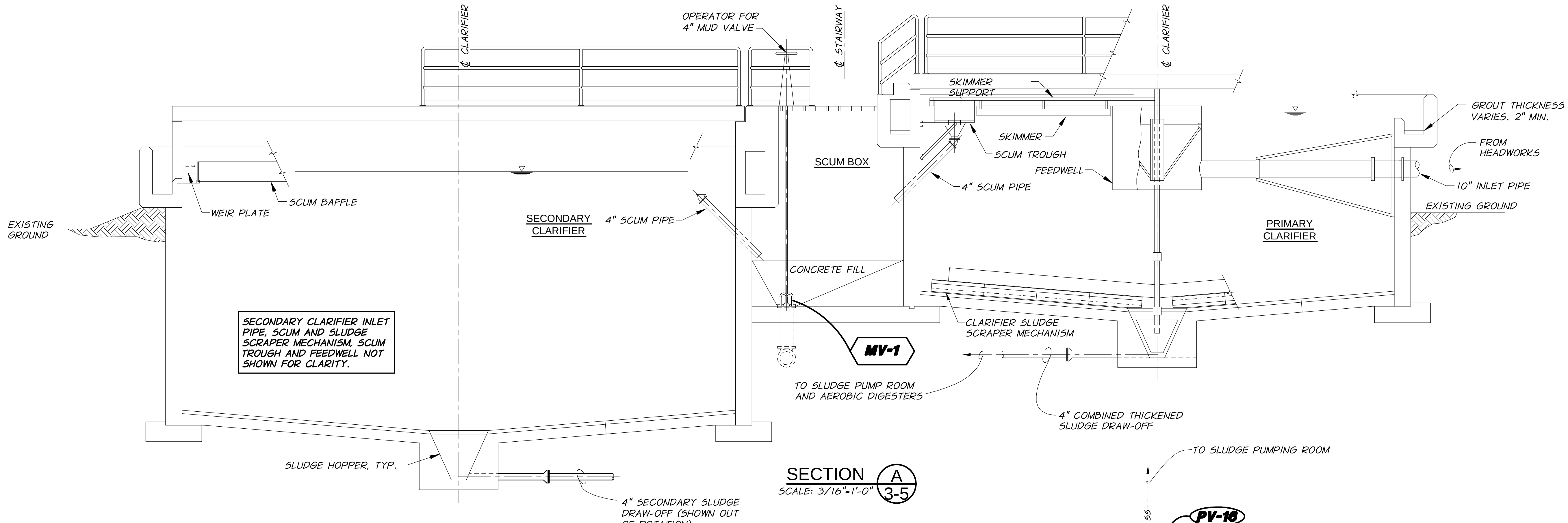
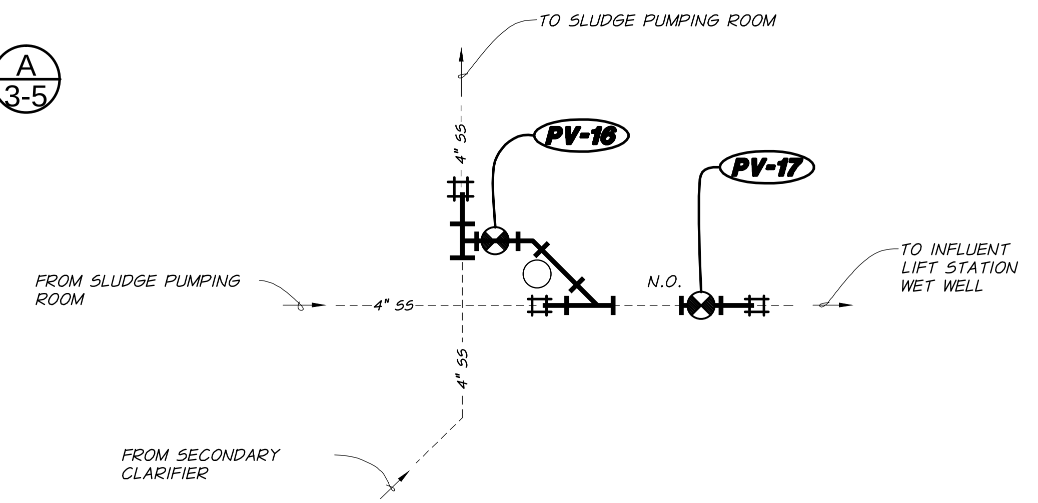
WASTEWATER FACILITIES PLAN

CLARIFIERS PLAN

FIGURE 3-5



SECTION A 3-5
SCALE: 3/16"=1'-0"



SECONDARY SLUDGE VALVING DETAIL
N.T.S.

VALVE SCHEDULE

PV-16 10" 3-WAY PLUG VALVE

PV-17 4" PINCH VALVE

MV-1 4" MUD VALVE

N.O. = NORMALLY OPEN

LEGEND

XX VALVE NUMBER LABELED AT PLANT AND AS STAMPED IN CONCRETE VALVE BOX COLLAR

XX-XX VALVE NOT LABELED AT PLANT VALVE ASSIGNED NUMBER FOR PROCESS DESCRIPTION PURPOSES

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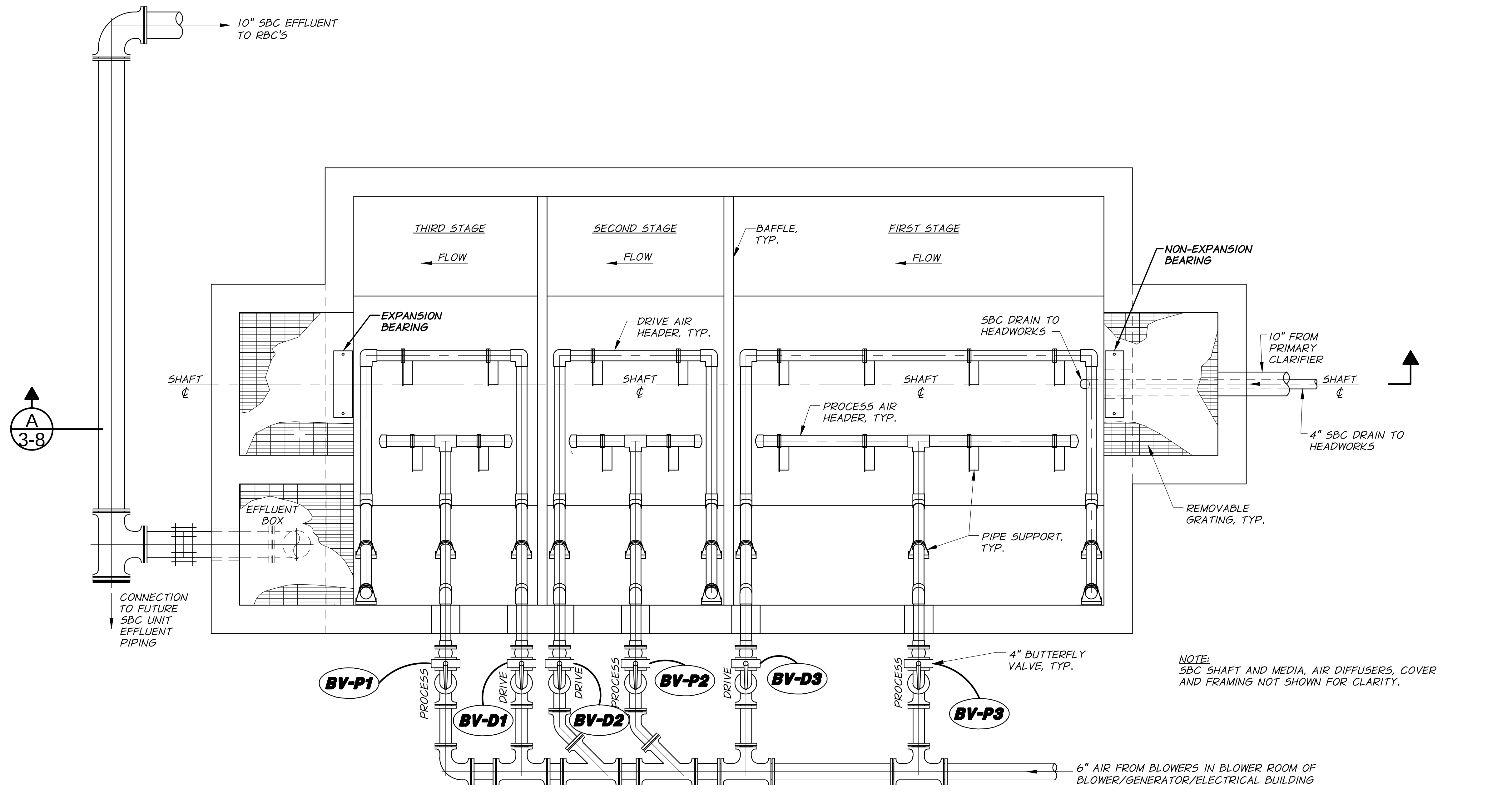
WASTEWATER FACILITIES PLAN

CLARIFIER SECTIONS

FIGURE
3-6



SUBMERGED BIOLOGICAL CONTACTOR PLAN

SCALE: 1/4"=1'-0"

LEGEND

BV-PX BUTTERFLY VALVE AND NUMBER, PROCESS AIR

BV-DX BUTTERFLY VALVE AND NUMBER, DRIVE AIR

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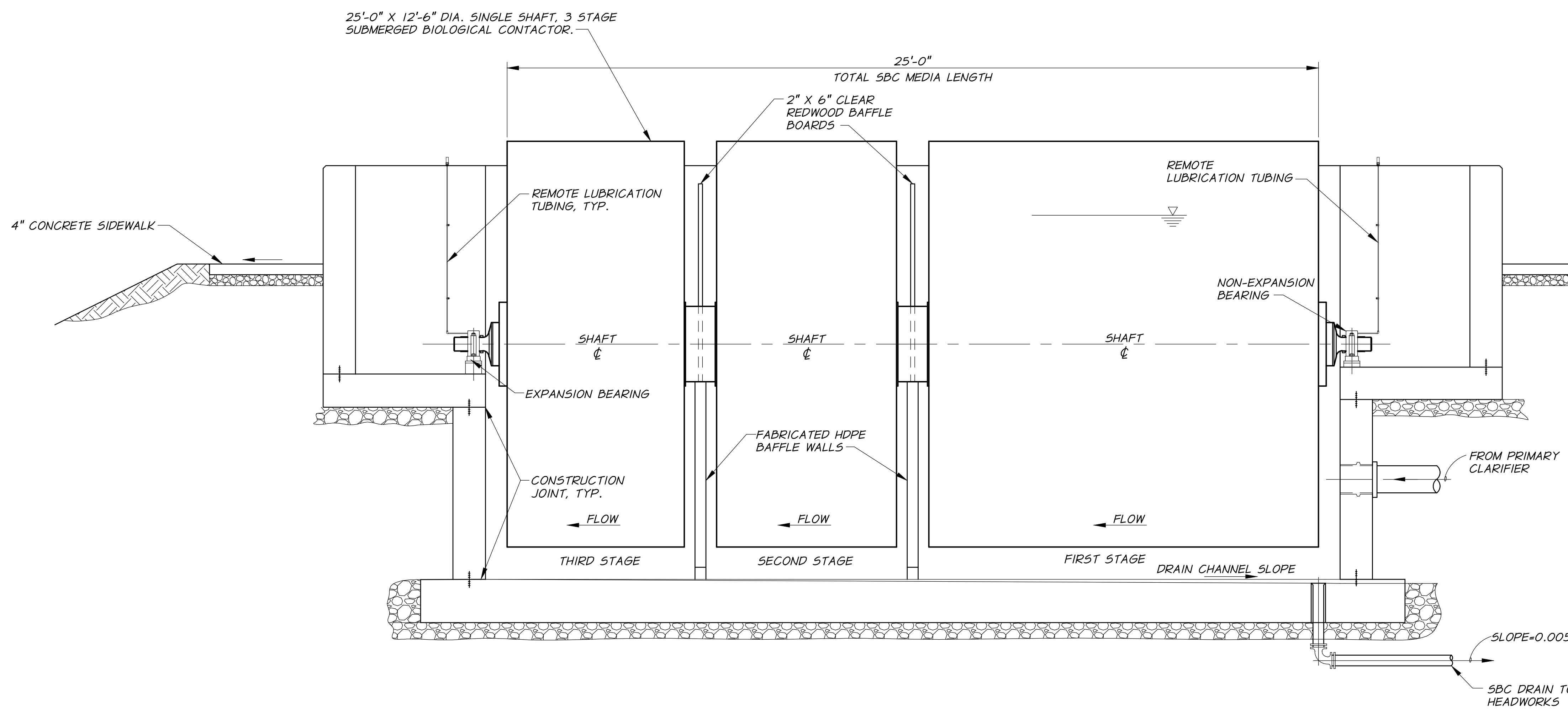
WASTEWATER FACILITIES PLAN

SUBMERGED BIOLOGICAL CONTACTOR PLAN

FIGURE 3-7



SECTION A 3-7
SCALE: 1/4"=1'-0"

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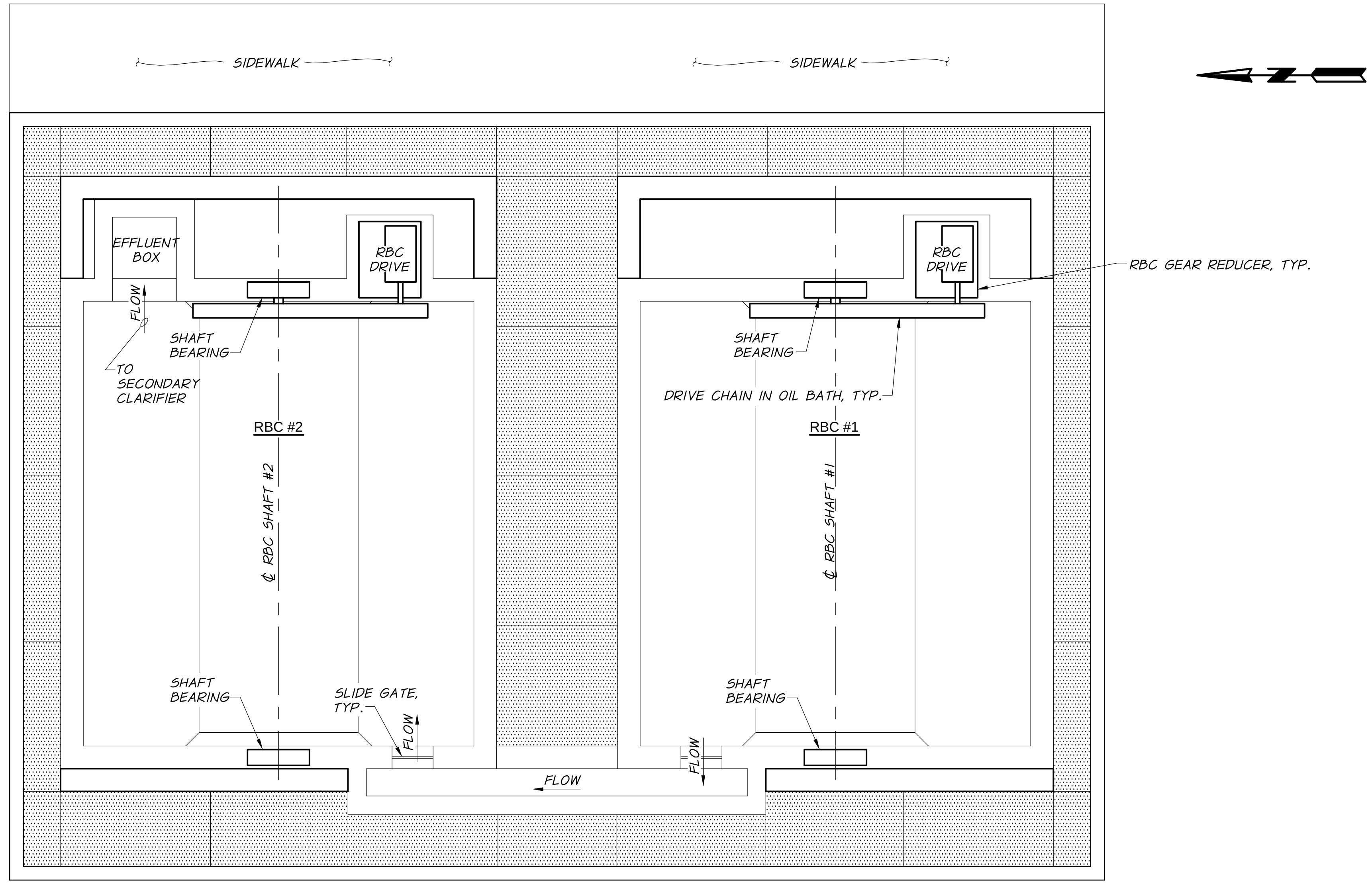
WASTEWATER FACILITIES PLAN

SUBMERGED BIOLOGICAL CONTACTOR SECTION

FIGURE 3-8



NOTE:
RBC SHAFT AND MEDIA, COVERS, FRAMING AND PIPING NOT SHOWN FOR CLARITY.

ROTATING BIOLOGICAL CONTACTORS PLAN

SCALE: 3/16"=1'-0"

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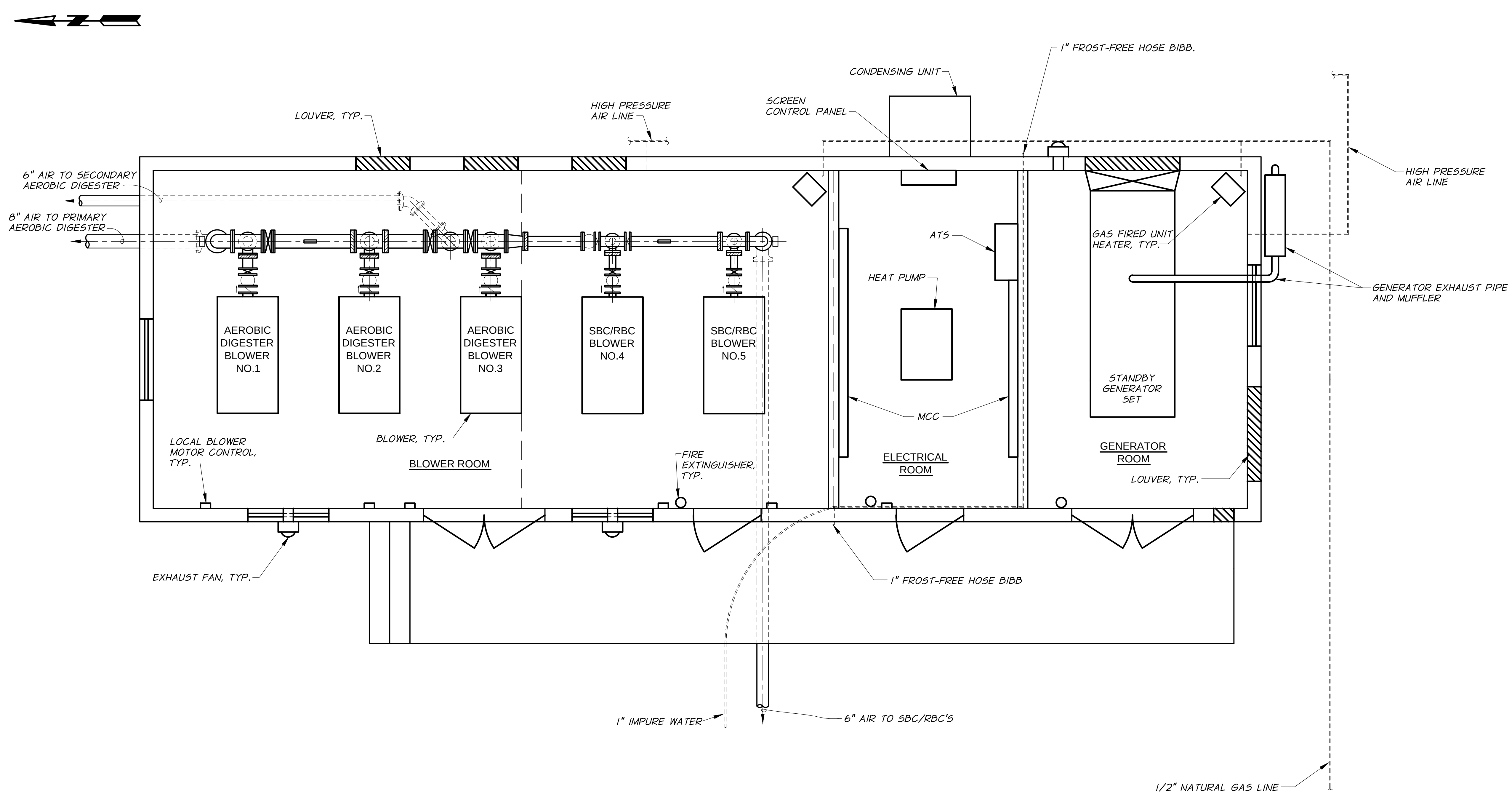
ROTATING BIOLOGICAL CONTACTOR PLAN

FIGURE
3-9



BUILDING FLOOR PLAN
BLOWER/GENERATOR/ELECTRICAL
3/16"=1'-0"

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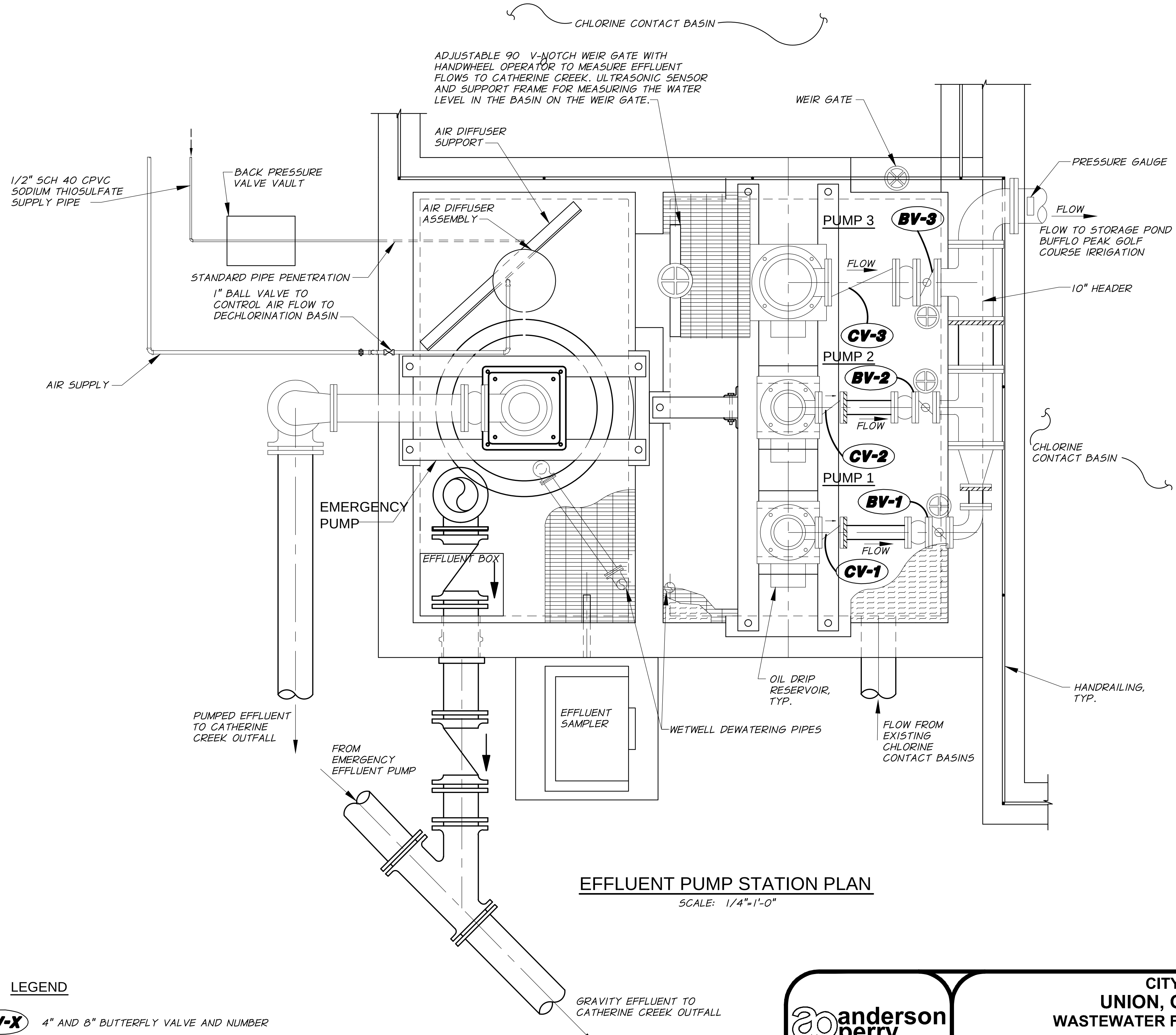
WASTEWATER FACILITIES PLAN

BLOWER/GENERATOR/ELECTRICAL BUILDING FLOOR PLAN

FIGURE 3-10

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 3-10.dwg, FIG 3-10, 3/16/2015 9:52:27 AM, prichardson



EFFLUENT PUMP STATION PLAN

SCALE: 1/4"=1'-0"

LEGEND

BV-X 4" AND 8" BUTTERFLY VALVE AND NUMBER

CV-X 4" AND 8" CHECK VALVE AND NUMBER

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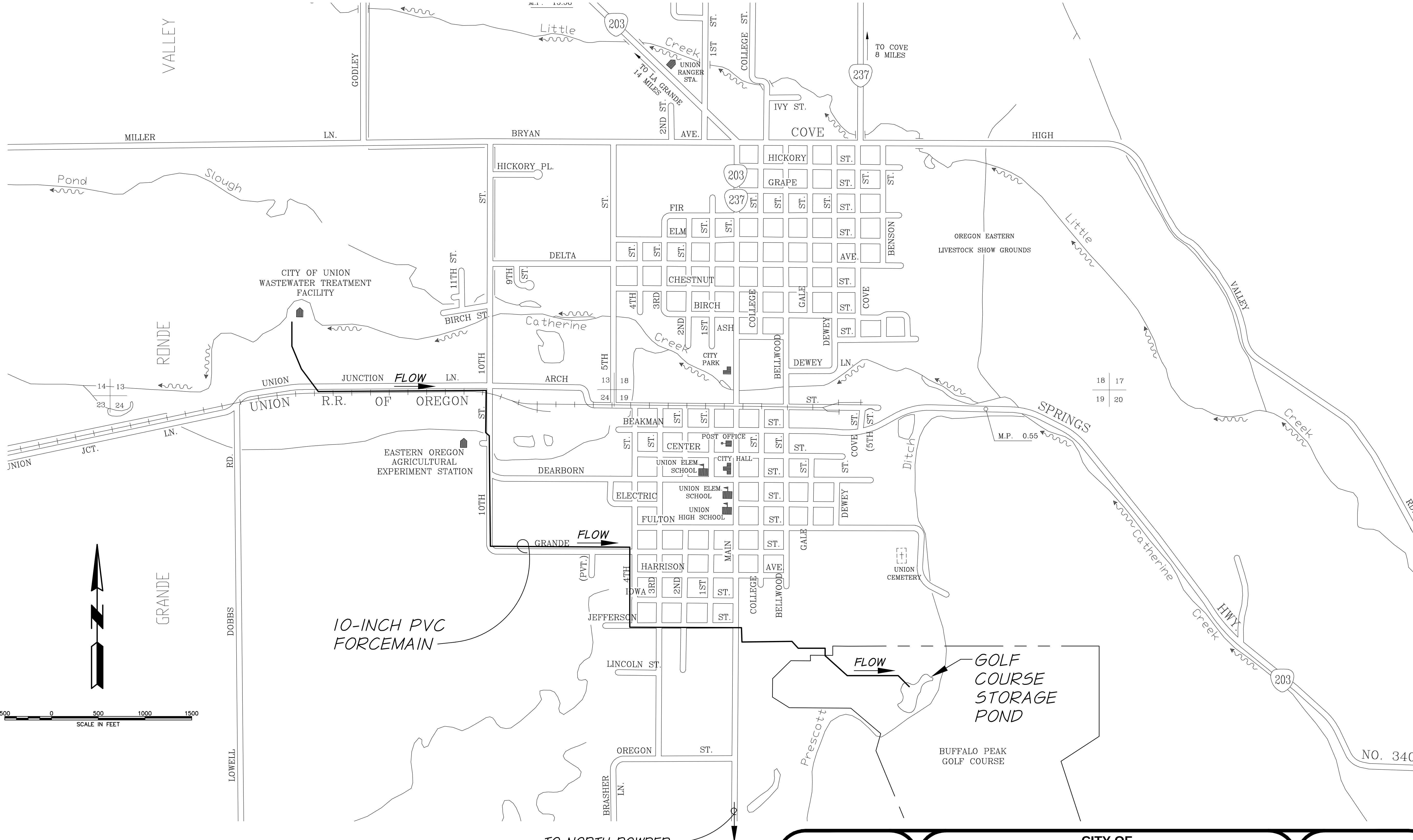
WASTEWATER FACILITIES PLAN

EFFLUENT PUMP STATION PLAN

FIGURE
3-11



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WASTEWATER FACILITIES PLAN

EFFLUENT FORCEMAIN

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FIGURE 3-12

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 3-12.dwg, Layout1, 3/16/2015 9:56:42 AM, prichardson

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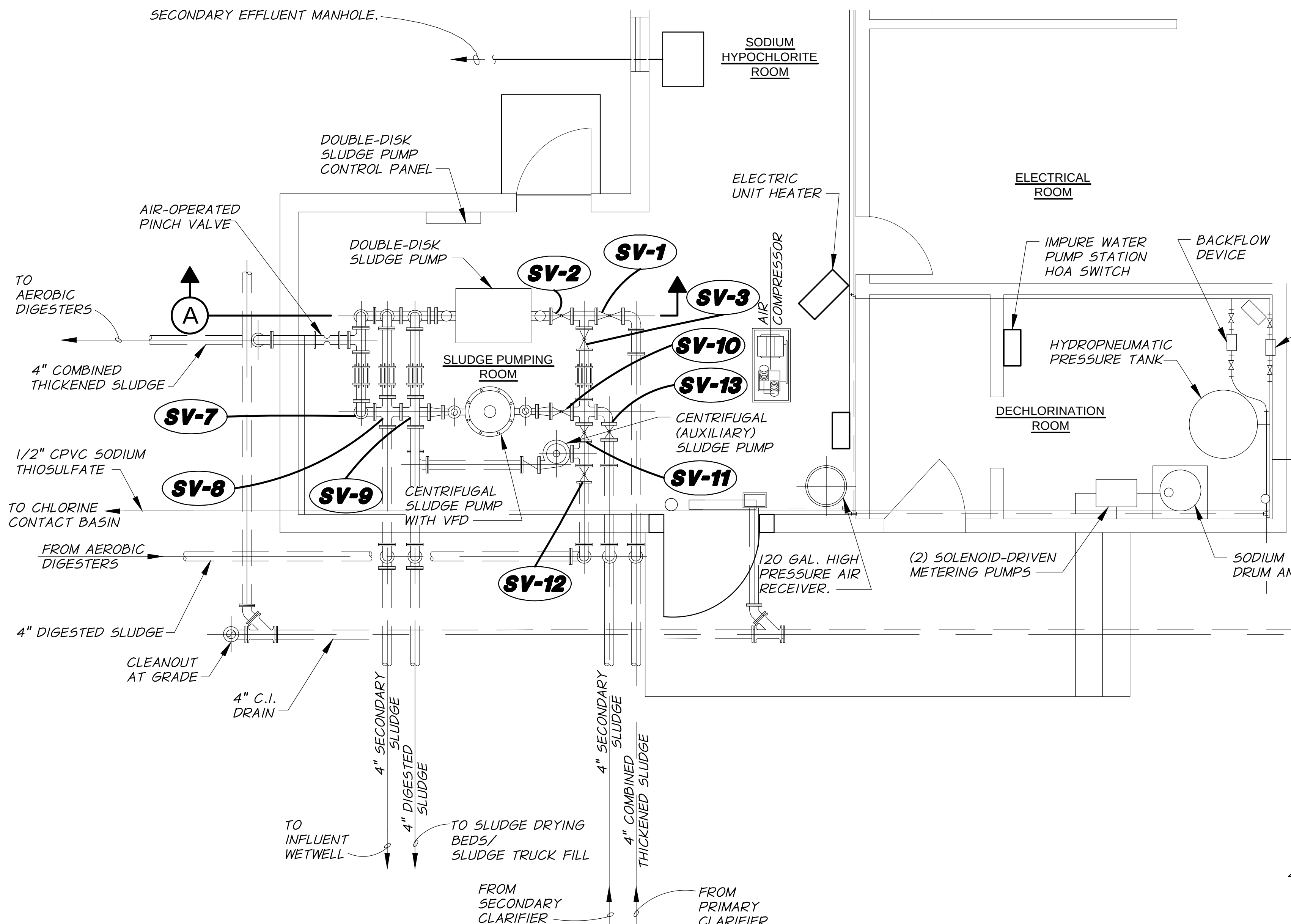
WASTEWATER FACILITIES PLAN

BUFFALO PEAK GOLF COURSE

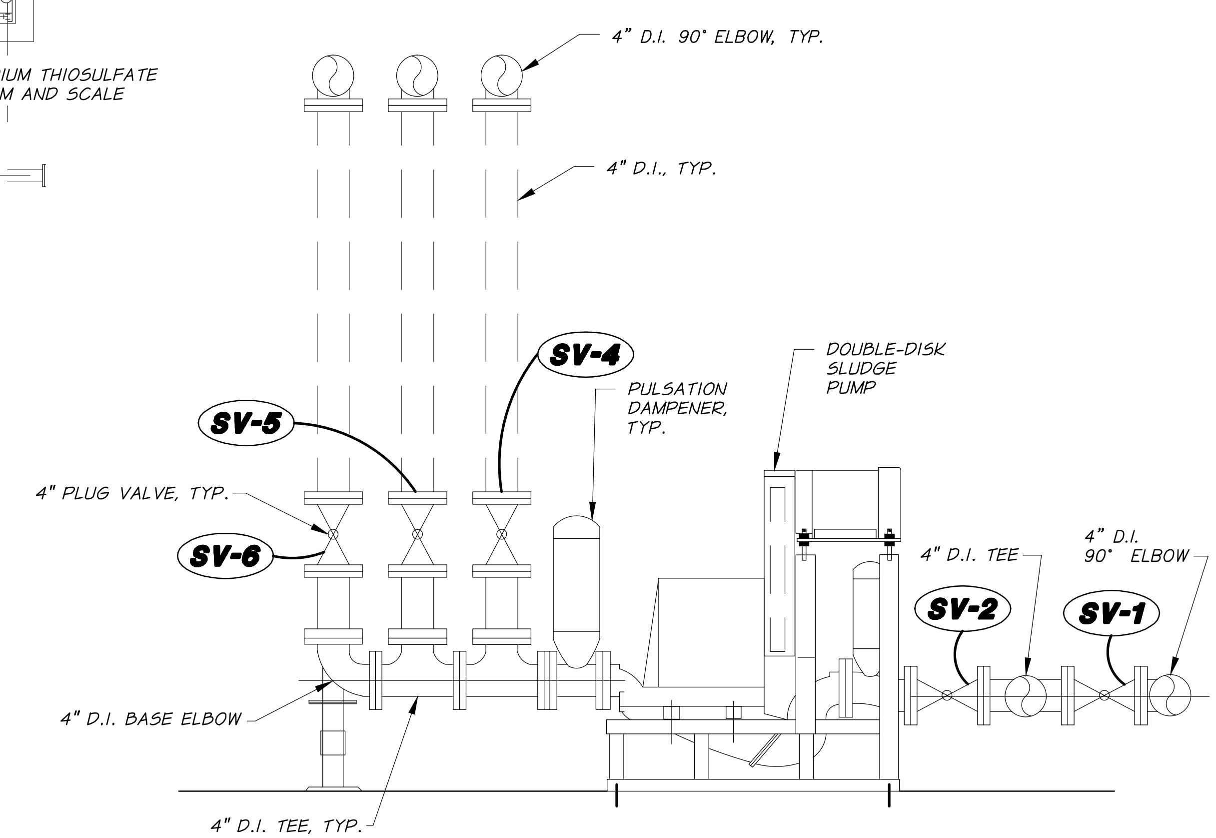
FIGURE
3-13

Job# 482-38-020 Nov. 14, 2014 lbauer



SLUDGE PUMPING ROOM PLAN

SCALE: 3/16"=1'-0"



SECTION A

SCALE: 1/2"=1'-0"

VALVE SCHEDULE

SV-XX VALVE NUMBER LABELED AT PLANT AND AS STAMPED IN CONCRETE VALVE BOX COVER

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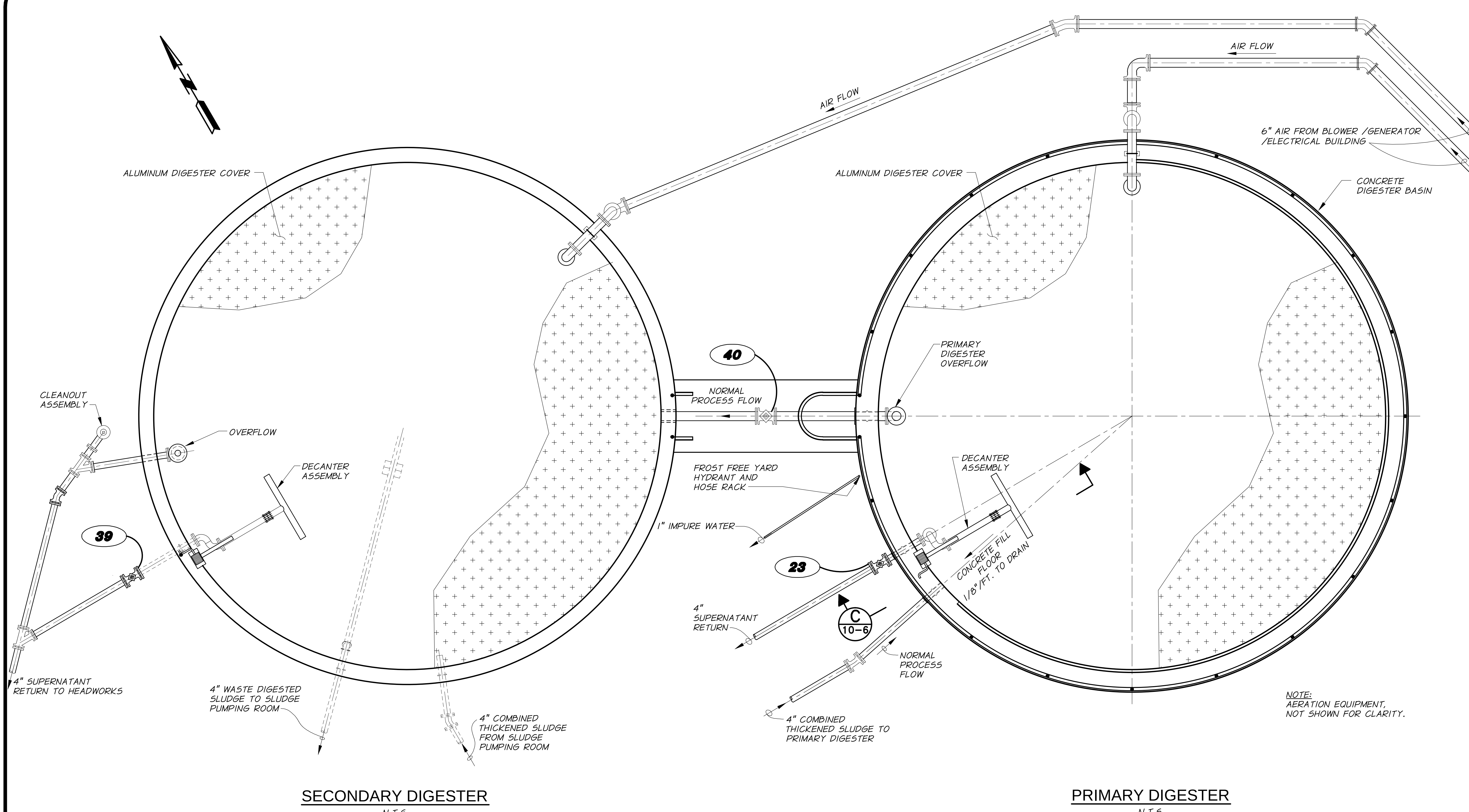
WASTEWATER FACILITIES PLAN

SLUDGE PUMPING ROOM PLAN AND SECTION

FIGURE 3-14



LEGEND

XX VALVE NUMBER LABELED AT PLANT AND AS STAMPED IN CONCRETE VALVE BOX COLLAR

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WASTEWATER FACILITIES PLAN

AEROBIC DIGESTERS PLAN

FIGURE
3-15

Chapter 4 - Collection System Evaluation

Introduction

This wastewater collection system evaluation provides an overall review of Union's wastewater collection system, summarizes the result of a television (TV) inspection program, and lists high, medium, and low priority improvements. An evaluation of infiltration and inflow (I/I) was also completed. Suggested improvements pertaining to inflow and infiltration have been provided.

Infiltration and Inflow

I/I is unwanted flows entering the wastewater collection system. I/I in a collection system can occur during different times of the year. During the winter and early spring, I/I normally originate from storm events and spring runoff. During the irrigation season, irrigation ditches and canals usually flow at full capacity. As a result, any irrigation water leaking from the ditches and canals elevates groundwater levels, and groundwater, in turn, infiltrates into any available weakness in the wastewater collection system. Specifically, infiltration and inflow are defined as follows:

- **Infiltration** - Water entering the collection system and service connections from the ground through such means as, but not limited to, defective pipes, pipe joints, and defective service line connections or manhole walls. Infiltration does not include, and is distinguished from, inflow.

- **Inflow** - Water discharged into a collection system and service connections from such sources as, but not limited to, roof drains, cellar, yard and area drains, foundation drains, sump pumps, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, stormwater, surface runoff, and street washes or drainage.

- **I/I** - The total quantity of water from both infiltration and inflow without distinguishing the source.

Most cities have some I/I contributing to their wastewater collection systems. Excessive I/I can be a problem because these flows must be treated along with normal wastewater flows and take up valuable treatment capacity at a city's treatment plant. Excessive I/I is defined as the quantity of I/I that can be economically eliminated from a collection system by rehabilitation or other means, as determined by a cost analysis that compares the cost effectiveness of correcting the I/I conditions with the total cost for transportation and treatment of I/I.

Collection System Overview

Background

Union's wastewater collection system was constructed in 1977 slightly before construction of the wastewater treatment facility (WWTF). Before 1977, the City relied on septic tank systems for wastewater containment and treatment. Some small residential subdivisions and several sewer extensions have been added to the collection grid since 1977. The main subdivisions are Century Estates, Century Ranch Estates, Buffalo Peak Addition, and Wapiti Lane. The year 2000 wastewater system improvements project included collection system improvements. These improvements reduced I/I and helped extend the life of the wastewater collection system.

An evaluation of the wastewater collection system, including main lines, manholes, and cleanouts was completed. An evaluation of service lines was not conducted. The wastewater collection system appears to be in reasonable overall condition; however, much of the system is approaching 40 years old and is nearing the end of its expected service life. Some line replacements and spot repairs are needed. The following paragraphs provide clarification of areas needing remedial work.

System Components

A map of Union's existing wastewater collection system, which identifies pipe sizes, is located in a pocket at the end of this Wastewater Facilities Plan (WWFP) and on Figure 4-1. The older (original) portions of Union's wastewater collection system are mostly asbestos cement (AC) pipe while system extensions and new subdivisions generally use polyvinyl chloride (PVC) pipe. Concrete manholes are used throughout the City. The wastewater collection system contains approximately 90,310 feet of gravity pipe and 11,905 feet of forcemains. The gravity portion of the wastewater collection system ranges from 6-inch diameter pipe to 14-inch diameter pipe. Two forcemains serve the City. The first forcemain is approximately 1,820 feet, 4-inch diameter pipe and transports wastewater from the Oregon Street Lift Station to a receiving manhole on Iowa Street. The second forcemain is approximately 10,085 feet, 10-inch diameter PVC pipe and transfers effluent from the WWTF to the Buffalo Peak Golf Course pond where the effluent is stored for irrigation use.

Following are the pipe sizes and lengths in the City of Union's collection system:

TABLE 4-1

Collection System Pipe

Pipe Size (inches)	Pipe Length (feet)
4	1,820 forcemain
6	1,750
8	71,850
10	5,540 gravity/10,085 forcemain
12	5,850
14	5,320

Catherine Creek bisects the City of Union from east to west, creating a natural geographic barrier between the north and south halves of the City. The collection system in the north and south areas is approximately equal is called the north basin and south basin for discussion purposes. This is shown on Figure 4-2 and on the Wastewater Collection System Basin Map located in a pocket at the end of this WWFP. The north basin encompasses areas from Catherine Creek to the north City limits and the south basin encompasses areas from Catherine Creek to the south City limits. The basins combine at the intersection of Arch Street and 10th Street where a 14-inch trunkline completes the connection to the WWTF. A lift station located on Oregon Street (in the south basin) pumps wastewater flows from the collection system on Jefferson Street and south of Jefferson Street through a 4-inch diameter forcemain to Manhole A 47 on Iowa Street, where gravity flow resumes.

The Oregon Street Lift Station was updated in 1995 when the existing submersible pumps were replaced with two new surface-mounted self-priming Hydronix pumps. The motors are rated at 7.5

horsepower with a pump capacity of 150 gallons per minute (gpm) at 49 feet of total dynamic head. The pumps are housed inside fiberglass enclosures. The wetwell is 6 feet in diameter and 12 feet deep and was already in place in 1995 when the existing pumps were replaced. The Oregon Street Lift Station has the capacity to handle design flows through the year 2034.

Oregon Street Lift Station Evaluation

The Oregon Street Lift Station does not have a source of backup power. The City should have backup power at the lift station, or be able to mobilize a generator to the lift station in the event of a power outage. This improvement should be completed in the next three to six years and is presented in Chapter 5 in the Implementation Plan. The cost presented in the Implementation Plan represents a new standby generator placed on a concrete pad, control panel, and automatic transfer switch.

In 2007, the pump controller, level sensor, and alarm were updated at the Oregon Street Lift Station, and one of the pumps was recently rebuilt. Although the lift station has capacity to handle the projected flow through 2034, the pumps are 14 years old and the wetwell is older. The Oregon Street Lift Station will need to be improved in the next 15 to 20 years. The improvements will most likely need to consist of replacing the pumps, updating the controls and telemetry, rehabilitating the wetwell, and replacing corroded pipes as required. The projected cost of the rehabilitation is presented in the Implementation Plan.

Collection System Television and Manhole Inspection

The City of Union proactively implemented a television and manhole inspection program in 2013 utilizing City equipment and personnel. The inspection program began in May 2013 and concluded in June 2013. The inspection program was designed to evaluate the collection system and identify problem areas.

Results of the Television Inspection

The television inspection showed areas of main wastewater collection line that have cracks, deterioration, and hydrogen sulfide corrosion. It was not possible to estimate the amount of infiltration (if any) from the deteriorated pipe because the television inspection work was performed in late spring and early summer when groundwater levels are normally lower than at other times of the year. Areas showing this type of deterioration normally remain functional until further deterioration occurs or they are disturbed. The television inspection also showed leaks where service lines attach to the main line, some offset joints and some bellies.

Funds should be accrued in a wastewater capital improvement account so that as deterioration continues, the City will have the necessary mechanism in place to finance a replacement program.

Evaluation and System Improvements Summary

This section provides a summary of the collection system evaluation and presents the recommendations and associated cost estimates to complete system improvements based on the results of the evaluation and concerns expressed by the City.

When determining the means of repair/replacement of problem areas, thought was given to the location and overall condition of main line, service line, and manholes. The decision to repair or replace main line was based on the location and the number of deficiencies. Replacement was suggested when the location was not in a high traffic or unrealistic area to dig (i.e., newly replaced highway). After researching options, it was decided that cured-in-place-pipe (CIPP) lining would be used to repair main line because of its ease of use and capability to repair the existing problems.

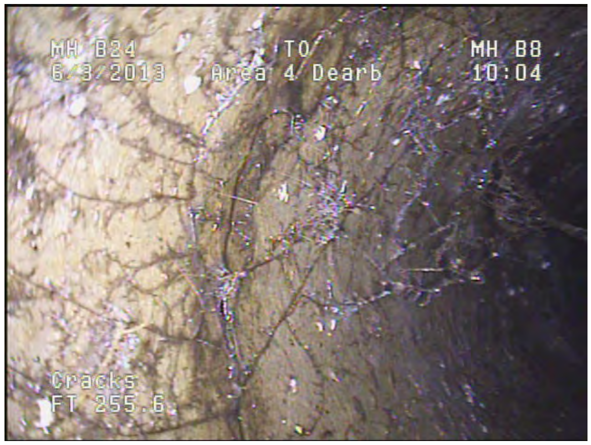
The recommended improvements have been placed in three priority categories based on opinion of necessity. The three priority categories are referred to as high priority, medium priority, and low priority improvements for purposes of discussion. High priority items include piping that is heavily leaking or that contains extensive structural damage where leaking or failure may be an issue in the near future. Medium priority items include root intrusion, cracks that could develop structural or I/I issues, minor I/I, and other problems that should be finished in a timely manner. Low priority issues include piping that has minor cracking, slight seeping at service line connections, or problems that could become sources of I/I in the future. Figure 4-3 summarizes the improvements. There are items noted on Figure 4-3 that will require additional inspection to determine the required repair. The cost estimates presented in this chapter do not reflect these items.

Figure 4-3 denotes additional categories including work item number, reach or manhole number, distance from manhole, description of work, and notes. Also included is the wastewater collection system sheet number; this sheet number refers to Figure 4-4 and the Wastewater Collection System Priority Improvements Map included in a pocket at the end of this WWFP and denotes which sheet the proposed improvement is located on. The work item number is not a ranking of importance, rather an identification of the improvement to be made. Reach or manhole numbers are a reference to the location of the improvement to be made. The distance from manhole is a description to further indicate where the problem exists, and the distance is referenced from the first manhole listed.

High Priority Improvements

The proposed high priority improvements include removal of roots, replacement of severely cracked pipes and broken cleanouts, and repair of manholes. The estimated cost to complete the proposed high priority collection system improvements is presented on Figure 4-5.

The most critical improvements for the City to undertake are on Fourth Street between Center and Beakman Streets. The 10-inch AC pipe contains cracks and root intrusion. Since Fourth Street is a gravel street, and in order to prevent future I/I and root intrusion, it was determined the best option would be to replace the pipe rather than repair it. The following picture shows the cracking and some of the root intrusion in this reach.



The following picture shows a destroyed cleanout. Broken cleanouts can lead to increased I/I, and the reduced access hinders maintenance ability.

Medium Priority Improvements

Improvements designated as medium priority are related to improving I/I flow issues that are 1 gpm or less and are not deemed as critical as the high priority improvements. The estimated cost to complete the proposed medium priority collection system improvements is presented on Figure 4-6.

Improvements proposed include application of RootX; cleaning, repairing, and grouting manholes; sewer main repair; and CIPP lining. CIPP lining was selected in order to reduce asphalt surface restoration because one faulty main line is located on East Bryan Street along a section of Highway 237, and another is located along a recently chip sealed section of West Delta Street. The following picture shows how the pipe under Bryan Street has cracked. Prior to the installation of the CIPP lining, it is recommended the City television inspect the line to ensure integrity of service connections.

Low Priority Improvements

Recommended low priority improvements are generally related to improving I/I flow issues that are less than 0.5 gpm but will need to be completed to minimize excessive I/I in the future. The cost estimate to complete the proposed low priority collection system improvements is presented on Figure 4-7.

Suggested improvements include sewer main line repair, replacing service connections, and cleaning, repairing, and grouting manholes.

Monitor Items

Provided in Appendix E is a list of items that should be monitored periodically. These items include bellies, shifted joints, rolled gaskets, and existing pipe repairs. These are items that currently are not causing sufficient system malfunction to justify the cost of the repairs; however, it will be important to periodically monitor them to ensure increased deterioration does not occur. When the TV inspection was performed, there were trunklines flowing between one third and one half full. Before any large expansions are made, the pertinent trunklines should be inspected to ensure there will be adequate capacity.

Included in Appendix F is a list of collection system maintenance items. These items are categorized based on opinion of necessity. High priority items include grease or debris blockages that at the time of the TV inspection were causing flow to back up in the main line; these lines should be jetted in the near future and monitored/jetted every three months. Medium priority items include grease and debris accumulation that is obstructing flow but is not causing a large backup in the main line. Low priority items include areas where grease and debris have begun to accumulate but were not substantially obstructed at the time of the TV inspection. A Wastewater Collection System Maintenance Priority Map is included in a pocket at the end of this WWFP.

Summary of Improvement Cost Estimates and Selected Action

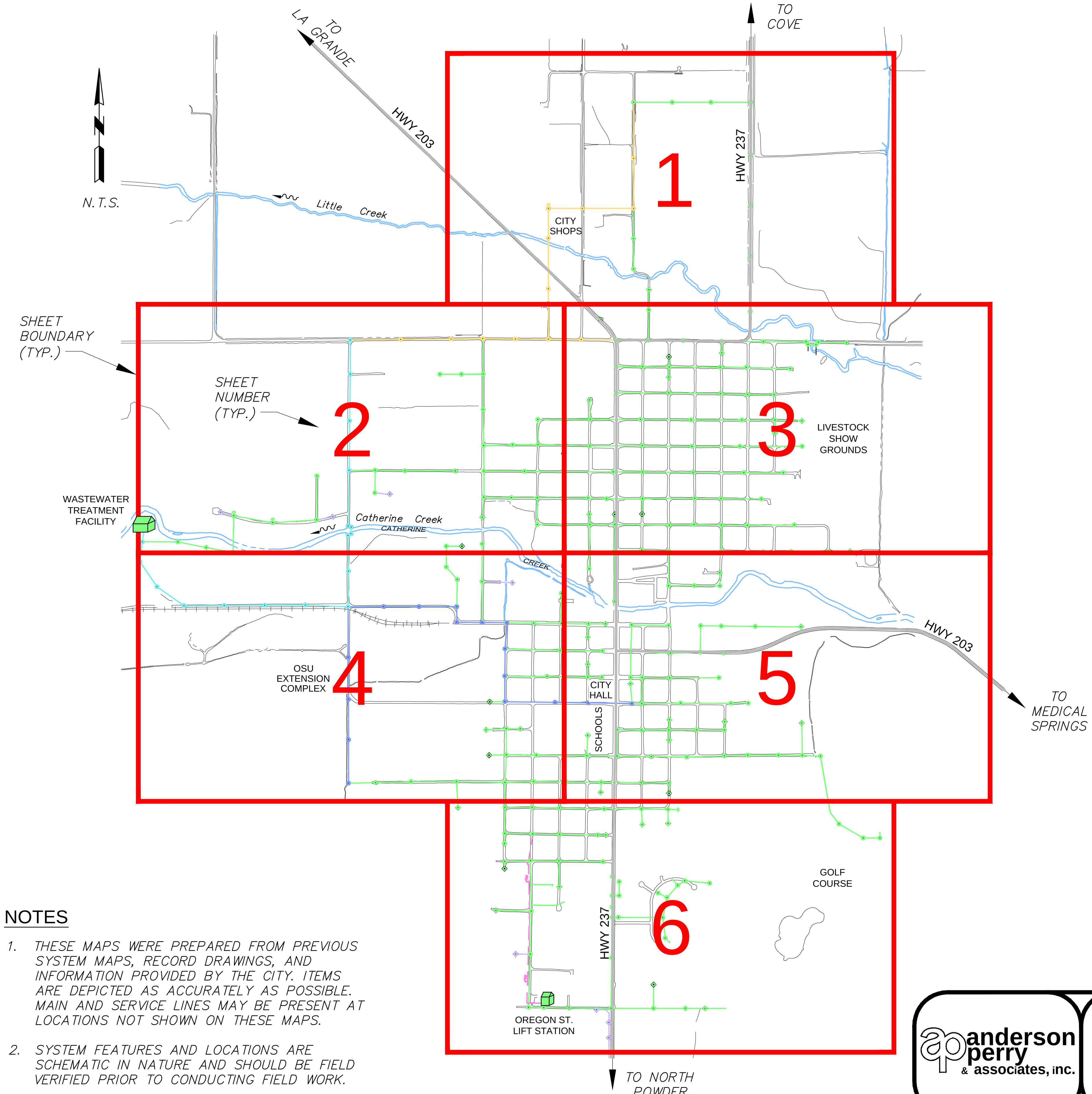
Following is a summary of estimated project costs for the three presented improvement priority levels proposed for the City of Union's collection system. See Figures 4-5, 4-6, and 4-7 for a detailed itemization of anticipated collection system improvement costs.

TABLE 4-2

Improvement and Cost Summary

Improvement Priority	Estimated Project Cost (2014 Dollars)
High	$95,000
Medium	$263,000
Low	$70,000
Total	$428,000

Based on information presented in this chapter and recommendations of City staff, a collection system improvements schedule is shown in the Implementation Plan presented in Chapter 5.



CITY OF UNION, OREGON

NOTES

1. THESE MAPS WERE PREPARED FROM PREVIOUS SYSTEM MAPS, RECORD DRAWINGS, AND INFORMATION PROVIDED BY THE CITY. ITEMS ARE DEPICTED AS ACCURATELY AS POSSIBLE. MAIN AND SERVICE LINES MAY BE PRESENT AT LOCATIONS NOT SHOWN ON THESE MAPS.
2. SYSTEM FEATURES AND LOCATIONS ARE SCHEMATIC IN NATURE AND SHOULD BE FIELD VERIFIED PRIOR TO CONDUCTING FIELD WORK.

SHEET INDEX

anderson perry & associates, inc.	CITY OF UNION, OREGON WASTEWATER FACILITIES PLAN EXISTING WASTEWATER COLLECTION SYSTEM	FIGURE 4-1 COVER

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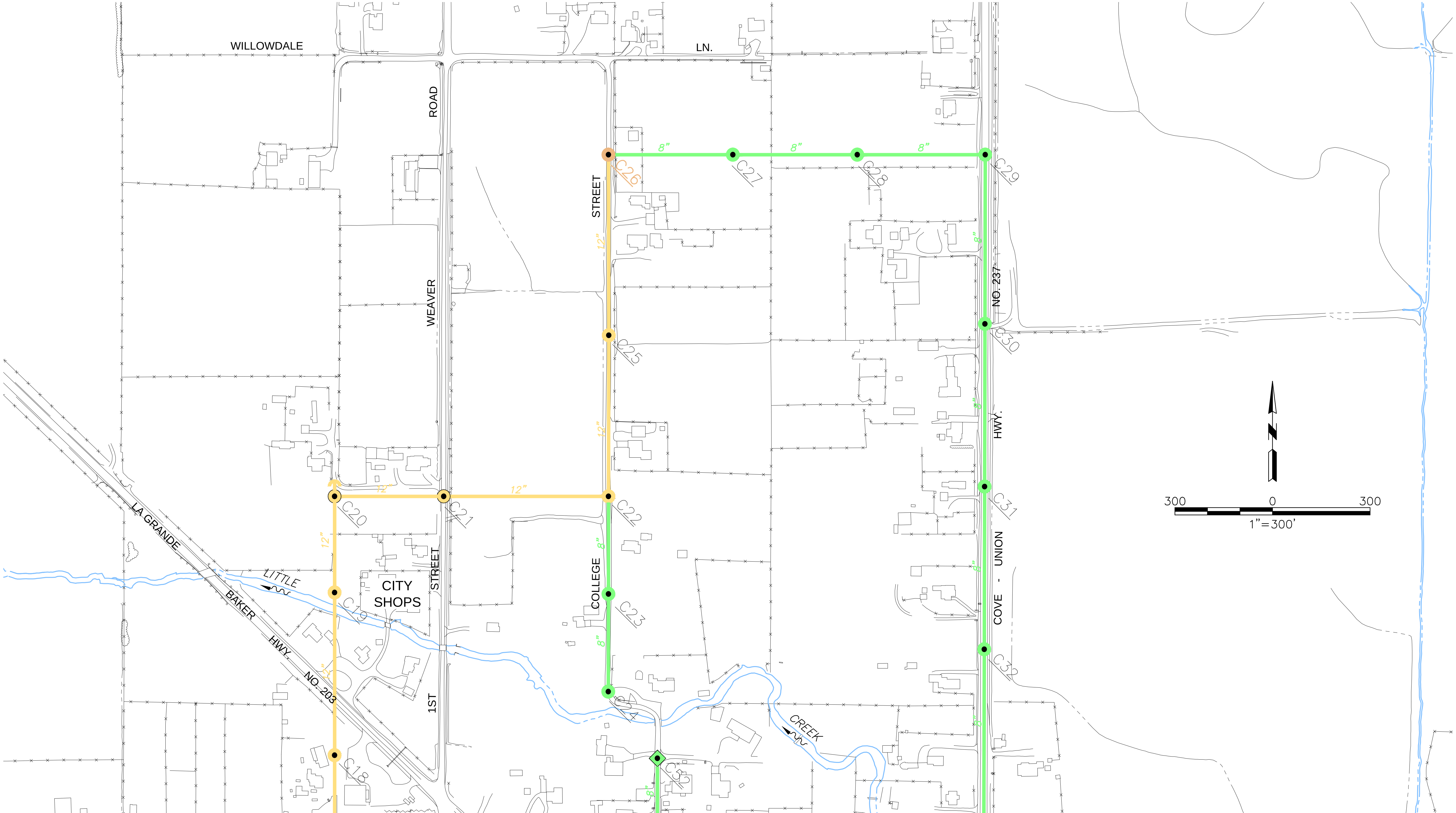


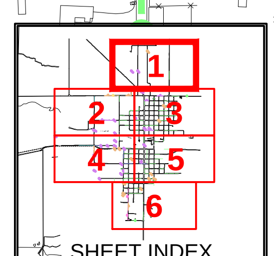
LEGEND

MANHOLE AND NUMBER (C18)

CLEANOUT AND NUMBER (C18)

8" SEWER LINE

12" SEWER LINE



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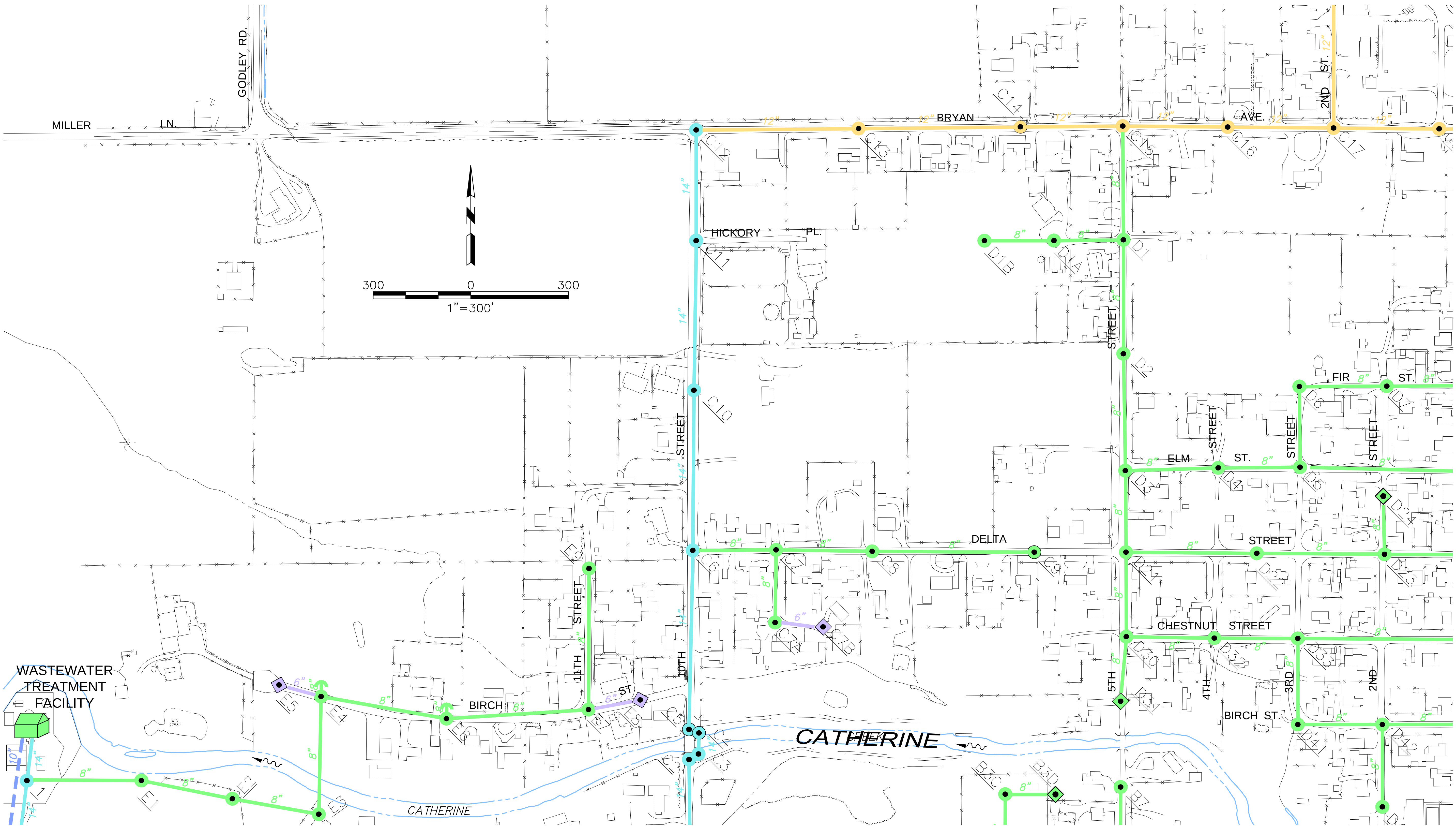
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
1 OF 6



LEGEND

MANHOLE AND NUMBER (C18)

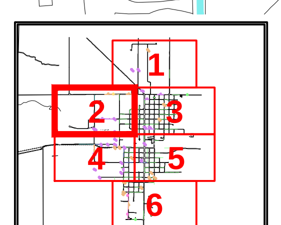
CLEANOUT AND NUMBER (C18)

6" SEWER LINE

8" SEWER LINE

12" SEWER LINE

14" SEWER LINE



SHEET INDEX

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
2 OF 6

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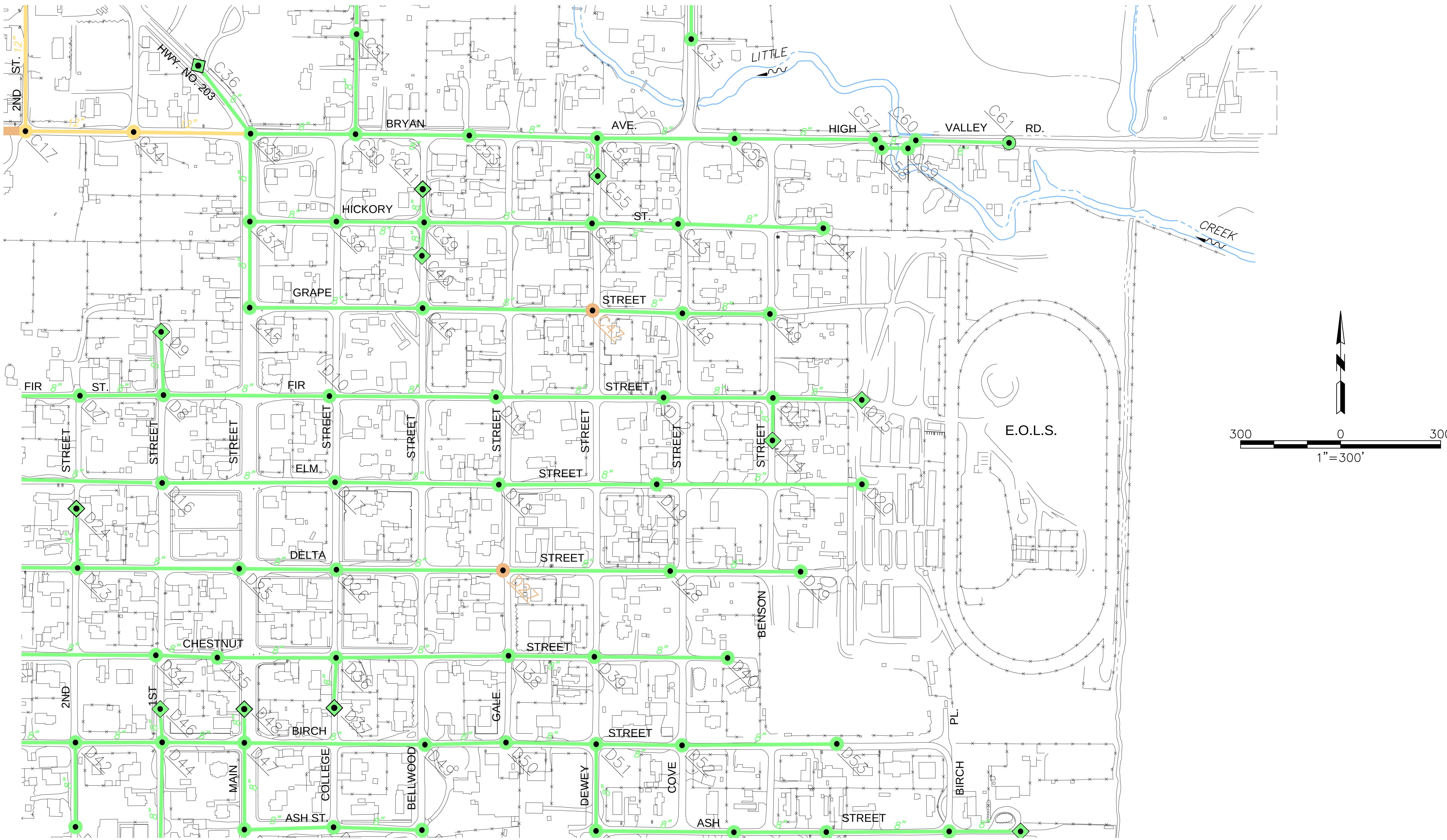


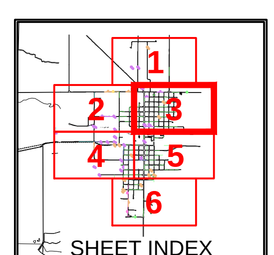
LEGEND

MANHOLE AND NUMBER C18

CLEANOUT AND NUMBER C18

8" SEWER LINE

12" SEWER LINE



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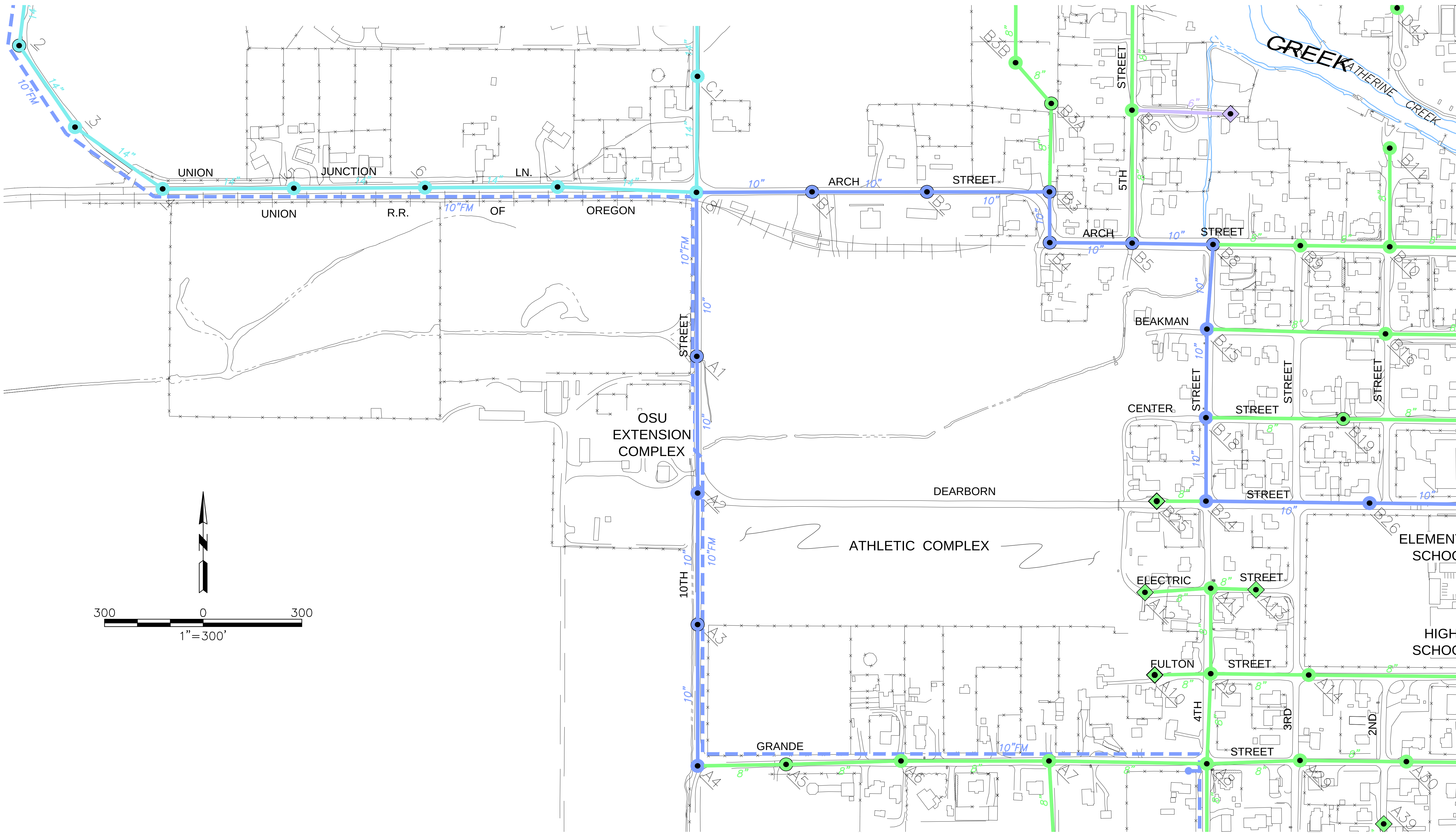
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
3 OF 6



LEGEND

MANHOLE AND NUMBER (C18)

CLEANOUT AND NUMBER (C18)

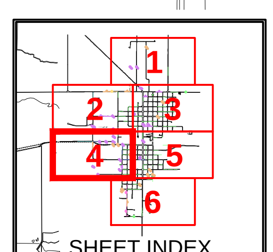
6" SEWER LINE

8" SEWER LINE

10" SEWER LINE

10" SEWER FORCEMAIN

14" SEWER LINE



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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
4 OF 6

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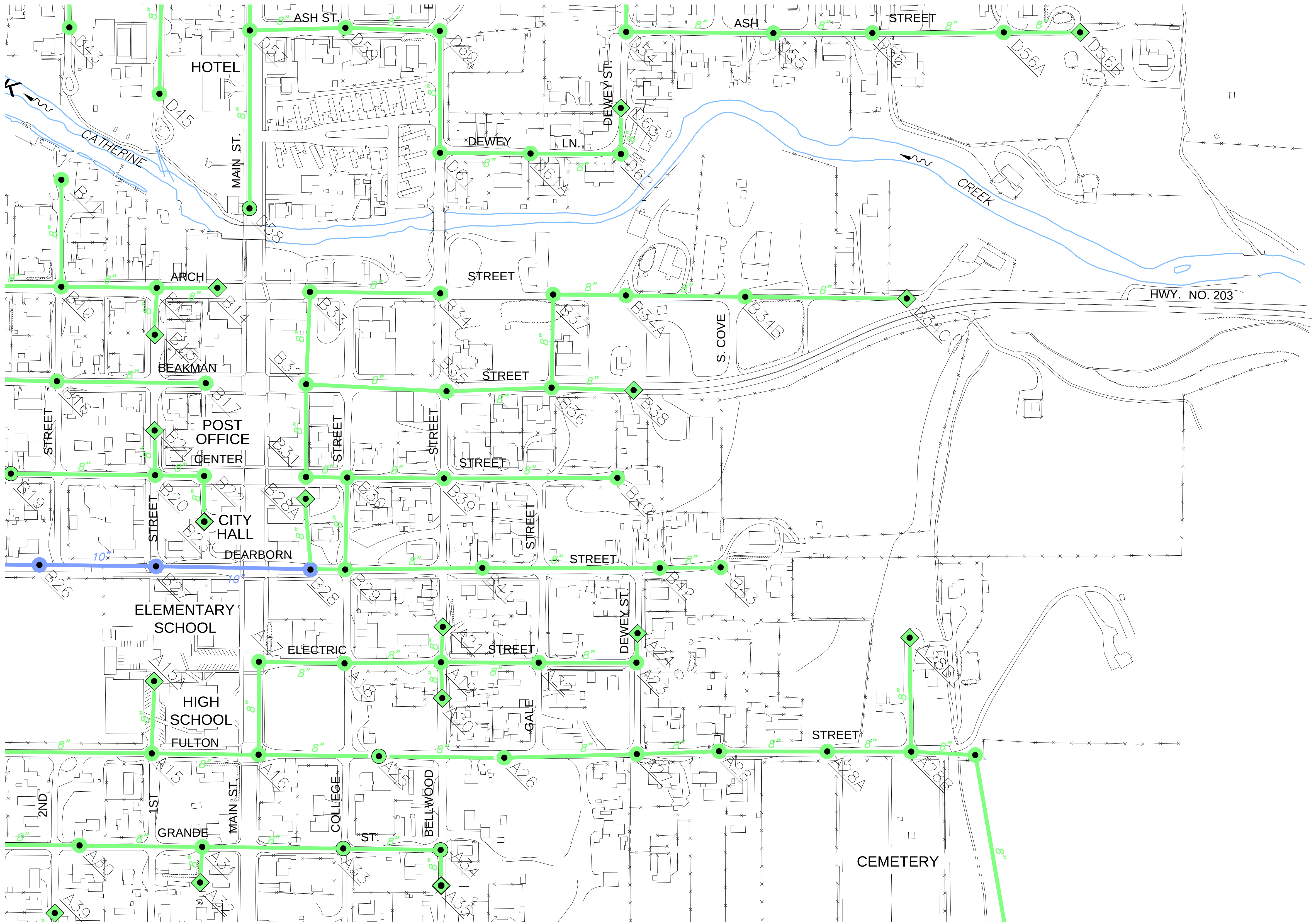


300 0 300
1"=300'

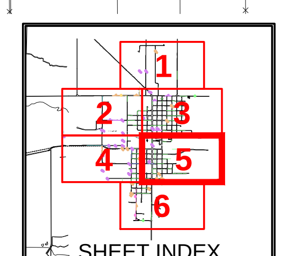
LEGEND

MANHOLE AND NUMBER C18

CLEANOUT AND NUMBER C18

8" 8" SEWER LINE

10" 10" SEWER LINE



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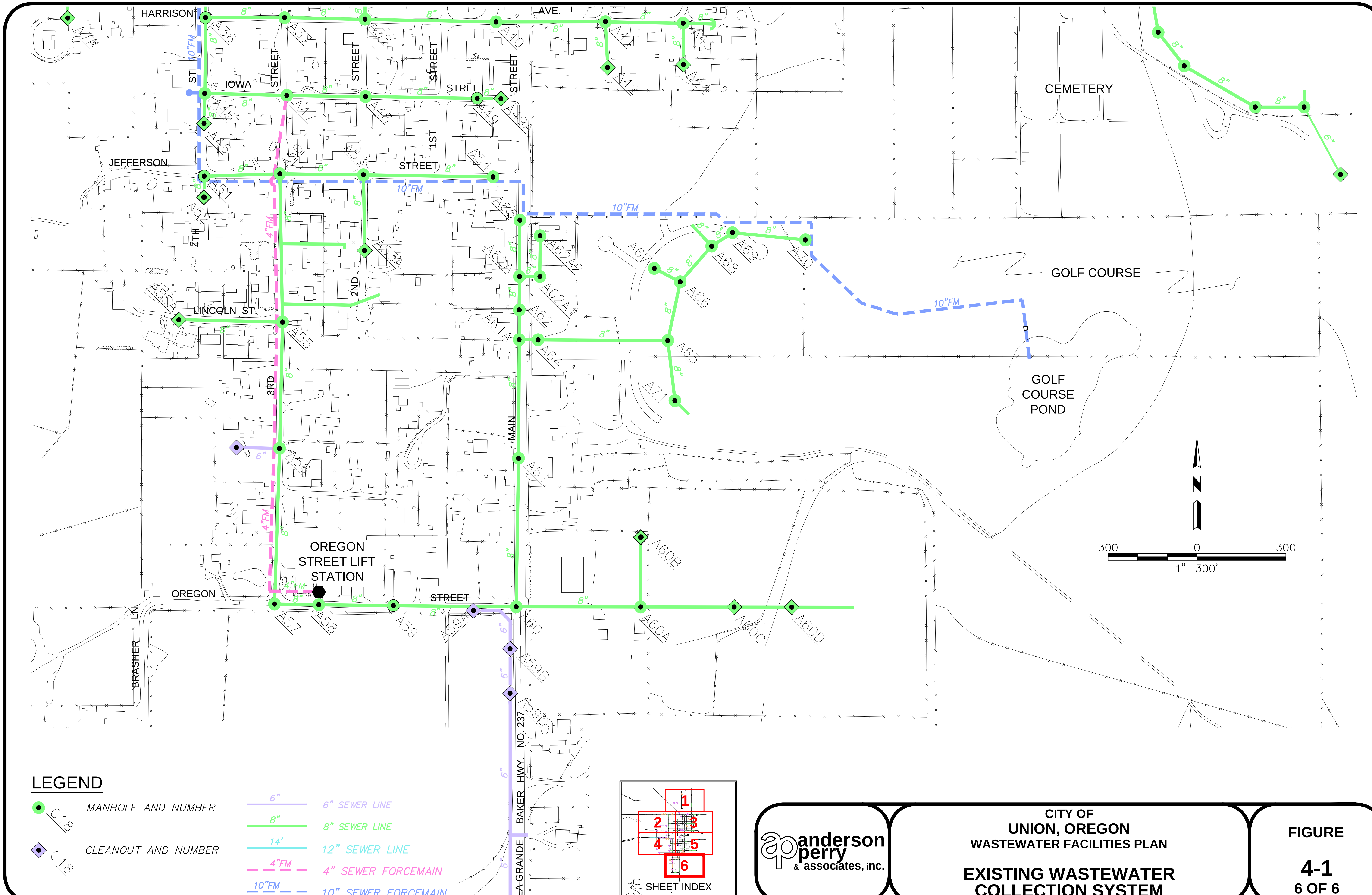
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
5 OF 6



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CITY OF
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WASTEWATER FACILITIES PLAN

EXISTING WASTEWATER COLLECTION SYSTEM

FIGURE
4-1
6 OF 6

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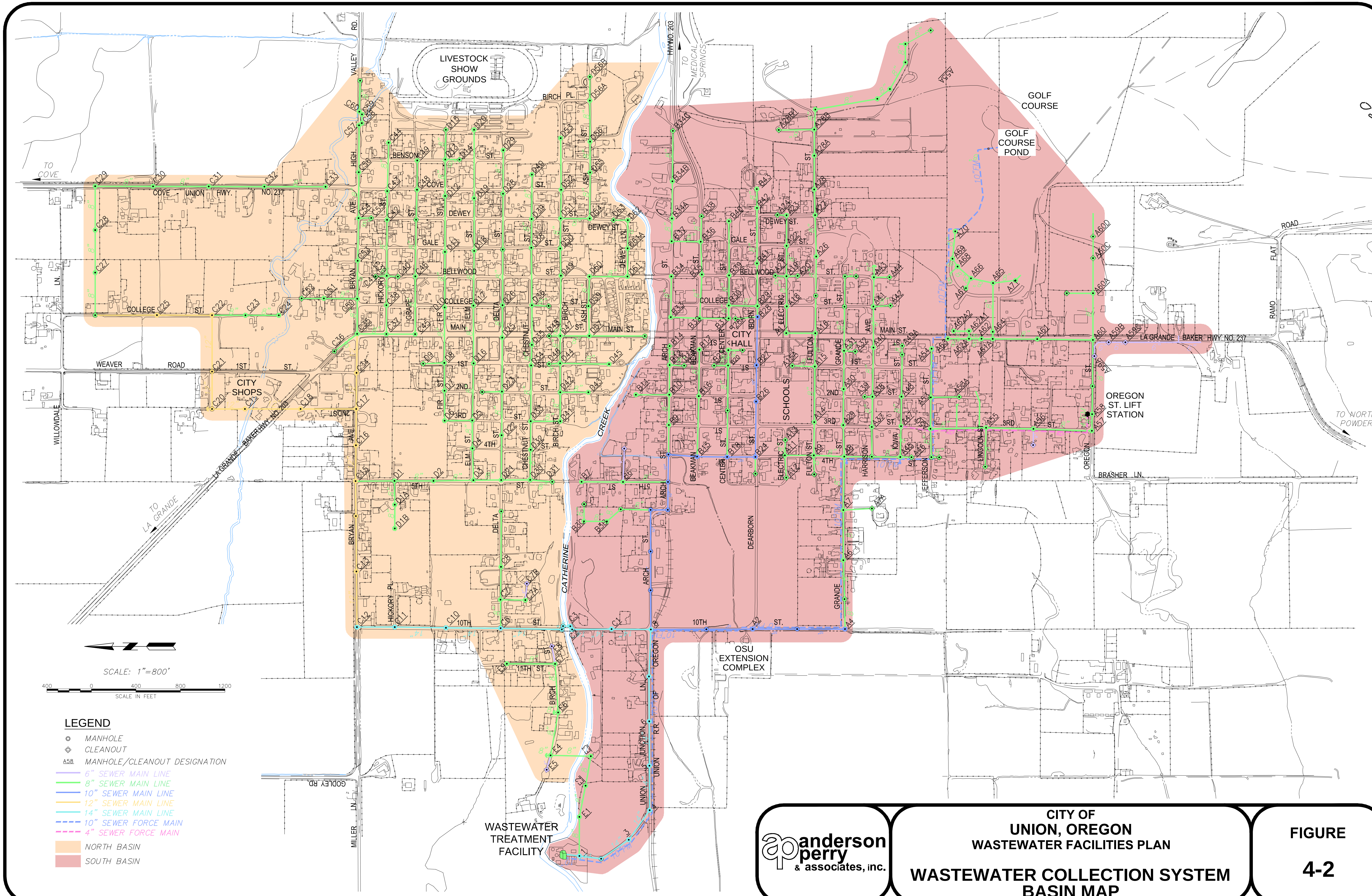

S:\UNION\482-38 Wastewater Facilities Plan\dwg\Sewer System Figures_half.dwg, BASIN FIG 4-2, 3/16/2015 10:10:16 AM, pichardson

High Priority Collection System Improvements

Work Item No.	Wastewater Collection System Sheet No.[1]	Reach or Manhole No.	Distance from Manhole (feet)	Description of Work	Notes
H1	4	A1-8	168	Additional inspection required.	Service (top) leaking 3 gpm.
H2	5	A35	NA	Inspect and repair cleanout as required.	Broken cleanout cap.
H3	6	A60b	NA	Replace broken cleanout with manhole.	Broken cleanout, pipe full of rocks.
H4	4	B18-B15	Entire Length	Replace 267 feet of 10-inch main line.	Circumferential crack leaking 0.5 gpm with roots, roots protruding through service.
H5	5	B17-B16	55	Additional inspection required.	Service (top) leaking 1 gpm.
H6	5	B17-B16	342	Additional inspection required.	Service (top) leaking 1 gpm.
H7	5	B31-B32	49	Application of RootX.	Roots.
H8	2	C14	NA	Clean, repair, and grout manhole.	I/I at base of manhole, 1 gpm.
H9	2	C10-C6	248	Additional inspection required.	Cracks, no I/I.
H10	2	C14-C13	51	Additional inspection required.	Service (top) leaking 3 gpm.
H11	3	C45-C37	4	Additional inspection required.	Service (left) leaking 1 gpm.
H12	3	C41	NA	Replace broken cleanout with manhole.	Broken cleanout.
H13	5	D57-D58	492	Application of RootX.	Roots growing through joint.
H14	6	A59	NA	Clean, repair, and grout manhole.	Top concrete ring is broken.
H15	3	C61	NA	Clean, repair, and grout manhole.	Cover off center of cone.

[1] See Figure 4-4, Wastewater Collection System Priority Improvements.

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

PROPOSED COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE 4-3

Medium Priority Collection System Improvements

Work Item No.	Wastewater Collection System Sheet No.[1]	Reach or Manhole No.	Distance from Manhole (feet)	Description of Work	Notes
M1	1	C20	NA	Clean, repair, and grout manhole.	I/I around manhole sections.
M2	3	C36	NA	Inspect and repair cleanout as required.	Gravel in cleanout.
M3	3	C38-C37	Entire	Application of RootX.	Roots in service.
M4	3	C53-C54	Entire Length	Line 390 feet of 8-inch asbestos cement main line.	Cracks and exposed aggregate.
M5	4	2	NA	Clean, repair, and grout manhole.	Infiltration between base and section.
M6	4	A5	NA	Clean, repair, and grout manhole.	Decay around top joint.
M7	4	B3	NA	Clean, repair, and grout manhole.	Cover off center of cone.
M8	4	B8	NA	Clean, repair, and grout manhole.	Cracks in section under cone.
M9	2	C4	NA	Clean, repair, and grout manhole.	Roots in joint between base and section, and around invert.
M10	2	C5	NA	Clean, repair, and grout manhole.	Decay at top of cone and around center section joint.
M11	1	C21	NA	Clean, repair, and grout manhole.	Cover off center of cone, top seal is broken.
M12	3	D47-D49	463	Repair main line joint.	Rolled gasket.
M13	4	A11-A9	Entire	Application of RootX.	Roots coming through joint.
M14	4	A1	NA	Clean, repair, and grout manhole.	I/I 0.5 gpm around west pipe penetration and between base and section.
M15	4	A3	NA	Clean, repair, and grout manhole.	I/I 0.5 gpm around east pipe penetration and between base and section.
M16	4	A10	NA	Inspect and repair cleanout as required.	Rocks in cleanout.
M17	6	A38-A37	106	Additional inspection required.	Service (top) leaking 1 gpm.
M18	2	B3D	NA	Inspect and repair cleanout as required.	Rocks completely blocking cleanout.
M19	4	B2	NA	Clean, repair, and grout manhole.	I/I around east main line connection 0.5 gpm.
M20	4	B1	NA	Clean, repair, and grout manhole.	I/I above west invert 0.5 gpm.
M21	4	B25	NA	Replace broken cleanout with manhole.	Rocks completely blocking cleanout.
M22	5	B23	NA	Inspect and repair cleanout as required.	Rocks in cleanout.
M23	2	C9-C7	Entire Length	Line 800 feet of 8-inch asbestos cement main line.	Severe cracks with I/I 1.5 gpm
M24	2	C15-D1	329	Additional inspection required.	Joint separation.
M25	3	D24	NA	Inspect and repair cleanout as required.	Gravel in cleanout.
M26	3	D37	NA	Inspect and repair cleanout as required.	Gravel in cleanout.
M27	5	D58	NA	Clean, repair, and grout manhole.	Roots.
M28	3	D48	NA	Inspect and repair cleanout as required.	Broken cleanout cap, rock and debris in cleanout.
M29	4	B3a	NA	Clean, repair, and grout manhole.	Cover off center of cone.
M30	2	C9	NA	Clean, repair, and grout manhole.	Infiltration between base and section.

[1] See Figure 4-4, Wastewater Collection System Priority Improvements.

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

PROPOSED COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE 4-3 CONT'D

Low Priority Collection System Improvements

Work Item No.	Wastewater Collection System Sheet No.[1]	Reach or Manhole No.	Distance from Manhole (feet)	Description of Work	Notes
L1	3	D27	NA	Clean, repair, and grout manhole.	Chipping around joints between sections.
L2	4	A1-8	169	Repair main line.	Hole (right) leaking 0.25 gpm.
L3	6	A52	NA	Application of RootX.	Roots in cleanout.
L4	6	A55-A56	93	Repair service connection.	Rolled gasket on tap, no I/I.
L5	4	B4	NA	Clean, repair, and grout manhole.	I/I around base of manhole 0.25 gpm, and around invert.
L6	2	C17-C16	203	Replace service connection.	Rolled gasket on tap, no I/I.
L7	5	A25	NA	Clean, repair, and grout manhole.	Cover off center of cone top, and rebar in the bottom of the manhole.
L8	5	A33	NA	Clean, repair, and grout manhole.	Top of cone has minor decay.
L9	5	A34	NA	Clean, repair, and grout manhole.	Section beginning to chip.
L10	6	A36	NA	Clean, repair, and grout manhole.	Cracks in bottom section.
L11	6	A49	NA	Clean, repair, and grout manhole.	Cracked lid, decay in mortar under cover.
L12	6	A51	NA	Clean, repair, and grout manhole.	Decay around inlet.
L13	4	B5	NA	Clean, repair, and grout manhole.	Chips in top section.
L14	4	B19	NA	Clean, repair, and grout manhole.	Minor decay at bottom of cone.
L15	1	C26	NA	Clean, repair, and grout manhole.	Infiltration through joint at top of cone.
L16	3	C47	NA	Clean, repair, and grout manhole.	Minor decay at bottom of cone.
L17	2	C9-C8	454	Repair service connection.	Joint separated on lateral at tap, no I/I
L18	2	C14-C13	224	Repair service connection.	I/I around tap, 0.25 gpm.
L19	2	C6-C5	125 to 130	Additional inspection required.	Cracks, no I/I.
L20	2	C6-C5	204	Additional inspection required.	Cracks, no I/I.
L21	2	C6-C5	351 to 361	Additional inspection required.	Cracks, no I/I.
L22	2	C10-C11	414	Additional inspection required.	Cracks, no I/I.

[1] See Figure 4-4, Wastewater Collection System Priority Improvements.

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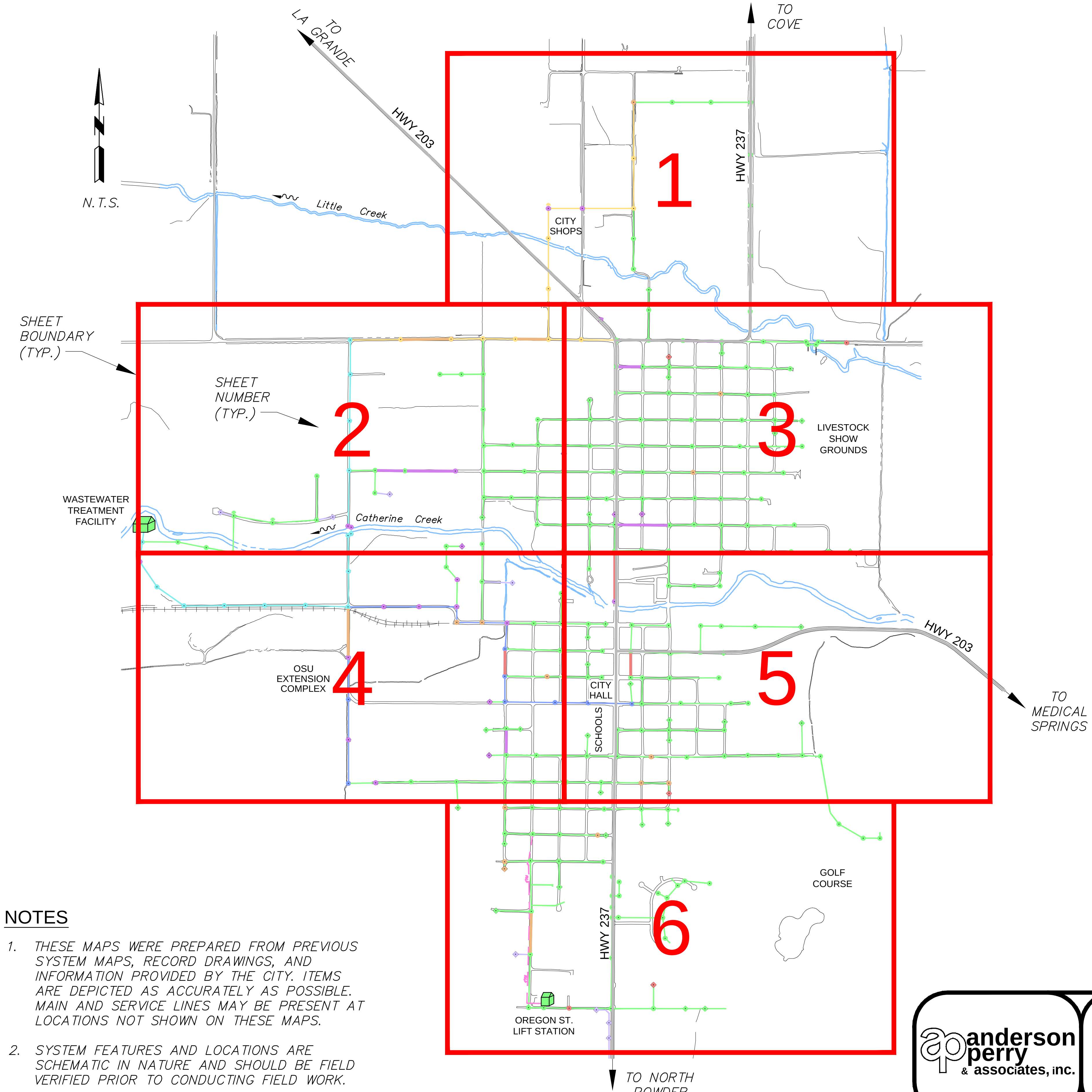
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

PROPOSED COLLECTION SYSTEM IMPROVEMENTS SUMMARY

FIGURE 4-3 CONT'D



CITY OF
UNION, OREGON

NOTES

1. THESE MAPS WERE PREPARED FROM PREVIOUS SYSTEM MAPS, RECORD DRAWINGS, AND INFORMATION PROVIDED BY THE CITY. ITEMS ARE DEPICTED AS ACCURATELY AS POSSIBLE. MAIN AND SERVICE LINES MAY BE PRESENT AT LOCATIONS NOT SHOWN ON THESE MAPS.
2. SYSTEM FEATURES AND LOCATIONS ARE SCHEMATIC IN NATURE AND SHOULD BE FIELD VERIFIED PRIOR TO CONDUCTING FIELD WORK.

SHEET INDEX

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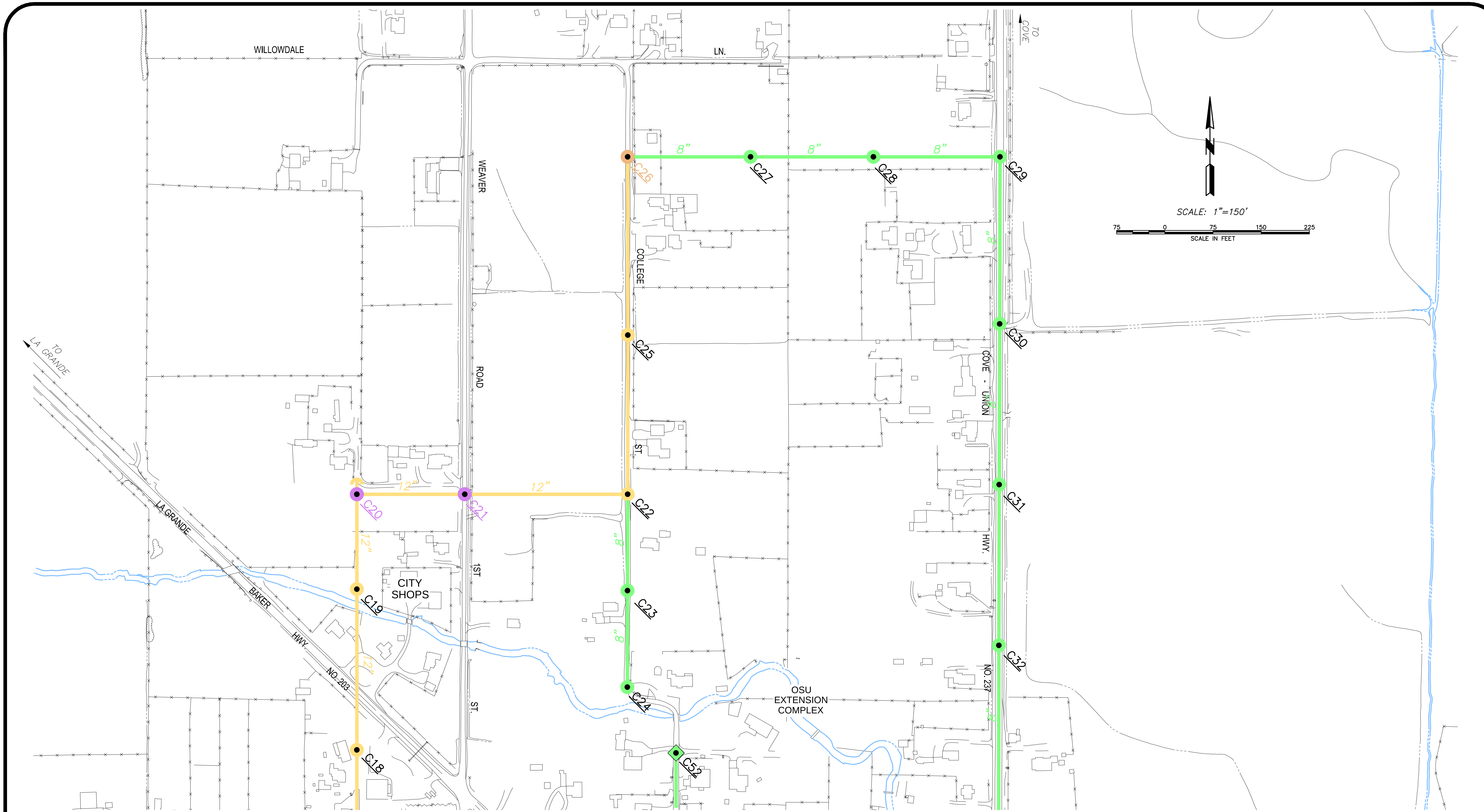
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
COVER



LEGEND

- MANHOLE
- CLEANOUT
- A58 MANHOLE/CLEANOUT DESIGNATION
- HIGH PRIORITY
- MEDIUM PRIORITY
- LOW PRIORITY
- 6" SEWER MAIN LINE
- 8" SEWER MAIN LINE
- 10" SEWER MAIN LINE
- 12" SEWER MAIN LINE
- 14" SEWER MAIN LINE
- 10" SEWER FORCE MAIN
- 4" SEWER FORCE MAIN

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CITY OF
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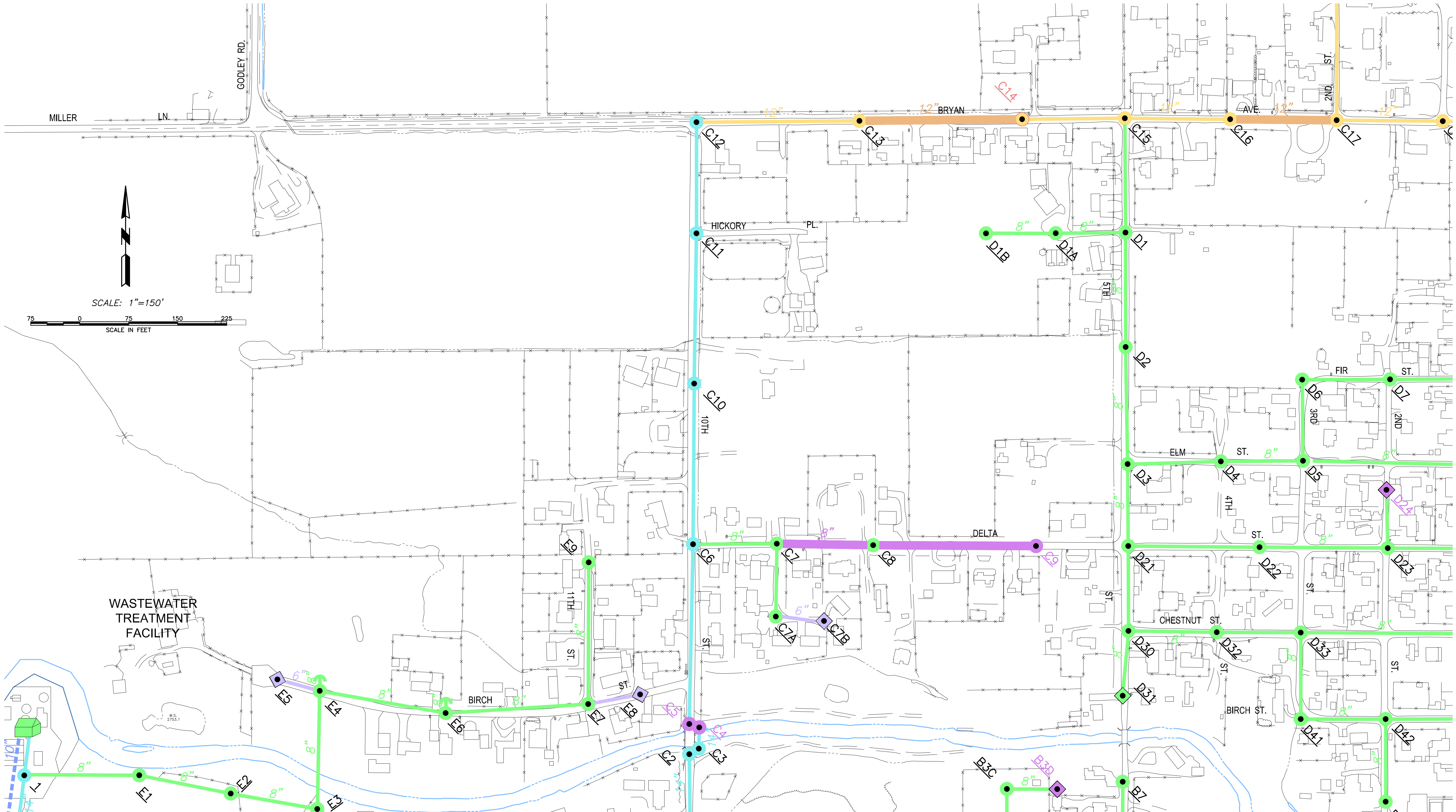
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
1 OF 6

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 4-4_1to6.dwg, FIG 4-4_1, 3/16/2015 10:16:52 AM, prichardson



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CITY OF
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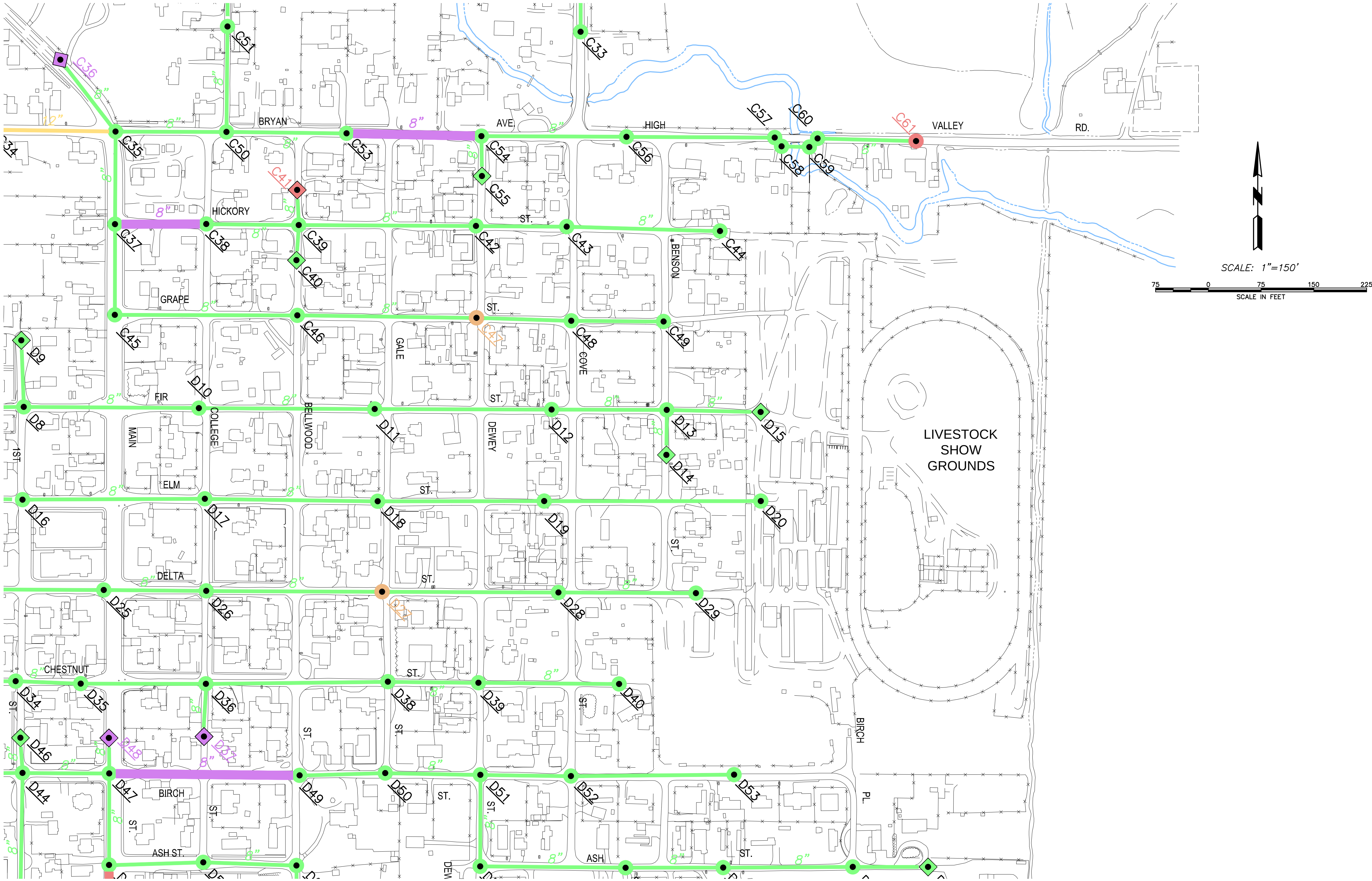
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
2 OF 6

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 4-4_1to6.dwg, FIG 4-4_2, 3/16/2015 10:17:44 AM, prichardson



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CITY OF
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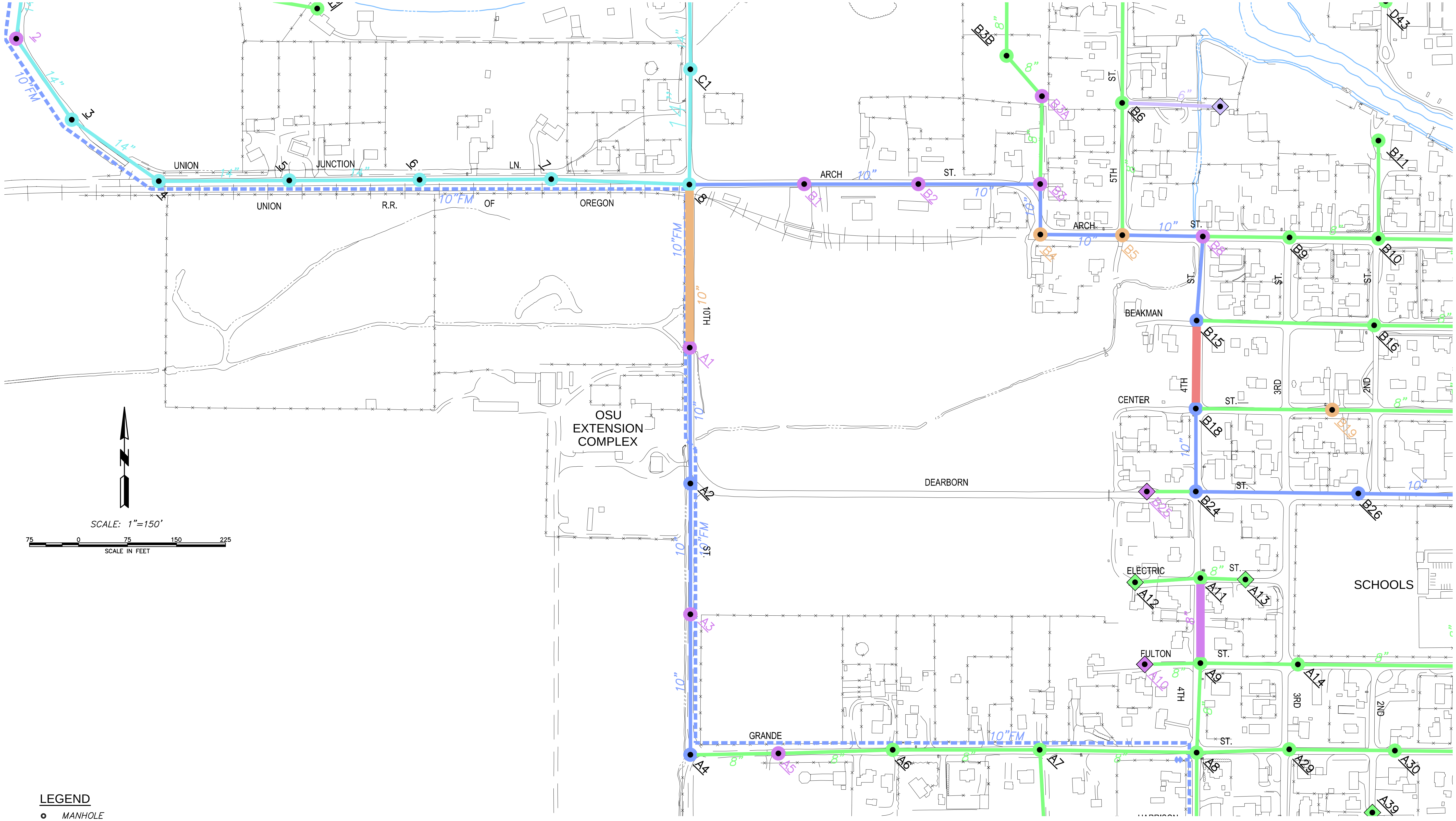
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
3 OF 6



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CITY OF
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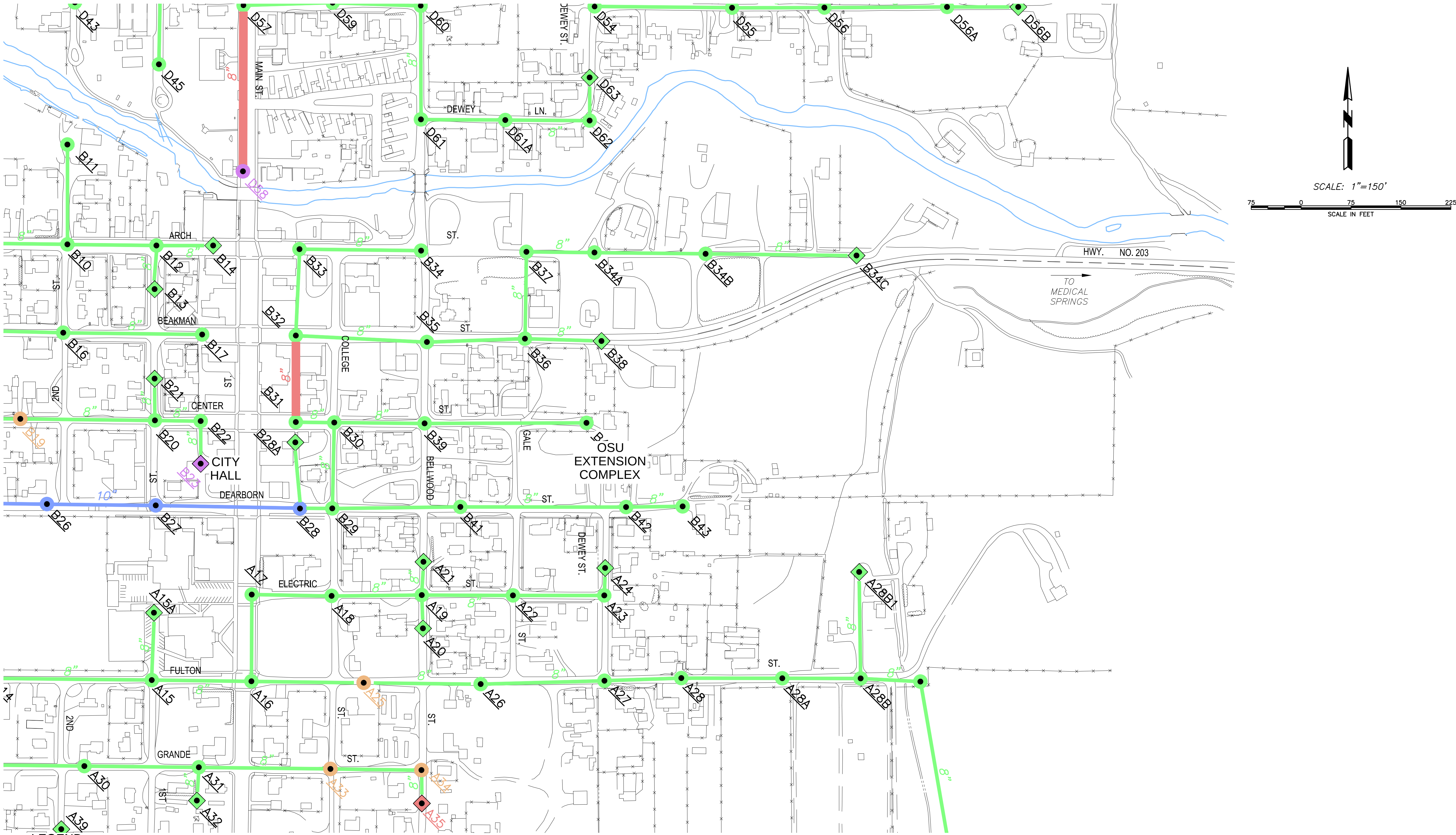
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
4 OF 6

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 4-4_1to6.dwg, FIG 4-4_4, 3/16/2015 10:19:44 AM, prichardson



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CITY OF
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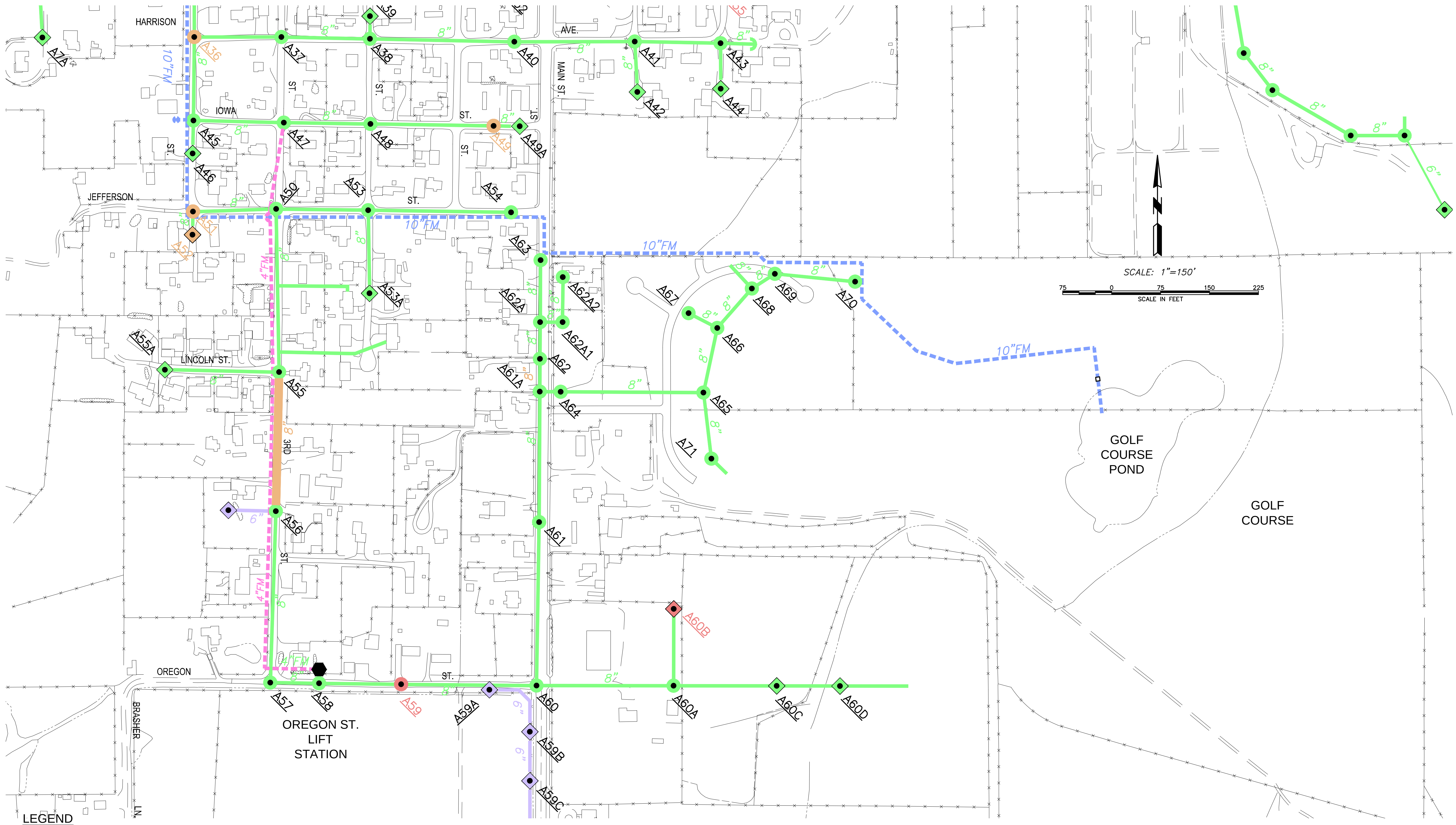
WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM PRIORITY IMPROVEMENTS MAP

FIGURE 4-4
5 OF 6

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 4-4_1to6.dwg, FIG 4-4_5, 3/16/2015 10:20:33 AM, prichardson



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CITY OF
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WASTEWATER FACILITIES PLAN

WASTEWATER COLLECTION SYSTEM
PRIORITY IMPROVEMENTS MAP

FIGURE
4-4
6 OF 6

HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS
COST ESTIMATE
(2014 DOLLARS)

NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	Mobilization/Demobilization	LS	All Req'd	$ 3,560	3,560
2	Temporary Protection and Direction of Traffic/Project Safety	LS	All Req'd	2,500	2,500
3	Clean, Repair, and Grout Manhole	EA	3	2,000	6,000
4	Precast Manhole	EA	3	4,000	12,000
5	Sewer Main Replacement, 10-inch Polyvinyl Chloride Pipe	LF	270	75	20,250
6	Application of RootX	LF	760	4	3,040
7	Additional Potholing	HR	10	90	900
8	Gravel Surface Restoration (Shoulders, Driveways, Alleys, and Parking Areas)	SY	450	15	6,750
9	Asphalt Surface Restoration	SY	50	150	7,500
10	Temporary Bypassing and Pumping of Wastewater	LS	All Req'd	2,500	2,500
11	Dewatering	LS	All Req'd	2,500	2,500
12	Repair of Unmarked Utilities	LS	All Req'd	2,500	2,500
	Total Estimated Construction Cost				**$ 70,000**
	Administration, Legal, Engineering, and Contingencies @ 35%				25,000
	TOTAL ESTIMATED PROJECT COST				**$ 95,000**

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CITY OF
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WASTEWATER FACILITIES PLAN
HIGH PRIORITY COLLECTION SYSTEM IMPROVEMENTS COST ESTIMATE

FIGURE 4-5

MEDIUM PRIORITY COLLECTION SYSTEM IMPROVEMENTS
COST ESTIMATE
(2014 DOLLARS)

NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	Mobilization/Demobilization	LS	All Req'd	$ 10,020	10,020
2	Temporary Protection and Direction of Traffic/Project Safety	LS	All Req'd	5,000	5,000
3	Sewer Main Repair	EA	1	3,000	3,000
4	Clean, Repair, and Grout Manhole	EA	15	1,500	22,500
5	Precast Manhole	EA	8	4,000	32,000
6	8-inch Cured-In-Place-Pipe Lining	LF	1,200	65	78,000
7	Internally Reinstate Sewer Service Line	EA	18	500	9,000
8	Application of RootX	LF	520	4	2,080
9	Additional Potholing	HR	10	90	900
10	Asphalt Surface Restoration	SY	150	150	22,500
11	Temporary Bypassing and Pumping of Wastewater	LS	All Req'd	5,000	5,000
12	Dewatering	LS	All Req'd	1,000	1,000
13	Repair of Unmarked Utilities	LS	All Req'd	4,000	4,000
				Total Estimated Construction Cost	**$ 195,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	68,000
				TOTAL ESTIMATED PROJECT COST	**$ 263,000**

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CITY OF
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WASTEWATER FACILITIES PLAN
MEDIUM PRIORITY COLLECTION SYSTEM IMPROVEMENTS COST ESTIMATE

FIGURE 4-6

LOW PRIORITY COLLECTION SYSTEM IMPROVEMENTS
COST ESTIMATE
(2014 DOLLARS)

NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	Mobilization/Demobilization	LS	All Req'd	$ 3,080	3,080
2	Temporary Protection and Direction of Traffic/Project Safety	LS	All Req'd	3,000	3,000
3	Sewer Main Repair	EA	1	3,000	3,000
4	Existing Service Line Connection Replacement	EA	3	2,400	7,200
5	Clean, Repair, and Grout Manhole	EA	12	1,500	18,000
6	Application of RootX	LF	80	4	320
7	Additional Potholing	HR	10	90	900
8	Asphalt Surface Restoration	SY	90	150	13,500
9	Temporary Bypassing and Pumping of Wastewater	LS	All Req'd	1,000	1,000
10	Dewatering	LS	All Req'd	1,000	1,000
11	Repair of Unmarked Utilities	LS	All Req'd	1,000	1,000
				Total Estimated Construction Cost	**$ 52,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	18,000
				TOTAL ESTIMATED PROJECT COST	**$ 70,000**

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CITY OF
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WASTEWATER FACILITIES PLAN
LOW PRIORITY COLLECTION SYSTEM IMPROVEMENTS COST ESTIMATE

FIGURE 4-7

Chapter 5 - Development and Evaluation of Wastewater Treatment Facility Improvement Alternatives

General

The City of Union's wastewater treatment facility (WWTF) operates in accordance with the limits established in the City's current National Pollutant Discharge Elimination System (NPDES) Permit. The Oregon Department of Environmental Quality (DEQ) regulates NPDES Permits in Oregon and expects to issue an NPDES Permit renewal shortly containing new restrictions that limit the amount of ammonia that can be discharged to Catherine Creek. This chapter provides a conceptual discussion of alternatives designed to meet the expected NPDES Permit ammonia limits and evaluates feasible alternatives. Cost estimates were developed for alternatives considered feasible after a thorough engineering evaluation.

A separate improvements schedule was proactively requested by the City of Union to address worn, aging, or outdated components of the WWTF and the collection system and is referred to as the Implementation Plan throughout this Wastewater Facilities Plan (WWFP). The Implementation Plan lists components of the existing collection system and existing WWTF that are likely to require remedial work during the 20 years represented by this WWFP and shows the year when the expected repair will be needed. The City of Union intends to make listed repairs using City funds generated through rate payer fees. The Implementation Plan follows the alternative section of this chapter and summarizes budget cost estimates. Cost estimates have been adjusted for inflation to the year the repair/improvement is expected to occur. Improvements to reduce odors are included in the Implementation Plan and are part of the capital improvements. An additional discussion of odor reduction and a method for implementation is provided in Chapter 6.

Wastewater Treatment Facility and Effluent Reuse Alternatives

Introduction

This portion of the WWFP describes WWTF modification alternatives and effluent reuse alternatives designed to comply with the expected NPDES Permit ammonia limits. The following paragraphs provide conceptual descriptions of the WWTF improvement alternatives and an explanation of how the alternatives would affect wastewater management in Union. It should be noted that portions of the WWTF lie in the floodplain. New wastewater facilities constructed in the floodplain must be designed to maintain their structural integrity during a 500-year flood event.

Conceptual Description of Wastewater Treatment Facilities Alternatives

This section introduces and describes the improvement alternatives. In the following alternatives, the growing season is generally described as May through September and the non-growing season as October through April. In practice, the operator has flexibility to land-apply effluent earlier and later in the year to match climate conditions.

The alternatives considered to comply with anticipated ammonia limits include:

1. No action.

2. Upgrade the WWTF to manage ammonia and continue seasonal effluent discharge to Catherine Creek from October through April. Land-apply treated effluent on the Buffalo Peak Golf Course from May through September.

3. Discontinue seasonal (October through April) discharge of treated effluent to Catherine Creek, store effluent generated from October through April, and land-apply stored effluent from May through September. Analyses are based on the assumption that the point of compliance remains at the initial discharge from the WWTF.

   3A. Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Pump stored effluent to the golf course for beneficial use from May through September. Pump treated effluent generated from May through September to the golf course.

   3B. Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Land-apply stored treated effluent on alfalfa from May through September and treated effluent generated from May through September. Discontinue recycled water use at the golf course.

   3C. Construct a two-cell effluent storage pond in northwest Union to store treated effluent generated from October through April. Land-apply stored effluent on alfalfa from May through September. Continue irrigating the golf course with treated effluent from May through September.

4. Decommission Union's Mechanical WWTF. Treat wastewater in facultative treatment lagoons and land-apply treated effluent at the golf course or on alfalfa from May through September. Store treated effluent generated from October through April in effluent storage ponds for land application from May through September.

Conceptual Discussion of Wastewater Treatment Facility Alternatives

Alternative 1

No Action.

Under the No Action alternative, the City would continue using the WWTF in its present condition. Chapter 3 provides a detailed discussion and evaluation of the existing plant. No work would be performed and no changes to the operation would be made. This alternative is viable if the NPDES Permit renewal continues to limit pollutants at the same or similar level as the current NPDES Permit and if the pollutant list does not expand to include ammonia. The No Action alternative is not viable if the regulated pollutant list expands to include ammonia or if the currently listed pollutant limits are significantly reduced. No action potentially makes the City vulnerable to fines, consent orders, DEQ-administered compliance schedules, and lawsuits from special interest groups. However, the DEQ anticipates adding ammonia to the City's regulated pollutant list when reissuing Union’s NPDES Permit. Additional evaluation of this alternative is not merited because a No Action alternative does not address anticipated ammonia limits.

Alternative 2

Upgrade the Wastewater Treatment Facility to Manage Ammonia and Continue Effluent Discharge to Catherine Creek from October through April. Land-Apply Treated Effluent on the Buffalo Peak Golf Course from May through September.

Alternative 2 would modify the WWTF by adding rotating biological contactors (RBCs) to the system. The additional biological contactor capacity will be designed to reliably reduce ammonia to meet the DEQ-proposed ammonia limits. Treated WWTF effluent would continue to discharge to Catherine Creek from October to April and would continue to discharge to the golf course for a beneficial use from May through September. A comprehensive evaluation of Alternative 2 is provided in the Detailed Evaluation of Feasible Alternatives section of this chapter.

Alternative 3

Discontinue Seasonal (October through April) Discharge of Treated Effluent to Catherine Creek, Store Effluent Generated from October through April, and Land-Apply Stored Effluent from May through September.

Alternative 3 has been divided into three subparts: 3A, 3B, and 3C. All three subparts share common features with variations on the final effluent disposal method.

In Alternative 3, no modifications would be made to the WWTF. Instead, all three subparts replace river discharge of effluent with a pond storage system for subsequent discharge to the golf course or on an alfalfa field. Beneficially reusing the WWTF effluent eliminates the need for an NPDES Permit and the related pollutant loading limits. Alternative 3 would reduce the permitting requirements to a Water Pollution Control Facilities (WPCF) Permit, which should significantly reduce the City's compliance burden.

Alternative 3A

Construct a Two-Cell Effluent Storage Pond in Northwest Union to Store Treated Effluent Generated from October through April. Pump Stored Effluent to the Golf Course for Beneficial Use from May through September. Pump Treated Effluent Generated from May through September to the Golf Course.

With Alternative 3A, effluent produced from October through April would be transferred to a two-cell effluent storage pond preliminarily located in northwest Union. Effluent would be transferred to the storage pond via gravity flow through a 10-inch effluent transfer pipe. Return flow would utilize the same transfer pipe but would require a transfer pump station to lift effluent back to the WWTF effluent pump station, which would then pump the treated effluent to the golf course. This alternative is considered viable because it utilizes existing infrastructure and provides an environmentally responsible solution. Alternative 3A is evaluated in the Detailed Evaluation of Feasible Alternatives section of this chapter.

Alternative 3B

Construct a Two-Cell Effluent Storage Pond in Northwest Union to Store Treated Effluent Generated from October through April. Land-Apply Stored Treated Effluent on Alfalfa from May through September and Treated Effluent Generated from May through September. Discontinue Recycled Water Use at the Golf Course.

With Alternative 3B, the full annual effluent flow would be transferred to a two-cell effluent storage pond through a new 10-inch transfer pipe. Stored effluent would then be pumped through a pivot irrigation system and land-applied. Alternative 3B would abandon the current WWTF effluent pump system and forcemain and would stop sending effluent to the golf course. Since there are outstanding loans associated with the current effluent pump station and forcemain, and since the continued operation of this system is a condition of the funding utilized to design and construct the effluent forcemain, effluent pump system, and irrigation distribution system, it does not appear feasible to further analyze Alternative 3B.

Alternative 3C

Construct a Two-Cell Effluent Storage Pond in Northwest Union to Store Treated Effluent Generated from October through April. Land-Apply Stored Effluent on Alfalfa from May through September. Continue Irrigating the Golf Course with Treated Effluent from May through September.

With Alternative 3C, WWTF effluent produced from October through April would be transferred to a two-cell effluent storage pond preliminarily sited in northwest Union. Effluent would be transferred to the storage ponds through a 10-inch gravity flow effluent transfer pipe. The stored effluent would be land-applied to an alfalfa field. Effluent produced from May through September would continue to be transferred to the golf course for beneficial reuse as irrigation.

Alternative 3C is considered feasible because this alternative reuses the full annual production of effluent without disrupting the golf course effluent reuse program. Alternative 3C also provides the most long-term flexibility of the alternatives because the land application portion of the alternative can be expanded if needed. An evaluation of Alternative 3C follows in the Detailed Evaluation of Feasible Alternatives section of this chapter.

Alternative 4

Decommission Union's Mechanical WWTF. Treat Wastewater in Facultative Treatment Lagoons and Land-Apply Treated Effluent at the Golf Course or on Alfalfa from May through September. Store Treated Effluent Generated from October through April in Effluent Storage Ponds for Land Application from May through September.

Alternative 4 removes effluent discharge to Catherine Creek from Union’s WWTF and decommissions the primary and secondary clarifiers, the biological contactors, the aerobic digesters, and the sludge drying beds. The existing headworks, consisting of the fine screen, influent sampler, Parshall flume, and associated wastewater channels and piping, would be retained. Additionally, the chlorination system and the irrigation effluent pump station would be retained. The biological wastewater treatment would be accomplished in facultative wastewater treatment lagoons that would replace the listed decommissioned biological treatment components. Once the wastewater treatment is completed in the treatment lagoons, the treated wastewater would be transferred to effluent storage ponds and subsequently used for irrigation of alfalfa on adjacent farm ground or pumped to Buffalo Peak Golf Course for irrigation during the growing season. Effluent used on farm ground for alfalfa must be treated to Class D, and effluent used on the golf course must be treated to Class C. To accomplish Class D effluent for the alfalfa field and avoid excessive pumping, an on-site chlorination system would be needed. To accomplish Class C effluent for reuse at the golf course, it will be necessary to recommission the travelling bridge rapid sand filter and add polymer through a flocculation tank. Recommissioning of the travelling bridge rapid sand filter and associated components is further explained in the Detailed Evaluation of Feasible Alternatives section of this chapter.

Detailed Evaluation of Feasible Alternatives

Evaluation of Regulatory Requirements

Presented hereafter is a summary of the regulatory requirements that may need to be met when implementing one of the feasible alternatives. These include regulations concerning groundwater quality protection, sludge management, and wetland and waterway impacts. Additionally, potential regulatory permitting requirements for erosion control plans and stormwater management plans are identified.

Groundwater Quality Protection

The criteria and guidelines for groundwater quality protection are contained in Oregon Administrative Rules (OAR), Chapter 340, Division 40 (OAR 340-040). Proposed treated effluent storage ponds in Alternative 3 and proposed wastewater treatment lagoons in Alternative 4 will be lined with an impervious membrane, so minimal potential will exist to discharge any wastewater into groundwater. No impacts to existing groundwater are anticipated.

Effluent Reuse Regulations

This section provides a general discussion of the effluent reuse regulations currently in place in Oregon that apply to land application of effluent on an alfalfa field or golf course. The criteria and guidelines for effluent irrigation summarized below are found in OAR 340-055. The reuse regulations vary depending on the quality of the effluent. The City of Union's WWTF produces Class C effluent as defined in the regulations. If the City decommissions the WWTF and replaces mechanical biological treatment with facultative wastewater treatment lagoons, a Class D effluent is expected to result. The following regulatory information applies to Class C effluent. Regulatory information for Class D effluent follows.

- In order to assume groundwater protection, treated wastewater must be applied at agronomic rates. This refers to the practice of applying the treated wastewater effluent at rates that are less than the crop being grown can use. This limitation applies to hydraulic loading as well as nutrient loading. For typical municipal wastewater and a crop such as alfalfa, hydraulic loading will be the controlling factor.

- Buffer zones surrounding the irrigation area will be required. For a Class C wastewater effluent and spray irrigation system, a minimum 70-foot buffer zone from the property line is required. The 70-foot buffer zone applies only to spray irrigation systems; underground systems such as drip irrigation require a 10-foot buffer zone.
- It is recommended that irrigation of effluent not occur for three days prior to harvesting a crop irrigated with Class C wastewater effluent.
- Animals used for production of milk must be restricted from direct contact with recycled wastewater effluent.
- Access to the effluent discharge area should be controlled by using fencing, a remote location, and/or signs.
- Submission of a Recycled Water Use Plan is required to demonstrate how the wastewater treatment system owner will comply with the rules established in OAR 340-055.
- The Recycled Water Use Plan will require updating if any modifications to the procedure occur.

The following regulatory information applies to Class D effluent that would be produced for application to an alfalfa field when using facultative lagoons for wastewater treatment (Alternative 4).

- Groundwater protection would be accomplished by applying treated wastewater at the agronomic rate associated with the crop being grown. This limitation applies to hydraulic loading as well as nutrient loading. Hydraulic loading is normally the controlling factor when irrigating a crop such as alfalfa with municipal wastewater.
- A 100-foot buffer zone is required from the edge of the site used for irrigation (Class D effluent) and the site property line when sprinkler irrigation is used. There must be a minimum of 100 feet from the edge of an irrigation site to a water supply source used for human consumption, and 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.
- Animals used for production of milk must be restricted from direct contact with recycled water.
- Class D recycled water must be oxidized and disinfected wastewater and 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. Monitoring for *E. coli* organisms must occur at least once per week.
- Irrigation of ornamental nursery stock, Christmas trees, sod, or pasture for animals are examples of allowable beneficial uses. 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 wastewater and is not safe for drinking. The Recycled Water Use Plan must specify how notification will be provided. Irrigating with effluent must cease three days before harvesting the crop.

- When irrigating, signs must be posted around the perimeter of the irrigation site stating recycled water is used and is not safe for drinking.

Sludge (Biosolids) Management

Any sludge that is produced in the process and land-applied must comply with current state and federal regulations. Applicable state regulations are OAR 340-050, Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products and Domestic Septage. Applicable federal regulations are found in the Code of Federal Regulations, Title 40, Part 503. The City will also need to comply with all biosolids management conditions stipulated in the most current NPDES Permit issued by the DEQ. Chapter 2 provides a more comprehensive discussion on the regulations regarding land application of biosolids.

Wetland Impacts and Waterway Protection

The mechanical WWTF (Alternative 2) has no potential to discharge wastewater into wetlands because no wetlands exist in the WWTF. Therefore, no impacts to existing wetlands are anticipated if Alternative 2 is implemented. Alternative 3 and Alternative 4 have potential to discharge to wetlands. A final analysis and approval of the selected land application site will be needed before commissioning the site.

Regulatory Permitting Requirements for Erosion Control Plans and Stormwater Management Plans

Construction projects that disturb one acre or more must have an Erosion and Sediment Control Plan approved by the DEQ prior to commencement of any on-site activities. The applicable permit is referred to as 1200-C. The 1200-C Permit generally requires the following:

- No discharge of significant amounts of sediment to surface waters. Examples of what the DEQ considers significant are provided in the 1200-C Permit.
- Preparation and implementation of an Erosion and Sediment Control Plan to prevent such discharges.
- Maintenance of erosion and sediment controls, cleanup of deposits of sediment that leave the site, and proper storage, handling, and disposal of hazardous materials.
- Compliance with water quality standards in OAR 340-041 and any total maximum daily loads established for specific basins. For example, no discharge can cause more than a 10 percent increase of in-stream turbidity from background.
- Visual inspections of erosion and sediment control measures.

Alternative 2 will not require a 1200-C Permit because the area being disturbed will be less than one acre.

Alternatives 3 and 4 will require a 1200-C Permit because more than one acre will be disturbed during construction. Application for the permit should be completed during the design phase of the improvements.

The Environmental Protection Agency (EPA) stormwater regulations require that certain stormwater discharges "associated with industrial activity" need NPDES Permits. In general, a permit is needed if:

1. The industry is listed by the EPA.

2. Stormwater from rain or snowmelt leaves the site through a "point source" and reaches surface waters either directly or through storm drainage. A point source discharge refers to a natural or human-made conveyance of water through such things as pipes, culverts, ditches, catch basins, or any other type of channel.

Neither of these two conditions would apply to the City because wastewater treatment plants of less than 1 million gallons (MG) per day design capacity are not listed and stormwater associated with storage pond construction will be held on site.

Environmental Review

The City will need to complete an environmental review of the proposed wastewater system improvements prior to the preferred alternative being pursued. Such a review would evaluate the impacts of the project, including any affected property needed for treatment and disposal facilities. The environmental review will need to be submitted to the DEQ and may also need to be submitted to outside funding agencies.

Alternative 2 - Detailed Evaluation

Upgrade the Wastewater Treatment Facility to Manage Ammonia and Continue Effluent Discharge to Catherine Creek from October through April. Land-Apply Treated Effluent on Buffalo Peak Golf Course from May through September.

Alternative 2 adds five RBCs to the wastewater treatment process to provide additional biological growth capacity for the treatment of ammonia. Currently, one submerged biological contactor (SBC) and two RBCs provide a total biological growth media area of 252,600 square feet. This existing biological growth area successfully reduces ammonia on average from about 31 milligrams per liter (mg/L) to 10 mg/L, representing an average ammonia reduction of about 67 percent. However, the proposed spawning season (October 1 through June 15) NPDES ammonia limits for Catherine Creek are 4.2 mg/L monthly average and 6.2 mg/L daily. To reliably nitrify ammonia so that an effluent with 4.2 mg/L (or less) results (based on 2034 five-day biochemical oxygen demand [BOD_5] projected loading of 388 pounds per day), an additional biological growth media area of approximately 876,000 square feet is required.

To obtain the required media area, five additional RBC shafts are needed. Each shaft requires a concrete tank approximately 15 feet by 25 feet in size, a 5 horsepower (Hp) motor, a fiberglass reinforced plastic roof, and associated process piping. To locate the additional RBC units on site, it will be necessary to remove the first two sludge drying beds. Historically, Union's WWTF has produced an average of 17.8 dry tons of sludge per year (see Table 3-14). Each sludge drying bed can process up to 21 dry tons per year. With this information, it is reasonable to reduce the sludge drying beds from four to three and replace one of the two displaced drying beds, as shown on Figure 5-1. The process schematic is shown on Figure 5-2. The total 2014 estimated cost for

Alternative 2 is approximately $3,049,500. Operation and maintenance is estimated at $31,800. The 2014 present worth is estimated at $3,482,500, and the 2018 present worth is estimated at $4,074,000.

A list of Alternative 2 system improvement components is presented on Figure 5-3, and the cost estimate for this alternative is presented on Figure 5-4.

Overall, Alternative 2 offers a straightforward expansion of Union's existing WWTF. Advantages and disadvantages of this alternative include:

Advantages

- Familiar operation.
- Similar equipment to existing.
- Reliable.

Disadvantages

- High initial cost.
- Additional mechanical complexity.
- Hard to fit into a tight site.
- Complex concrete work.
- WWTF is still subject to future (possibly stricter) regulations related to continued discharge of treated effluent to Catherine Creek during future permit renewal cycles.

Alternative 3- Detailed Evaluation

Discontinue Seasonal (October through April) Discharge of Treated Effluent to Catherine Creek, Store Effluent Generated from October through April, and Land-Apply Stored Effluent from May through September.

Three subparts to Alternative 3 were described in the conceptual discussion of WWTF alternatives. Of the three subparts, two (3A and 3C) were considered feasible for detailed evaluation. Alternative 3B was not considered viable because it would decommission the golf course irrigation system and effluent forcemain, which would be a violation of funding conditions as discussed earlier in this chapter.

Alternative 3A

Construct a Two-Cell Effluent Storage Pond in Northwest Union to Store Treated Effluent Generated from October through April. Pump Stored Effluent to the Golf Course for Beneficial Use from May through September. Pump Treated Effluent Generated from May through September to the Golf Course.

Alternative 3A would store treated effluent produced from October through April in a two-cell storage pond and land-apply the treated effluent on the golf course from May through September. The total treated effluent flow to the golf course equals the full annual effluent from Union's WWTF. The water balances associated with this alternative (Figures 5-5 through 5-7) show that the present treated effluent application utilizes approximately 60 acres of the available 124 irrigable acres. To successfully land-apply treated effluent at the golf course utilizing the full 2014 available annual volume, the water balance shown on Figure 5-5 requires 70 acres of turf area to irrigate, for an increase of 10 acres. Initial evaluations show that irrigating an additional 10 acres at the golf course is possible and that the additional irrigation should not adversely affect the golf course's rating as a links-style golf course. Evaluating this alternative considering projected 2034 wastewater production shows that 85 acres (see Figure 5-7) of golf course would be needed to accept the treated effluent at the agronomic rate.

Although the golf course design plans show that sufficient area is available to accommodate the additional required irrigation area, a review of the topography and geological makeup of the golf course site shows that obtaining up to 25 additional irrigation acres will be challenging, because there are several areas with rock and shallow topsoil.

City Council workshop discussions and a telephone conversation with the Buffalo Peak Golf Course greens keeper indicated that increasing the irrigation area to 85 acres could change the golf course's links-style designation. The links-style designation is considered a unique, positive feature of the golf course.

The final point of evaluation for Alternative 3A is to see if the existing effluent pump station and forcemain have sufficient capacity to transfer the additional stored treated effluent from the WWTF to Buffalo Peak Golf Course. Three variations of flow were considered. The first scenario applies treated effluent to the golf course at the highest agronomic rate. The highest agronomic rate should occur in July 2034 and is projected to equal 13.59 MG for the month, as shown on Figure 5-7, which equates to 314 gallons per minute (gpm).

The effluent pump station is equipped with two 250 gpm pumps with variable frequency drives (VFD) and one 750 gpm pump with soft start. The 250 gpm pumps are set to activate first, and their combined volumetric flow rate of up to 500 gpm exceeds the 314 gpm requirement. Therefore, the effluent pump station is adequate to transfer the agronomic effluent demand rate to the golf course.

The second scenario considers if the effluent pump station can transfer treated effluent from the WWTF to the golf course at peak hour flow (PHF). Figure 2-5 in Chapter 2 predicts a PHF of 783,000 gallons per day (gpd), which equates to 544 gpm. The combined capacity of the effluent pump station equals 1,250 gpm, exceeding 544 gpm; therefore, the effluent pump station can adequately transfer 2034 projected PHF to the golf course.

The third pumping scenario and probable worst case will be if effluent is pumped to the golf course at average annual flow (AAF) from the stored effluent ponds at the same time PHF occurs. The 2034 AAF is projected to equal approximately 174,000 gpd, or 120 gpm. Combining PHF of 544 gpm with AAF of 120 gpm equals approximately 664 gpm. The effluent pump station is adequate to pump 664 gpm.

Velocity in 10-inch diameter forcemains is normally held to 5 feet per second (fps) or less. The worst probable flow is projected as 664 gpm. The estimated velocity at 664 gpm equals 2.72 fps, which is about 54 percent of the allowable velocity. Therefore, the forcemain has sufficient capacity to transfer any of the possible flow conditions described above.

As shown in the above flow discussions, the treated effluent pump station and forcemain have sufficient capacity to pump the projected 2034 PHF and AAF from the treated effluent storage ponds to Buffalo Peak Golf Course.

The total 2014 estimated cost for Alternative 3A equals approximately $3,423,000. Operation and maintenance is estimated at $25,500, and the 2014 present worth is estimated at $3,770,000. The 2018 present worth is estimated at $4,411,000.

Figures 5-8 and 5-9 present Alternative 3A improvement components and cost estimates. The conceptual layout is presented on Figures 5-10 and 5-11.

Advantages

- Utilizes existing WWTF effluent pump system and forcemain.
- Provides a beneficial use of effluent generated from October through April.
- Eliminates seasonal discharge to Catherine Creek and associated NPDES requirements.

Disadvantages

- May require additional golf course personnel time.
- Reliant on continued golf course operation.
- May jeopardize links-style designation.
- Difficult to obtain needed additional irrigated area.

Alternative 3C

Construct a Two-Cell Effluent Storage Pond in Northwest Union to Store Treated Effluent Generated from October through April. Land-Apply Stored Effluent on Alfalfa from May through September. Continue Irrigating the Golf Course with Treated Effluent from May through September.

Alternative 3C land-applies treated effluent at Buffalo Peak Golf Course and a neighboring alfalfa field owned by the Eastern Oregon Agricultural Research Center (EOARC). Alternative 3C relies on continued golf course irrigable land availability and a long-term agreement with EOARC that formalizes preliminary discussions conducted in September 2014 regarding application of treated effluent onto their land. The water balance shows that treated effluent water will be land-applied through the current reuse system at the golf course to meet the 60-acre turf irrigation needs. The remaining effluent water would be beneficially used on the 50-acre EOARC alfalfa field. EOARC would need to provide irrigation water in addition to treated effluent to satisfy the projected requirements of irrigation for the 50-acre alfalfa field. EOARC may need to transfer water rights from an adjacent source if this option is chosen. The water balances are included as Figures 5-12 and 5-13. A more detailed land application discussion is provided in Chapter 6.

Effluent storage ponds are an integral part of Alternative 3C. A pond of approximately 12 acres is required to contain the anticipated October through April 2034 effluent production. This pond would be divided into two cells to facilitate maintenance and effluent management. The two cells would be divided by a dike wide enough for a maintenance vehicle to drive on and would be interconnected with transfer structures and culverts. Alternative 3C has been configured so it will integrate with Alternative 4 if the City decides to decommission the WWTF at a future date and install facultative wastewater treatment lagoons.

Four additional components are part of Alternative 3C. These components are an effluent transfer pipeline, a pivot irrigation system, a return flow pump station, and an irrigation pump station. An 8-inch diameter transfer pipe would be required to convey treated effluent to and from the WWTF and the effluent storage ponds. The pipeline would be approximately 5,500 feet long. The pipeline was checked for adequacy by assuming the 2034 AAF from the WWTF would occur when the flow would be directed to the effluent storage ponds. At AAF, the velocity in the transfer pipe would be approximately 0.77 fps. The 2034 peak hourly flow was also considered and the velocity in the pipe was approximated at 3.47 fps. The noted velocities are less than the industry standard recommendation of 5 fps. The 8-inch diameter transfer pipe is adequate. A 100 gpm, a 2 Hp pump will be needed to return treated effluent to the WWTF effluent pump station leading to final disposal for beneficial use at the Buffalo Peak Golf Course.

A pivot irrigation system would draw water from the effluent storage ponds and would not be subject to peak flows. The pivot irrigation system would be sized to match the needed flow. The irrigation pump station is also unaffected by peak flows and would be sized to manage the AAF and meet irrigation demand. The pump station would contain a 300 gpm capacity, 15 Hp pump, and a 30-foot by 30-foot building; 480 volt 3-phase power is also anticipated. The effluent storage ponds and pump station would be fenced.

The total 2014 estimated cost for Alternative 3C is approximately $3,997,000. Operation and maintenance is estimated at $29,500. The 2014 present worth is estimated at $4,398,000, and the 2018 present worth is estimated at $5,145,000.

Figures 5-14 and 5-15 present the system improvement components and cost estimate associated with Alternative 3C. The conceptual layout is presented on Figure 5-16.

Advantages

- Provides a beneficial use of WWTF effluent year-round.
- Eliminates discharge to Catherine Creek and the associated NPDES requirements.
- Provides an alternative to the golf course effluent reuse site.

Disadvantages

- Adds a farming and irrigation operation for the City to manage.

- Adds effluent storage ponds with associated management and maintenance requirements.
- High initial cost.

Alternative 4 - Detailed Evaluation

Alternative 4 adds all the components described in Alternative 3C and replaces the main treatment components of the WWTF with facultative wastewater treatment lagoons. Alternative 4 continues using the existing headworks, fine screen, and influent pumps to provide removal of non-digestible portions of the waste flow and a positive pressurized gravity flow to the wastewater facultative lagoon system. While Alternative 4 is a standalone option, it is intended for the facultative treatment lagoon system to be complementary to Alternative 3C. Making Alternatives 4 and 3C complementary provides the City of Union with the most flexibility possible. The City can choose to implement Alternative 4, or the City can implement Alternative 3C and add the facultative lagoon system components at a later date if the City decides to decommission the WWTF in the future.

The water balance equation shows that the golf course will continue providing 60 acres of turf for irrigation and that a 50-acre alfalfa field could be irrigated with treated effluent. According to an initial evaluation, the facultative treatment lagoons would consist of one 9-acre primary treatment lagoon and one 6-acre secondary lagoon (discussed below). The facultative treatment lagoons would be separated by a dike wide enough for a maintenance vehicle to drive on. Flow control structures and associated piping would be contained in the dike.

The facultative wastewater treatment lagoons have been sized to accommodate a projected population of 2,950 people, estimated to occur in the year 2054. The year 2054 was selected to provide a planning guide for the City for 20 years beyond the time frame presented by this WWFP in the event the City decides to decommission the mechanical WWTF in the future.

The lagoon size was determined by projecting the current BOD_5 loading rate per person to the anticipated 2054 population. The resulting average day flow works out to 204,000 gpd with a BOD_5 of 450 pounds per day (lb/day). Industry standards show that non aerated facultative wastewater lagoons can treat about 30 pounds of BOD_5 per day per acre of lagoon. The lagoon area required to treat the anticipated loading equals 15 acres.

It is desirable to build in redundancy for maintenance purposes. To provide for maintenance and redundancy, the 15-acre pond has been divided, assuming a higher treatment rate of 50 pounds per acre (lb/ac) rather than 30 lb/ac in the primary lagoon. The primary lagoon then becomes 9 acres and the secondary lagoon becomes 6 acres, satisfying the 15-acre lagoon requirement. The secondary lagoon provides additional treatment time and a quiescent (quiet) zone for improved total suspended solids (TSS) settling. The preliminary facultative treatment lagoon system will provide industry-recognized treatment time, settling, and maintenance.

In addition to organic treatment, wastewater facultative lagoons must be evaluated for hydraulic retention time (HRT). The HRT is estimated as 55 days for the primary lagoon and 37 days for the secondary lagoon. The total HRT for the lagoon system is estimated at 92 days. The 2002 EPA fact sheet for facultative lagoons recommends 20 to 180 days of HRT for adequate solids settling and biological digestion. The proposed system falls slightly above the middle of the published range and is considered adequate for the projected hydraulic flow and organic loading. The preliminary facultative treatment lagoon system layout shown on Figure 5-17 provides room for an additional effluent storage pond for possible future expansion. Alternatively, this area could contain an additional facultative treatment lagoon if a more in-depth evaluation shows that additional facultative treatment lagoon area is needed.

The facultative lagoon system described above is expected to produce Class D effluent. If treated effluent is applied to the golf course, the effluent rating must be improved to Class C. Proposed additional treatment to obtain Class C effluent includes adding a polymer to a mixing flocculation tank and recommissioning the travelling bridge rapid sand filter. In practice, the polymer and mixing flocculation tank would be added in line with the effluent flow to the travelling bridge rapid sand filter. The polymer would increase the particle size and, in turn, the efficiency of the travelling bridge rapid sand filter. The travelling bridge rapid sand filter would reduce TSS and chlorine demand and increase the disinfection process efficiency. After treatment in the travelling bridge rapid sand filter, the filtered effluent flow would be disinfected with chlorine and, finally, discharged through the existing WWTF effluent pump station to the golf course. The travelling bridge rapid sand filter was evaluated in Chapter 3 and has sufficient capacity to treat the projected quantities of treated effluent.

As shown on Figure 5-18, Alternative 4 requires a pressure gravity wastewater transfer pipe in addition to the transfer piping noted in Alternative 3C. This pipe is called the pressure gravity line and connects the headworks to the facultative treatment lagoons. The pressure gravity line will connect to the bottom of the screen channel at the same place that the primary clarifier currently connects. The pipe will be approximately 5,500 feet long. Based on flow projections, it is anticipated that an 8-inch diameter pipe will adequately convey the projected wastewater quantities at or below industry-recommended velocities.

Equipment required to complete Alternative 4 includes:

- Pressure wastewater transfer pipe.
- Effluent pump station to return flow to the WWTF effluent pump station.
- Forcemain for return flows.
- Pivot irrigation pump station.
- Flocculation tank with polymer feed.
- Recommissioning of the travelling bridge rapid sand filter.

The total 2014 estimated cost for Alternative 4 is approximately $7,699,000. Operation and maintenance is estimated at $34,500. The 2014 present worth is estimated at $8,168,000, and the 2018 present worth is estimated at $9,556,000.

Figures 5-19 and 5-20 present the system improvement components and cost estimate associated with Alternative 4.

Advantages

- Replaces mechanical treatment equipment with low maintenance treatment lagoons.
- Reduces energy requirements.
- Eliminates the NPDES Permit.
- Reduces operator time requirement.

Disadvantages

- Requires two new pipelines.
- Requires two new pump stations.
- High construction cost.
- Abandons existing mechanical treatment plant before the anticipated loan retirement date of 2040.

Summary of Estimated Project Costs

The following table summarizes the estimated project costs; annual operation, maintenance, and replacement (OM&R) costs; and present worth of each treatment alternative. Additionally, the table shows the average project cost, average OM&R, and average present worth. As shown on the following table, based on evaluation of the alternatives, Alternative 2 has the lowest overall capital cost and present worth and Alternative 3A has the lowest annual operation and maintenance costs. The average estimated project cost, not including the proposed collection system improvements (see Chapter 4), is about $5.5 million.

TABLE 5-1

Summary of Estimated Project Costs

Treatment Alternative	Estimated Project Cost	Estimated Annual OM&R Cost of Treatment Facility	Estimated Present Worth of Treatment Facility (2014)
2	$3,049,500	$31,800	$3,482,500
3A	$3,423,000	$25,500	$3,770,000
3C	$3,997,000	$29,500	$4,398,000
4	$7,699,000	$34,500[1]	$9,556,000
Average	$4,496,000	$30,500	$5,476,875

[1] *This cost may be offset by the reduced OM&R associated with decommissioning parts of the current WWTF.*

Description of Wastewater Treatment Process Options

Wastewater Treatment Process - Alternative 2

If Alternative 2, upgrade the WWTF to manage ammonia and continue winter discharge to Catherine Creek, is selected as the preferred alternative, five RBC shafts will be added to the WWTF. Each shaft requires an area approximately 33 feet by 17 feet. One additional SBC was anticipated during the 2000 WWTF expansion project and an expansion area was reserved on the south side of the SBC. Four additional RBC sites are needed to contain the remaining RBC units. Preliminarily, two RBCs can be located between the existing SBC and the sludge drying beds and the remaining three RBC units could be placed in the first two sludge drying bed areas.

The flow process would be modified such that the wastewater will flow from the primary clarifier through the primary effluent pump station to the five new RBCs, the SBC, and the original RBC. Flow will be in parallel through the new RBCs and in series beginning at the SBC. Wastewater from the original RBC will continue flowing to the secondary clarifier. As a consequence of adding RBC units, two drying beds will be removed. The drying bed plumbing will need to be capped and rerouted. Additionally, one replacement drying bed will be needed. Figure 5-1 shows a revised process schematic with the additional RBC units installed and the relocated drying bed.

The following list explains items that must also be modified to accommodate additional RBC units:

Primary Effluent Pump Station

A primary effluent pump station will be needed to ensure positive flow from the primary clarifier to the RBC units. The pump station will be located on the west side of the clarifier and will connect to the RBC through process piping.

Yard and Process Piping

New process piping will be necessary to transport wastewater from the primary clarifier to the new RBC units and back to the SBC unit. Miscellaneous piping will be needed to transport water for washdown and drainage from the impure water system.

Electrical, Instrumentation, and Controls

New electrical, instrumentation, and controls will be required for the new RBC units. The new instrumentation and controls system is needed to provide accurate monitoring and control of the new facilities.

Demolition and Site Work

Demolition of at least one sludge drying bed is anticipated. Additional site work will be needed to replace the drying bed, install the new RBC shafts, and ensure a complete, safe, and operational installation.

Wastewater Treatment Process - Alternative 3

Alternative 3 removes WWTF effluent flow to Catherine Creek and utilizes treated effluent for irrigation on an alfalfa field, at the Buffalo Peak Golf Course, or a combination of both. Alternatives 3A and 3C were considered viable.

Alternative 3A

In Alternative 3A, treated wastewater effluent generated during the non-growing season is stored in a two-cell pond for land application during the growing season. Effluent generated during the growing season would be transferred to the Buffalo Peak Golf Course through the existing effluent pump station. This portion of the WWTF would be unchanged from the current treated effluent process.

If Alternative 3A is selected, the flow process will be modified such that the existing WWTF components will remain in service up to the treated effluent pump station and outfall to Catherine Creek. The outfall to Catherine Creek will be connected to a new treated effluent transfer line that will convey treated effluent to a treated effluent storage pond.

Stored treated effluent would be pumped back to the WWTF's effluent pump station during the growing season and land-applied at the Buffalo Peak Golf Course.

The following list describes items that must be added or modified to implement Alternative 3A.

Treated Effluent Pump Station

The Catherine Creek outfall begins at the effluent pump station. The effluent pump station also contains a pump designed to overcome pressure from Catherine Creek during high flow events such as spring runoff.

To implement Alternative 3A, the outfall to Catherine Creek must be discontinued, and the pump configuration modified and attached to the proposed treated effluent transfer line.

Treated Effluent Transfer Line

As shown on Figure 5-10, a new treated effluent transfer line would be constructed from the WWTF to a two-cell treated effluent storage pond preliminarily sited on EOARC property. The transfer pipeline will be approximately 5,500 feet long. Initial estimates show that an 8-inch diameter pipe would adequately convey the treated effluent.

Pump Station

A pump station is required to provide return flows during times when the operator needs to transfer treated effluent to the golf course.

Preliminarily, it is anticipated that a 5 Hp, 200 gpm pump will provide adequate capacity to transfer the treated effluent from the treated effluent storage pond to the WWTF effluent pump station.

Storage Pond

The water balance for this alternative predicts that an approximately 10-acre pond is required to store treated effluent produced during the non-growing season.

The storage pond would be divided into two five-acre cells as shown on Figure 5-10.

Golf Course

As shown in the Alternative 3A water balances on Figures 5-6 and 5-7, 70 and 85 acres of irrigation are needed for land application of the WWTF annual flow in 2014 and 2034, respectively. Sixty acres of the golf course are currently irrigated with treated effluent. Ten additional acres of irrigation equipment would be needed in 2014, and 15 acres (for a total of 25 acres) in 2034.

Electrical, Controls, and Telemetry

Electrical, controls, and telemetry will be needed for the pumps and ancillary components. It is anticipated that remote monitoring of the effluent storage pond, transfer pumps, and associated equipment will be necessary.

Alternative 3C

Lagoon Piping

New treated effluent transfer piping will be needed to connect the existing Catherine Creek outfall to the proposed effluent storage ponds. Initially, it is anticipated that the treated effluent transfer pipe will be 8-inch polyvinyl chloride or high density polyethylene. The pipe will begin at the current effluent outfall and continue approximately 5,500 feet to the proposed effluent storage ponds.

Process piping modifications will be needed in the existing WWTF to remove flow to Catherine Creek and connect to the new treated effluent transfer pipeline. Additional lagoon piping will be needed at the effluent storage ponds to connect the treated effluent transfer pipeline to the effluent storage ponds.

Pumps

Four pump processes are included with Alternative 3C. The first pump is the existing emergency effluent pump that currently pumps to Catherine Creek. This pump and associated piping would be modified to pump treated effluent to the effluent ponds.

The second pump is preliminarily sized at 100 gpm. This pump would be located on the east side of the effluent storage ponds and would be used to transfer treated effluent back to the WWTF effluent pump station.

The third pump would be located on the west side of the effluent storage ponds and would provide pressure and flow to the pivot irrigation system. The pivot irrigation pump has been preliminarily sized at 300 gpm.

The fourth pump would be located on an existing irrigation ditch and would provide makeup water for the pivot irrigation. The pump has been preliminarily sized at 100 gpm and 2 Hp.

New Effluent Storage Pond

A new effluent storage pond with two cells would be located on farm ground as shown on Figure 5-16. The pond would use 12 acres and contain approximately 31.3 million gallons.

Irrigation Site

The irrigation site is anticipated to contain approximately 50 acres, as shown on the 2034 water balance (see Figure 5-13). A conceptual layout is provided on Figure 5-16.

Electrical, Controls, and Telemetry

Electrical, controls, and telemetry will be needed for the pumps and ancillary components. Additionally, it is anticipated that remote monitoring of the treatment system and associated alarms will be needed.

Wastewater Treatment Process - Alternative 4

Operation Sequence

The following generally outlines the anticipated operating sequence of the revised WWTF if Alternative 4 is implemented. The process is intended to efficiently collect and treat wastewater for land application while minimizing capital outlay where possible. Wastewater would continue flowing to the existing treatment plant through the 14-inch main influent line. Flow would continue to the existing headworks, where primary screening would take place. The screened influent wastewater would then be lifted by the influent pumps to allow wastewater to gravity flow to the primary lagoon for biological treatment through a new 8-inch diameter, 5,500-foot gravity forcemain. The primary treatment lagoon would be sized at approximately 9 acres. Following primary wastewater treatment, wastewater would gravity flow to the secondary treatment lagoon, sized at approximately 6 acres, which would provide final treatment.

Once treatment was completed in the wastewater treatment lagoons, wastewater would gravity flow to the wastewater storage ponds for storage until final application for a beneficial use at either the Buffalo Peak Golf Course or the adjoining land-application farm ground. The wastewater storage pond would be sized at approximately 12 acres to contain the full volume of wastewater generated during portions of the year when inclement weather prevents crop growth.

Since wastewater gravity flows from the WWTF to the wastewater storage lagoons, the reverse flow to supply irrigation water to the golf course would require a pump station and dedicated treated effluent return line. Figure 5-17 provides an overview of the lagoon and land-application site, and Figure 5-18 shows effluent transfer piping and decommissioned components at the WWTF.

Stored effluent transferred to the golf course for beneficial use must achieve a Class C level, because it is more likely that people will contact the effluent at a golf course than on an alfalfa field. Proposed additional treatment to obtain a Class C level would include adding polymer to a mixing flocculation tank and recommissioning the travelling bridge rapid sand filter. The polymer and mixing flocculation tank would be added in line with the effluent flow to the travelling bridge rapid sand filter. The polymer would increase the particle size and, in turn, the efficiency of the travelling bridge rapid sand filter. The travelling bridge rapid sand filter would reduce bacteria and chlorine demand. After treatment in the travelling bridge rapid sand filter, the effluent flow would be treated with chlorine through the existing chlorine contact chamber and, finally, discharged through the existing effluent pump station to the golf course.

As shown on Figure 5-17, the farm ground is adjacent to the proposed treatment lagoons and effluent storage ponds. Since it is not practical to pump effluent back to the WWTF site for further treatment (chlorination) prior to beneficial use on farm ground, a chlorination system and contact basin would be added to ensure a minimum Class D effluent to the farm ground. It is anticipated that chlorination could be accomplished in a 48-inch diameter pipe located in line with the transfer pipeline from the effluent storage ponds to the pivot irrigation supply pipeline. Treated effluent would be land-applied through the pivot irrigation system.

Alternative 4 generally complements Alternative 3C by decommissioning the main wastewater treatment components at the WWTF and replacing them with facultative wastewater treatment lagoons.

Electrical, Controls, and Telemetry

Additional electrical, controls, and telemetry will be needed to monitor flows to the lagoons, collect flow data, and provide alarms in case of an emergency situation.

The remaining processes are the same as Alternative 3C.

Discussion of the Existing Wastewater System 20-Year Improvements Implementation Plan

The Existing Wastewater System 20-Year Improvements Implementation Plan (Implementation Plan) provides a 20-year projection of anticipated projects that are needed to ensure continued operation of the wastewater collection and treatment facilities, time of occurrence, and budgetary pricing. The projects identified in the Implementation Plan are actions needed to remain in compliance rather than actions brought about because of additional rules or other compliance-related issues. The Implementation Plan is presented on Figure 5-21. It should be noted that the further a cost is projected into the future, the more uncertain it becomes. Costs should be carefully evaluated at least every five years to ensure the assumptions used in the estimates parallel actual conditions and that needs are consistent with the Implementation Plan.

Two items in the Implementation Plan require specific discussion: Installation of mechanical mixers in the aerobic digesters and biofilters to control odors.

1. Installation of Mechanical Mixers in the Aerobic Digesters

   Mechanical mixing in the aerobic digesters is intended to keep solids in suspension to allow contact with the biomass for improved solids reduction. Currently, air is utilized to mix sludge and diffuse air. Mechanical mixing reduces air requirements and mitigates foam production which, in turn, will allow air injection at a more sustainable, consistent rate that will maintain dissolved oxygen (DO) levels at the levels needed to maintain a healthy biomass. The system components and cost estimate associated with the addition of mechanical mixing are presented on Figures 5-22 and 5-23.

2. Odor Control (Biofilters)

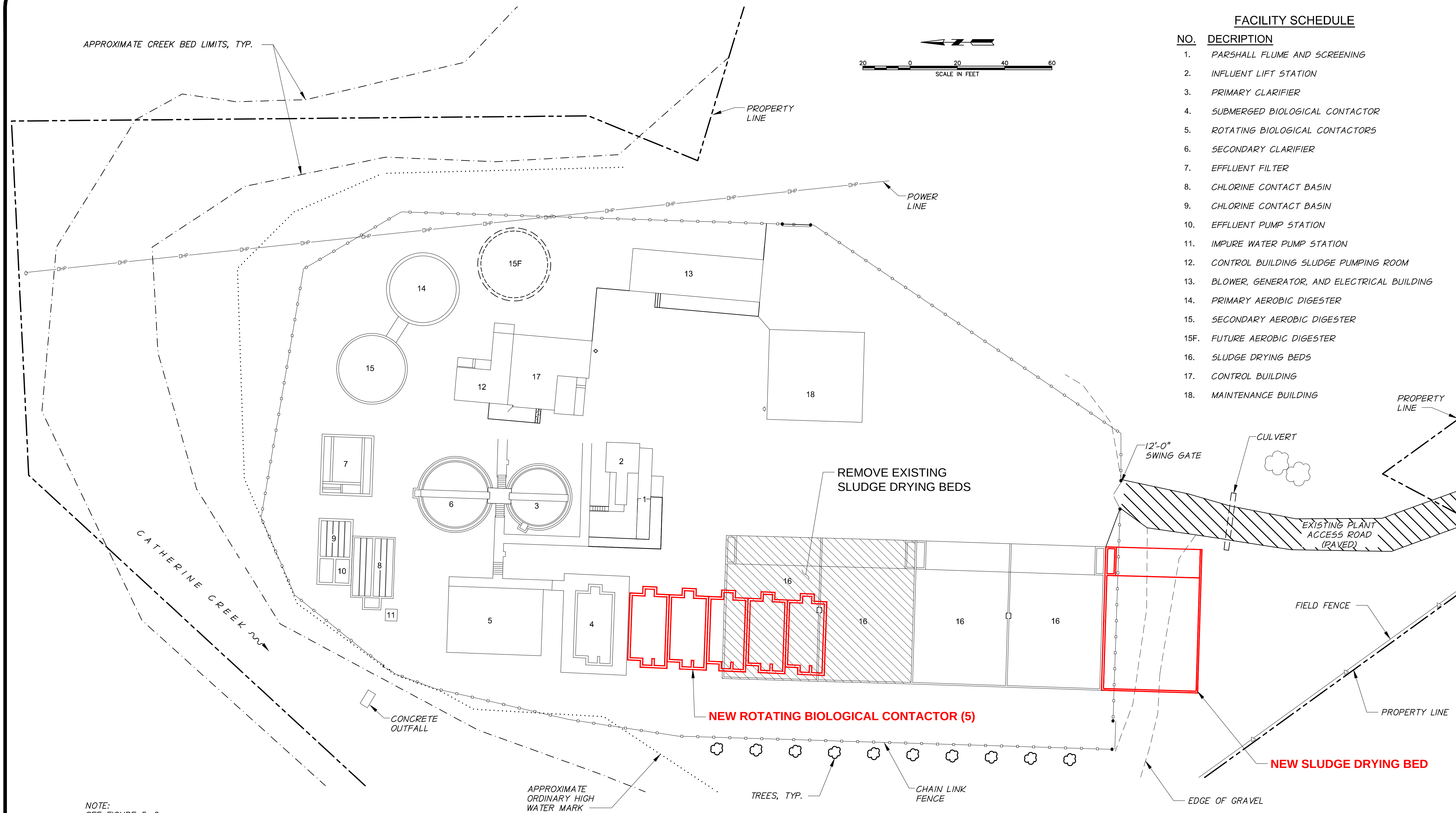
   Biofilters are intended to capture and neutralize offensive odors. Discussions regarding offensive odors show that insufficient data exist to develop sound engineering solutions. To correct the data shortfall, the City is proactively upgrading the digester monitoring system by adding new DO, temperature, and pH sensors. With the sensors in place, data will be collected and analyzed. If the DO shortfall can be corrected and reliably maintained, a healthy biomass should result. A healthy biomass should reduce offensive odors. The system components and cost estimate associated with the addition of biofilters are presented on Figures 5-24 and 5-25.

In addition to mechanical mixing and odor control, blower replacement is anticipated in 2020. By 2020, the current blowers will have exceeded their design life. Blowers have become more efficient, and modernized blowers will aid in the reduction of energy consumption and noise production. The Implementation Plan also projects repairing/replacing portions of the sewer main lines every five years. Areas of the collection system requiring upgrades were identified by reviewing the City's television videos of the collection system. The highest priority (worst condition) collection system main lines are addressed first, medium-level repairs next, and low-level repairs last. Although a timeline has been identified, repairs can be rescheduled and collection system main lines can be substituted as needed to best serve the City.

Summary

The DEQ has informed the City of Union that an ammonia limit will be included in the renewed NPDES Permit that authorizes operation of the City's WWTF. This chapter discussed wastewater treatment alternatives that were considered to meet the impending limits, narrowed the discussion to alternatives considered viable, and provided evaluations, process descriptions, and cost estimates for the viable alternatives.

The City of Union’s City Council has indicated that Alternative 3C should be selected for implementation and that Alternative 4 should be implemented when the WWTF becomes too expensive to maintain. This WWFP covers approximately 20 years (2014 to 2034). Alternative 4 was projected to 2054 (20 years beyond the current planning time) to provide a planning guide to the City of Union.



FACILITY SCHEDULE

NO.	DECRIPTION
1.	PARSHALL FLUME AND SCREENING
2.	INFLUENT LIFT STATION
3.	PRIMARY CLARIFIER
4.	SUBMERGED BIOLOGICAL CONTACTOR
5.	ROTATING BIOLOGICAL CONTACTORS
6.	SECONDARY CLARIFIER
7.	EFFLUENT FILTER
8.	CHLORINE CONTACT BASIN
9.	CHLORINE CONTACT BASIN
10.	EFFLUENT PUMP STATION
11.	IMPURE WATER PUMP STATION
12.	CONTROL BUILDING SLUDGE PUMPING ROOM
13.	BLOWER, GENERATOR, AND ELECTRICAL BUILDING
14.	PRIMARY AEROBIC DIGESTER
15.	SECONDARY AEROBIC DIGESTER
15F.	FUTURE AEROBIC DIGESTER
16.	SLUDGE DRYING BEDS
17.	CONTROL BUILDING
18.	MAINTENANCE BUILDING

NOTE:
SEE FIGURE 5-2 FOR A PROCESS SCHEMATIC OF ALTERNATIVE 2.

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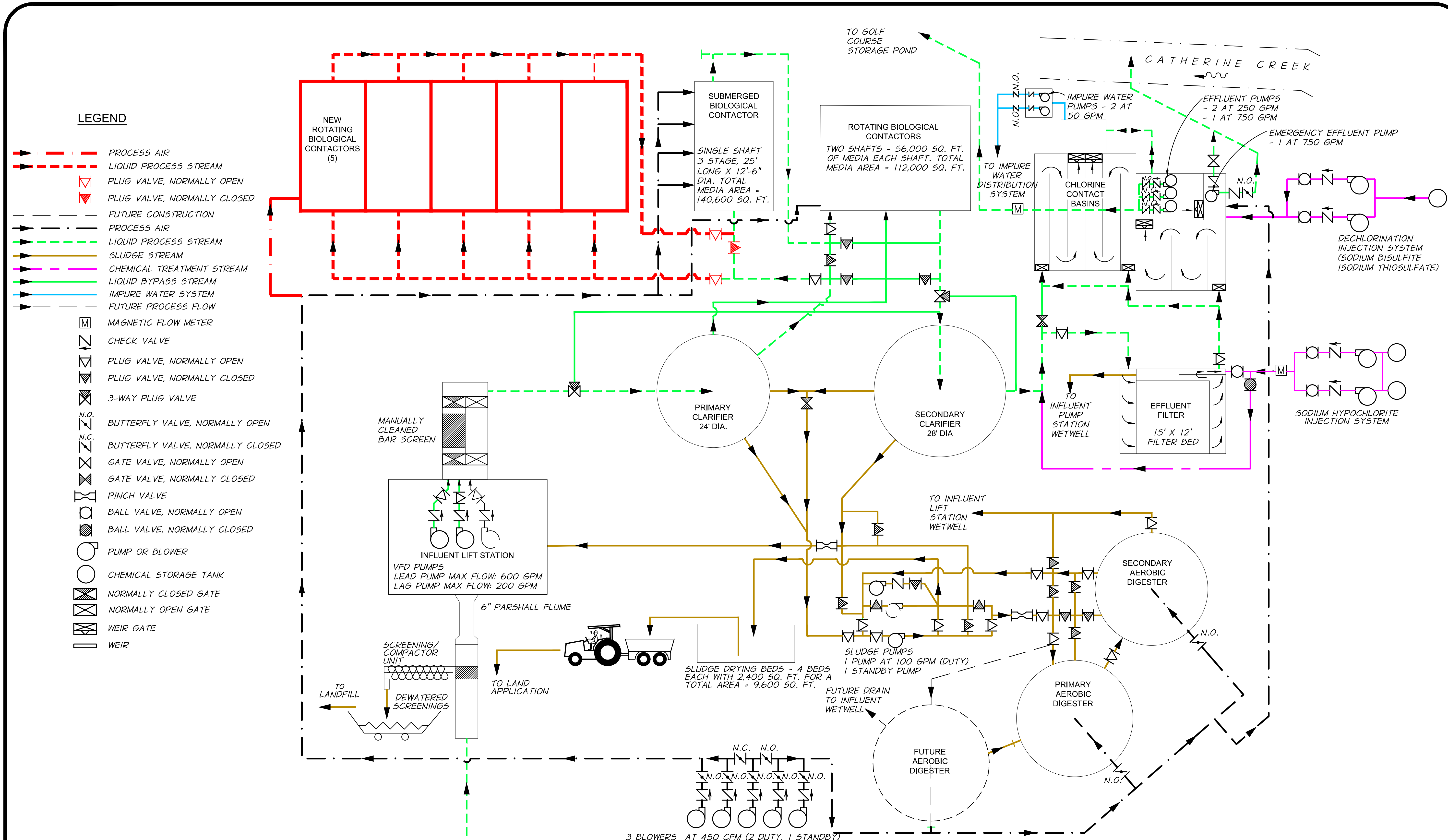
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 2 CONCEPTUAL PLAN
WWTF AMMONIA REDUCTION

FIGURE
5-1

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG 5-3_Alt2.dwg, FIG 5-3, 3/16/2015 10:23:45 AM, prichardson



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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 2
WWTF AMMONIA REDUCTION
PROCESS SCHEMATIC

FIGURE
5-2

CITY OF UNION, OREGON
ALTERNATIVE 2
UPGRADE WASTEWATER TREATMENT FACILITY (WWTF) TO MANAGE AMMONIA AND CONTINUE WINTER DISCHARGE TO CATHERINE CREEK
SYSTEM IMPROVEMENT COMPONENTS

1. Add Rotating Biological Contactors (RBC)
   - Five shafts at 252,000 square feet (SF) per shaft = 756,000 SF additional contactor area to treat ammonia.
   - Concrete tanks for additional RBC shafts.
   - Primary effluent pump station.
   - Process and yard piping.
   - Fiberglass reinforced plastic cover/roof for each shaft.
   - Dewatering and dewatering controls.
   - Electrical.
   - Instrumentation and controls.
2. Relocate One Cell of Drying Bed
   - Demolish existing drying bed.
   - Clear and grub replacement drying bed area.
   - Process and yard piping.
   - Construct replacement drying bed.
3. Modify Aerobic Digesters
   - Remove fine bubble diffusers.
   - Replace with coarse bubble diffusers.
4. Site Work

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ALTERNATIVE 2 - UPGRADE WASTEWATER TREATMENT FACILITY TO MANAGE AMMONIA AND CONTINUE WINTER DISCHARGE TO CATHERINE CREEK
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 106,000	All Req'd	$ 106,000
2	Clearing, Grubbing, and Demolition	LS	25,000	All Req'd	25,000
3	Process and Yard Piping	LS	125,000	All Req'd	125,000
4	Fiberglass-Reinforced Plastic Covers	LS	120,000	All Req'd	120,000
5	Rotating Biological Contactors Shafts, Tanks, and Installation	LS	1,400,000	All Req'd	1,400,000
6	Foundation Material	LS	20,000	All Req'd	20,000
7	Electrical, Controls, and Instrumentation	LS	125,000	All Req'd	125,000
8	Dewatering and Dewatering Controls	LS	40,000	All Req'd	40,000
9	Primary Effluent Pump Station	LS	80,000	All Req'd	80,000
10	Miscellaneous Site Work	LS	25,000	All Req'd	25,000
11	Replace One Sludge Drying Bed	LS	95,000	All Req'd	95,000
12	Replace Fine Bubble Diffusers with Coarse Bubble Diffusers	LS	45,000	All Req'd	45,000
13	Project Safety and Quality Control	LS	15,000	All Req'd	15,000
	Subtotal Estimated Construction Cost				$ 2,221,000
	Contingencies (10% of Estimated Construction Cost)				222,000
	Total Estimated Construction Cost				**$ 2,443,000**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 489,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2014)				**$ 2,932,000**
	Other Estimated Project Costs				
	Funding Acquisition				$ 20,000
	Legal and Administration				35,000
	Environmental Review Report				20,000
	Archaeological Report				15,000
	Cultural Resource Monitoring				25,000
	Regulatory Agency Reporting and Review Fees				2,500
	Total Other Project Costs (2014 Dollars)				**$ 117,500**
	TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)				**$ 3,049,500**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 13,000
2	Power (Additional Power for RBC Shafts and Primary Effluent Pump Station)	13,800
3	Miscellaneous Repairs	5,000
	Total OM&R	**$ 31,800**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	433,000
	Total Present Worth (2014 Dollars)	**$ 3,482,500**
	Total Present Worth (2018 Dollars)	**$ 4,074,000**

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 2
PRELIMINARY COST ESTIMATE

FIGURE 5-4

CITY OF UNION, OREGON
EXISTING CONDITIONS
YEAR 2014 WATER BALANCE

Month	Influent[1] (MG)	Outfall (Discharge to Creek)[2] (MG)	Outfall (Discharge to Pond)[3] (MG)	Precipitation to Storage Pond[4] (in.)	Precipitation to Storage Pond[4] (MG)	Evaporation from Storage Pond[5] (in.)	Evaporation from Storage Pond[5] (MG)	Volume from Prescott Ditch[6] (MG)	Allowable Seepage[7] (MG)	Irrigation[8] Crop: Turf, Acreage: 60 (in.)	Irrigation[8] Crop: Turf, Acreage: 60 (MG)
January	5.06	5.06	0.00	1.11	0.08	0.00	0.00	0.00	0.27	0.00	0.00
February	5.69	5.69	0.00	0.92	0.06	0.00	0.00	0.00	0.25	0.00	0.00
March	4.42	2.91	1.51	1.19	0.08	0.00	0.00	0.00	0.27	0.81	1.32
April	4.20	0.97	3.22	1.40	0.10	1.99	0.14	0.00	0.26	1.79	2.92
May	5.04	0.00	5.04	1.82	0.13	3.02	0.21	0.47	0.27	3.16	5.15
June	5.18	0.00	5.18	1.61	0.11	3.80	0.27	2.18	0.26	4.26	6.94
July	4.52	0.00	4.52	0.52	0.04	4.72	0.33	5.65	0.27	5.89	9.60
August	4.26	0.00	4.26	0.71	0.05	4.28	0.30	4.41	0.27	5.00	8.15
September	4.35	0.00	4.35	0.86	0.06	2.72	0.19	1.13	0.26	3.12	5.08
October	4.27	1.21	3.05	1.11	0.08	1.73	0.12	0.00	0.27	1.68	2.74
November	4.31	3.27	1.04	1.31	0.09	0.00	0.00	0.00	0.26	0.53	0.86
December	4.84	4.84	0.00	1.19	0.08	0.00	0.00	0.00	0.27	0.00	0.00
TOTALS	**56.12**	**23.95**	**32.17**	**13.75**	**0.97**	**22.26**	**1.57**	**13.84**	**3.22**	**26.24**	**42.75**

Storage Pond	SF	Acres	Total Depth (ft.)	Storage Depth (ft.)	Storage Volume (MG)
Existing Golf Course Pond[9]	113,256	2.60	12	8	5.3
TOTAL	113,256	2.60	-	-	5.3

Notes:
1 Based on the average total monthly flow between 2008 and 2012.
2 Represents balance of flow not irrigated at the reuse site. No creek discharge in July, August, or September. Discharge in June allowed only under certain creek conditions.
3 Represents the treated wastewater sent to the existing golf course storage pond to meet turf irrigation needs.
4 Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Union, Oregon, 1911 to 2012 data (used mean rainfall for each month).
5 Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.63.
6 Represents the volume of fresh water required to provide make-up water for turf irrigation needs.
7 Assumes 1/8-inch per day seepage rate.
8 Turf grass irrigation needs based on Coates Irrigation Consultants, Inc., water demand chart for the effluent reuse site. Assumes 90 percent efficient irrigation system.
9 The existing golf course pond provides operational storage only. It is assumed no seasonal storage is provided.

ft. = Feet
in. = Inch
MG = Million Gallons
SF = Square Feet

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
EXISTING CONDITIONS
YEAR 2014 WATER BALANCE

FIGURE
5-5

CITY OF UNION, OREGON
ALTERNATIVE 3A - WINTER STORAGE - GOLF COURSE TURF IRRIGATION
YEAR 2014 WATER BALANCE

Month	Influent[1] (MG)	Outfall (Discharge to Creek)[2] (MG)	Outfall (Discharge to Pond)[3] (MG)	Precipitation to Storage Pond[4]		Evaporation from Storage Pond[5]		Allowable Seepage[6] (MG)	Irrigation[7] Crop: Turf; Acreage: 70		Storage (+ into Strg., - out of Strg.) (MG)	Cumulative Storage Needed (MG)
				(in.)	(MG)	(in.)	(MG)		(in.)	(MG)		
January	5.06	0.00	5.06	1.11	0.39	0.00	0.00	0.27	0.00	0.00	5.18	14.24
February	5.69	0.00	5.69	0.92	0.33	0.00	0.00	0.25	0.00	0.00	5.77	20.01
March	4.42	0.00	4.42	1.19	0.42	0.00	0.00	0.27	0.81	1.54	3.03	23.04
April	4.20	0.00	4.20	1.40	0.50	1.99	0.71	0.26	1.79	3.40	0.32	23.36
May	5.04	0.00	5.04	1.82	0.65	3.02	1.08	0.27	3.16	6.01	-1.67	21.69
June	5.18	0.00	5.18	1.61	0.57	3.80	1.35	0.26	4.26	8.10	-3.97	17.73
July	4.52	0.00	4.52	0.52	0.18	4.72	1.68	0.27	5.89	11.20	-8.45	9.28
August	4.26	0.00	4.26	0.71	0.25	4.28	1.52	0.27	5.00	9.50	-6.79	2.50
September	4.35	0.00	4.35	0.86	0.31	2.72	0.97	0.26	3.12	5.93	-2.50	0.00
October	4.27	0.00	4.27	1.11	0.39	1.73	0.61	0.27	1.68	3.19	0.58	0.58
November	4.31	0.00	4.31	1.31	0.47	0.00	0.00	0.26	0.53	1.01	3.50	4.08
December	4.84	0.00	4.84	1.19	0.42	0.00	0.00	0.27	0.00	0.00	4.99	9.07
TOTALS	**56.12**	**0.00**	**56.12**	**13.75**	**4.89**	**22.26**	**7.92**	**3.22**	**26.24**	**49.88**		

Storage Pond	SF	Acres	Total Depth (ft.)	Storage Depth (ft.)	Storage Volume (MG)
Existing Golf Course Pond[8]	113,256	2.60	12	8	5.3
New Two-Cell Treated Effluent Storage Ponds	457,380	10.50	12	8	27.4
TOTAL	570,636	13.10	-	-	32.7

Notes:
1 Based on the average total monthly flow between 2008 and 2012.
2 Assumed to be zero for this alternative.
3 Assumes all treated wastewater is sent to the storage pond to meet turf irrigation needs.
4 Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Union, Oregon, 1911 to 2012 data (used mean rainfall for each month).
5 Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.63.
6 Assumes 1/8-inch per day seepage rate on the existing pond and no seepage on the new ponds.
7 Turf grass irrigation needs based on Coates Irrigation Consultants, Inc., water demand chart for the effluent reuse site. Assumes 90 percent efficient irrigation system.
8 The existing golf course pond provides operational storage only. It is assumed no seasonal storage is provided.

ft. = Feet
in. = Inch
MG = Million Gallons
SF = Square Feet

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3A
YEAR 2014 WATER BALANCE

FIGURE
5-6

CITY OF UNION, OREGON
ALTERNATIVE 3A - WINTER STORAGE - GOLF COURSE TURF IRRIGATION
YEAR 2034 WATER BALANCE

Month	Influent[1] (MG)	Outfall (Discharge to Creek)[2] (MG)	Outfall (Discharge to Pond)[3] (MG)	Precipitation to Storage Pond[4] (in.)	Precipitation to Storage Pond[4] (MG)	Evaporation from Storage Pond[5] (in.)	Evaporation from Storage Pond[5] (MG)	Allowable Seepage[6] (MG)	Irrigation[7] Crop: Turf, Acreage: 85 (in.)	Irrigation[7] Crop: Turf, Acreage: 85 (MG)	Storage (+ into Strg., - out of Strg.) (MG)	Cumulative Storage Needed (MG)
January	5.98	0.00	5.98	1.11	0.39	0.00	0.00	0.27	0.00	0.00	6.10	16.71
February	6.72	0.00	6.72	0.92	0.33	0.00	0.00	0.25	0.00	0.00	6.80	23.51
March	5.23	0.00	5.23	1.19	0.42	0.00	0.00	0.27	0.81	1.87	3.51	27.02
April	4.96	0.00	4.96	1.40	0.50	1.99	0.71	0.26	1.79	4.13	0.36	27.38
May	5.96	0.00	5.96	1.82	0.65	3.02	1.08	0.27	3.16	7.29	-2.04	25.34
June	6.12	0.00	6.12	1.61	0.57	3.80	1.35	0.26	4.26	9.83	-4.76	20.59
July	5.34	0.00	5.34	0.52	0.18	4.72	1.68	0.27	5.89	13.59	-10.02	10.57
August	5.04	0.00	5.04	0.71	0.25	4.28	1.52	0.27	5.00	11.54	-8.05	2.52
September	5.15	0.00	5.15	0.86	0.31	2.72	0.97	0.26	3.12	7.20	-2.98	0.00
October	5.04	0.00	5.04	1.11	0.39	1.73	0.61	0.27	1.68	3.88	0.67	0.67
November	5.09	0.00	5.09	1.31	0.47	0.00	0.00	0.26	0.53	1.22	4.07	4.74
December	5.72	0.00	5.72	1.19	0.42	0.00	0.00	0.27	0.00	0.00	5.87	10.61
TOTALS	**66.35**	**0.00**	**66.35**	**13.75**	**4.89**	**22.26**	**7.92**	**3.22**	**26.24**	**60.56**		

Storage Pond	SF	Acres	Total Depth (ft.)	Storage Depth (ft.)	Storage Volume (MG)
Existing Golf Course Pond[8]	113,256	2.60	12	8	5.3
New Two-Cell Treated Effluent Storage Ponds	457,380	10.50	12	8	27.4
TOTAL	570,636	13.10	-	-	32.7

Notes:
1 Based on the average total monthly flow between 2008 and 2012 projected to 2034 based on population growth.
2 Assumed to be zero for this alternative.
3 Assumes all treated wastewater is sent to the storage pond to meet turf irrigation needs.
4 Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Union, Oregon, 1911 to 2012 data (used mean rainfall for each month).
5 Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.63.
6 Assumes 1/8-inch per day seepage rate on the existing pond and no seepage on the new ponds.
7 Turf grass irrigation needs based on Coates Irrigation Consultants, Inc., water demand chart for the effluent reuse site. Assumes 90 percent efficient irrigation system.
8 The existing golf course pond provides operational storage only. It is assumed no seasonal storage is provided.

ft. = Feet
in. = Inch
MG = Million Gallons
SF = Square Feet

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3A
YEAR 2034 WATER BALANCE

FIGURE
5-7

CITY OF UNION, OREGON
ALTERNATIVE 3A
WINTER STORAGE - GOLF COURSE TURF IRRIGATION
SYSTEM IMPROVEMENT COMPONENTS

1. Modify Existing Wastewater Treatment Facility (WWTF) Piping and Abandon Outfall Line
   - Connect new treated effluent line to existing Catherine Creek outfall.
   - Connect new treated effluent line to existing 10-inch effluent forcemain.
   - Modify existing WWTF effluent pump station to allow pond water to discharge to existing pump station wetwell.
   - Abandon outfall line to Catherine Creek.
   - Modify aerobic digesters by removing the fine bubble diffusers and replacing them with coarse bubble diffusers.
2. New Treated Effluent Line from WWTF
   - Estimated 5,500 feet of 6-inch pipeline from existing WWTF effluent pump station to new storage ponds.
3. Modify Existing Effluent Outfall Pump
   - Modify existing Catherine Creek outfall pump to pump treated effluent to the new storage ponds.
4. Electrical, Controls, and Instrumentation
   - New electrical, controls, and instrumentation as required.
   - New monitoring and alarms.
5. New Effluent Storage Ponds with Lagoon Piping
   - Two new lined storage ponds.
   - Surface area of the storage ponds at 8-foot depth = 5.25 acres x 2 = 10.5 acres.
   - Approximate storage volume of the storage ponds at 8-foot depth = 13.7 million gallons (27.4 total).
   - Piping and control structures.
6. New Pump Station at Storage Ponds
   - One pump with 200 gallons per minute capacity and 5 horsepower.
   - Concrete vault.
   - New electrical service.
   - New controls.
7. Fence and Signs/Security
   - New fence and signs around the new storage ponds.
8. Expand Existing Golf Course Irrigation System
   - Modify existing irrigation pump station.
   - Expand irrigation system from roughs to native areas.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3A - WINTER STORAGE - GOLF COURSE TURF IRRIGATION
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 118,000	All Req'd	$ 118,000
2	Modify Existing Wastewater Treatment Facility (WWTF) Piping	LS	50,000	All Req'd	50,000
3	Replace Fine Bubble Diffusers with Coarse Bubble Diffusers	LS	45,000	All Req'd	45,000
4	Treated Effluent Line from WWTF	LF	40	5,500	220,000
5	Modify Existing Effluent Outfall Pump	LS	50,000	All Req'd	50,000
6	Electrical, Controls, and Instrumentation	LS	90,000	All Req'd	90,000
7	Effluent Storage Ponds, Lagoon Piping, and Transfer Structures	LS	1,375,000	All Req'd	1,375,000
8	Pump Station at Storage Ponds	LS	50,000	All Req'd	50,000
9	Fence and Signs/Security	LF	10	3,500	35,000
10	Expand Existing Golf Course Irrigation System and Modify Existing Irrigation Pump Station	LS	375,000	All Req'd	375,000
11	Project Safety and Quality Control	LS	25,000	All Req'd	25,000
12	Dewatering	LS	35,000	All Req'd	35,000
	Subtotal Estimated Construction Cost				$ 2,468,000
	Contingencies (10% of Estimated Construction Cost)				247,000
	Total Estimated Construction Cost				**$ 2,715,000**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 543,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2014)				**$ 3,258,000**
	Other Estimated Project Costs				
	Funding Acquisition				$ 40,000
	Legal and Administration				50,000
	Environmental Review Report				20,000
	Archaeological Report				15,000
	Cultural Resource Monitoring				35,000
	Regulatory Agency Reporting and Review Fees				5,000
	Total Other Project Costs (2014 Dollars)				**$ 165,000**
	TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)				**$ 3,423,000**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 20,000
2	Fence and Signs	500
3	Power	5,000
	Total OM&R	**$ 25,500**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	347,000
	Total Present Worth (2014 Dollars)	**$ 3,770,000**
	Total Present Worth (2018 Dollars)	**$ 4,411,000**

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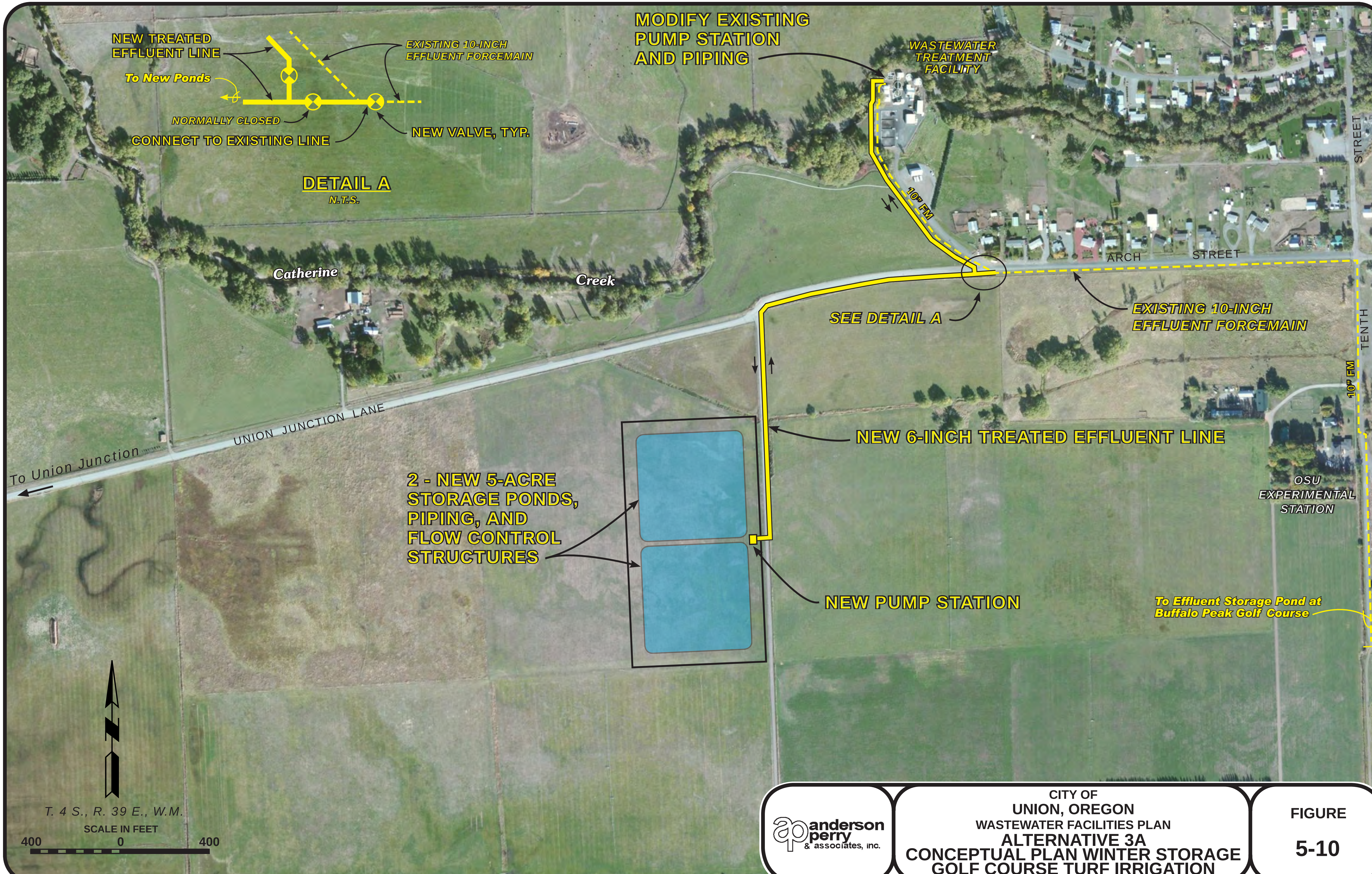
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 3A
PRELIMINARY COST ESTIMATE

FIGURE 5-9



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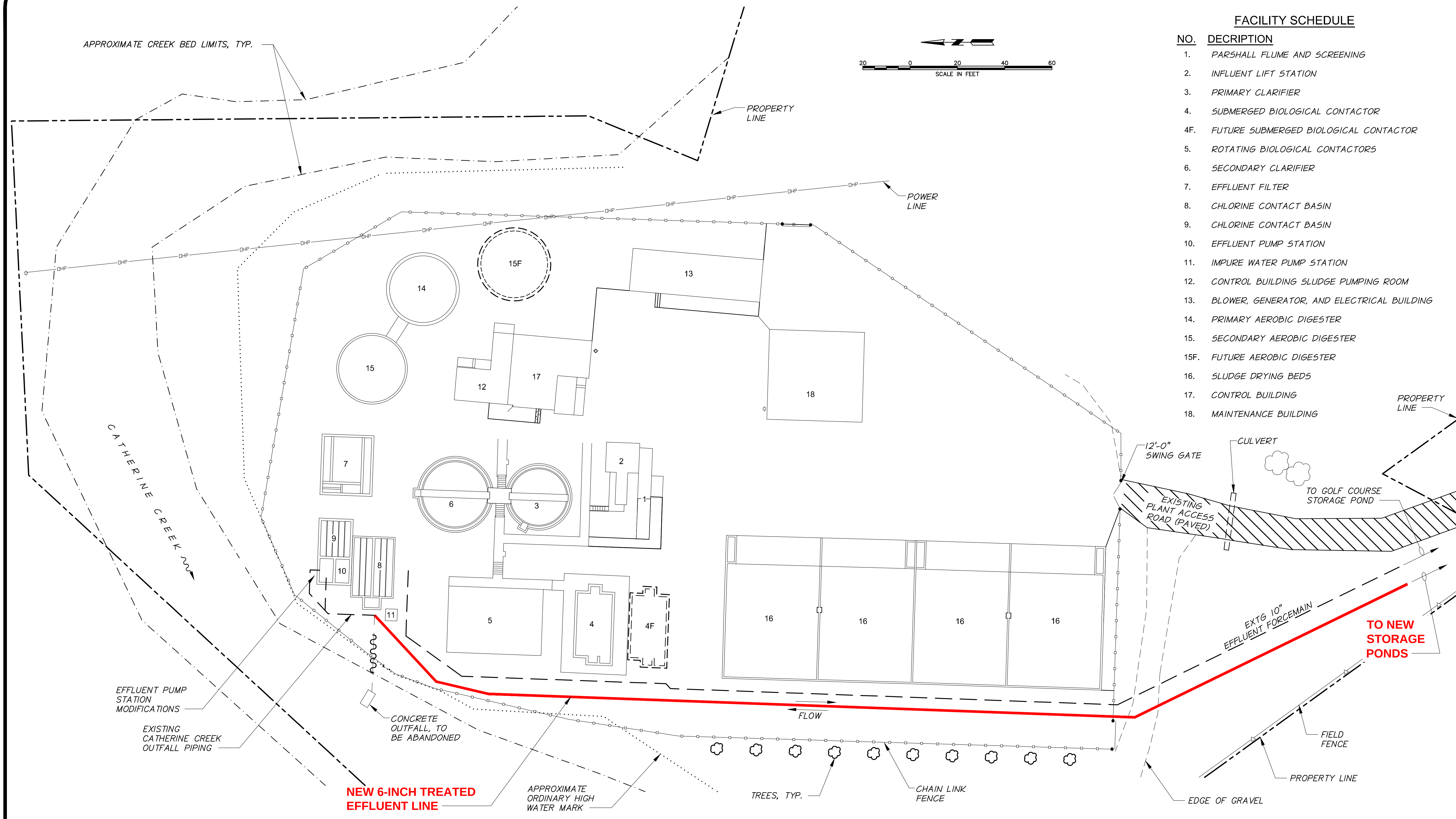
CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3A
CONCEPTUAL PLAN WINTER STORAGE
GOLF COURSE TURF IRRIGATION

FIGURE
5-10

Job# 482-38-020 Nov. 14, 2014 lbauer



FACILITY SCHEDULE

NO.	DECRIPTION
1.	PARSHALL FLUME AND SCREENING
2.	INFLUENT LIFT STATION
3.	PRIMARY CLARIFIER
4.	SUBMERGED BIOLOGICAL CONTACTOR
4F.	FUTURE SUBMERGED BIOLOGICAL CONTACTOR
5.	ROTATING BIOLOGICAL CONTACTORS
6.	SECONDARY CLARIFIER
7.	EFFLUENT FILTER
8.	CHLORINE CONTACT BASIN
9.	CHLORINE CONTACT BASIN
10.	EFFLUENT PUMP STATION
11.	IMPURE WATER PUMP STATION
12.	CONTROL BUILDING SLUDGE PUMPING ROOM
13.	BLOWER, GENERATOR, AND ELECTRICAL BUILDING
14.	PRIMARY AEROBIC DIGESTER
15.	SECONDARY AEROBIC DIGESTER
15F.	FUTURE AEROBIC DIGESTER
16.	SLUDGE DRYING BEDS
17.	CONTROL BUILDING
18.	MAINTENANCE BUILDING

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3A CONCEPTUAL PLAN
WINTER STORAGE
GOLF COURSE TURF IRRIGATION

FIGURE
5-11

CITY OF UNION, OREGON
ALTERNATIVE 3C - WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION
YEAR 2014 WATER BALANCE

Month	Influent[1] (MG)	Outfall (Discharge to Creek)[2] (MG)	Outfall (Discharge to New Pond)[3] (MG)	Outfall (Discharge to Golf Course)[4] (MG)	Precipitation to Storage Pond[5] (in.)	(MG)	Evaporation from Storage Pond[6] (in.)	(MG)	Allowable Seepage from Storage Pond[7] (MG)	Turf Irrigation Volume from New Storage Pond[8] (MG)	Irrigation[9] Crop: Turf Acreage: 60 (in.)	(MG)	Alfalfa Irrigation Volume from Godley Ditch[10] (MG)	Alfalfa Irrigation Volume from Tile Drain[11] Ditch (MG)	Alfalfa Irrigation Volume from Storage Pond[12] (MG)	Irrigation[13] Crop: Alfalfa Acreage: 50 (in.)	(MG)	Storage (+ into Strg., - out of Strg.) (MG)	Cumulative Storage Needed (MG)
January	5.06	0.00	5.06	0.00	1.11	0.44	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.22	14.97
February	5.69	0.00	5.69	0.00	0.92	0.36	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.80	20.77
March	4.42	0.00	3.10	1.32	1.19	0.47	0.00	0.00	0.27	0.00	0.81	1.32	0.00	0.00	0.00	0.00	0.00	3.30	24.07
April	4.20	0.00	1.28	2.92	1.40	0.56	1.99	0.79	0.26	0.00	1.79	2.92	0.00	0.00	0.00	0.00	0.00	0.78	24.85
May	5.04	0.00	0.00	5.04	1.82	0.72	3.02	1.20	0.27	0.11	3.16	5.15	4.74	0.00	0.00	3.49	4.74	-0.86	23.99
June	5.18	0.00	0.00	5.18	1.61	0.64	3.80	1.51	0.26	1.77	4.26	6.94	6.84	0.00	0.00	5.04	6.84	-2.90	21.10
July	4.52	0.00	0.00	4.52	0.52	0.21	4.72	1.87	0.27	5.08	5.89	9.60	5.67	0.00	6.04	8.63	11.71	-13.06	8.03
August	4.26	0.00	0.00	4.26	0.71	0.28	4.28	1.70	0.27	3.89	5.00	8.15	0.00	8.89	0.73	7.08	9.62	-6.31	1.73
September	4.35	0.00	0.00	4.35	0.86	0.34	2.72	1.08	0.26	0.73	3.12	5.08	0.00	5.41	0.00	3.99	5.41	-1.73	0.00
October	4.27	0.00	1.53	2.74	1.11	0.44	1.73	0.68	0.27	0.00	1.68	2.74	0.00	0.00	0.00	0.00	0.00	1.01	1.01
November	4.31	0.00	3.44	0.86	1.31	0.52	0.00	0.00	0.26	0.00	0.53	0.86	0.00	0.00	0.00	0.00	0.00	3.70	4.71
December	4.84	0.00	4.84	0.00	1.19	0.47	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.04	9.74
TOTALS	**56.12**	**0.00**	**24.93**	**31.18**	**13.75**	**5.45**	**22.26**	**8.83**	**3.22**	**11.57**	**26.24**	**42.75**	**17.24**	**14.30**	**6.77**	**28.23**	**38.32**		

Storage Pond	SF	Acres	Total Depth (ft.)	Storage Depth (ft.)	Storage Volume (MG)
Existing Golf Course Pond[15]	113,256	2.60	12	8	5.3
New Two-Cell Treated Effluent Storage Ponds	522,720	12.00	12	8	31.3
TOTAL	635,976	14.60	-	-	36.6

Crop Usage Data-Alfalfa

Month	Annual Precip. (in.)	Evapotrans.[14] (in.)	Net Irrigation Req'd (in.)	85% Efficiency (in.)
May	1.82	4.79	2.97	3.49
June	1.61	5.89	4.28	5.04
July	0.52	7.85	7.33	8.63
August	0.71	6.73	6.02	7.08
September	0.86	4.25	3.39	3.99

Notes:
1 Based on the average total monthly flow between 2008 and 2012.
2 Assumed to be zero for this alternative.
3 Represents the treated wastewater sent to the new storage ponds when not discharging to the golf course.
4 Represents the treated wastewater sent directly to the golf course without being stored in the new storage ponds.
5 Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Union, Oregon, 1911 to 2012 data (used mean rainfall for each month).
6 Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.63.
7 Assumes 1/8-inch per day seepage rate on the existing pond and no seepage on the new winter storage ponds.
8 Represents the treated wastewater sent to the golf course from the new storage ponds to meet turf irrigation needs.
9 Turf grass irrigation needs based on Coates Irrigation Consultants, Inc., water demand chart for the effluent reuse site. Assumes 90 percent efficient irrigation system.
10 Assumed to irrigate alfalfa with the existing water right associated with the land until July 15.
11 Volume of water needed to make up alfalfa irrigation needs not supplied by treated effluent after July 15 .
12 Volume of treated effluent used for alfalfa irrigation needed to empty the new storage pond.
13 Based on a crop of alfalfa with an irrigation season from May 1 to September 30. Assumes 85 percent efficient irrigation system.
14 Based on average monthly data from the U.S. Bureau of Reclamation AgriMet Station in Imbler, Oregon
15 The existing golf course pond provides operational storage only. It is assumed no seasonal storage is provided.

ft. = Feet
in. = Inch
MG = Million Gallons
SF = Square Feet

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3C
YEAR 2014 WATER BALANCE

FIGURE
5-12

CITY OF UNION, OREGON

ALTERNATIVE 3C - WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION

YEAR 2034 WATER BALANCE

Month	Influent[1] (MG)	Outfall (Discharge to Creek)[2] (MG)	Outfall (Discharge to New Pond)[3] (MG)	Outfall (Discharge to Golf Course)[4] (MG)	Precipitation to Storage Pond[5] (in.)	Precipitation to Storage Pond[5] (MG)	Evaporation from Storage Pond[6] (in.)	Evaporation from Storage Pond[6] (MG)	Allowable Seepage from Storage Pond[7] (MG)	Turf Irrigation Volume from New Storage Pond[8] (MG)	Irrigation[9] Crop: Turf Acreage: 60 (in.)	Irrigation[9] Crop: Turf Acreage: 60 (MG)	Alfalfa Irrigation Volume from Godley Ditch[10] (MG)	Alfalfa Irrigation Volume from Tile Drain[11] Ditch (MG)	Alfalfa Irrigation Volume from Storage Pond[12] (MG)	Irrigation[13] Crop: Alfalfa Acreage: 50 (in.)	Irrigation[13] Crop: Alfalfa Acreage: 50 (MG)	Storage (+ into Strg., - out of Strg.) (MG)	Cumulative Storage Needed (MG)
January	5.98	0.00	5.98	0.00	1.11	0.44	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.14	18.33
February	6.72	0.00	6.72	0.00	0.92	0.36	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.84	25.17
March	5.23	0.00	3.91	1.32	1.19	0.47	0.00	0.00	0.27	0.00	0.81	1.32	0.00	0.00	0.00	0.00	0.00	4.11	29.28
April	4.96	0.00	2.05	2.92	1.40	0.56	1.99	0.79	0.26	0.00	1.79	2.92	0.00	0.00	0.00	0.00	0.00	1.55	30.83
May	5.96	0.00	0.81	5.15	1.82	0.72	3.02	1.20	0.27	0.00	3.16	5.15	4.74	0.00	0.00	3.49	4.74	0.06	30.89
June	6.12	0.00	0.00	6.12	1.61	0.64	3.80	1.51	0.26	0.82	4.26	6.94	6.84	0.00	0.00	5.04	6.84	-1.95	28.93
July	5.34	0.00	0.00	5.34	0.52	0.21	4.72	1.87	0.27	4.25	5.89	9.60	5.67	0.00	6.04	8.63	11.71	-12.23	16.70
August	5.04	0.00	0.00	5.04	0.71	0.28	4.28	1.70	0.27	3.11	5.00	8.15	0.00	0.00	9.62	7.08	9.62	-14.42	2.28
September	5.15	0.00	0.06	5.08	0.86	0.34	2.72	1.08	0.26	0.00	3.12	5.08	0.00	4.07	1.34	3.99	5.41	-2.28	0.00
October	5.04	0.00	2.31	2.74	1.11	0.44	1.73	0.68	0.27	0.00	1.68	2.74	0.00	0.00	0.00	0.00	0.00	1.79	1.79
November	5.09	0.00	4.23	0.86	1.31	0.52	0.00	0.00	0.26	0.00	0.53	0.86	0.00	0.00	0.00	0.00	0.00	4.48	6.27
December	5.72	0.00	5.72	0.00	1.19	0.47	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.92	12.19
TOTALS	**66.35**	**0.00**	**31.78**	**34.57**	**13.75**	**5.45**	**22.26**	**8.83**	**3.22**	**8.19**	**26.24**	**42.75**	**17.24**	**4.08**	**17.00**	**28.23**	**38.32**		

Storage Pond	SF	Acres	Total Depth (ft.)	Storage Depth (ft.)	Storage Volume (MG)
Existing Golf Course Pond[15]	113,256	2.60	12	8	5.3
New Two-Cell Treated Effluent Storage Ponds	522,720	12.00	12	8	31.3
TOTAL	635,976	14.60	-	-	36.6

Crop Usage Data-Alfalfa

Month	Annual Precip. (in.)	Evapotrans.[14] (in.)	Net Irrigation Req'd (in.)	85% Efficiency (in.)
May	1.82	4.79	2.97	3.49
June	1.61	5.89	4.28	5.04
July	0.52	7.85	7.33	8.63
August	0.71	6.73	6.02	7.08
September	0.86	4.25	3.39	3.99

Notes:

1 Based on the average total monthly flow between 2008 and 2012 projected to 2034 based on population growth.

2 Assumed to be zero for this alternative.

3 Represents the treated wastewater sent to the new storage ponds when not discharging to the golf course.

4 Represents the treated wastewater sent directly to the golf course without being stored in the new storage ponds.

5 Utilized precipitation on record with the Western Regional Climate Center (WRCC) for Union, Oregon, 1911 to 2012 data (used mean rainfall for each month).

6 Utilized pan evaporation data obtained from the WRCC, 1928 to 2005, for Union Experimental Station, Oregon, with a pan coefficient of 0.63.

7 Assumes 1/8-inch per day seepage rate on the existing pond and no seepage on the new winter storage ponds.

8 Represents the treated wastewater sent to the golf course from the new storage ponds to meet turf irrigation needs.

9 Turf grass irrigation needs based on Coates Irrigation Consultants, Inc., water demand chart for the effluent reuse site. Assumes 90 percent efficient irrigation system.

10 Assumed to irrigate alfalfa with the existing water right associated with the land until July 15.

11 Volume of water needed to make up alfalfa irrigation needs not supplied by treated effluent after July 15.

12 Volume of treated effluent used for alfalfa irrigation needed to empty the new storage pond.

13 Based on a crop of alfalfa with an irrigation season from May 1 to September 30. Assumes 85 percent efficient irrigation system.

14 Based on average monthly data from the U.S. Bureau of Reclamation AgriMet Station in Imbler, Oregon.

15 The existing golf course pond provides operational storage only. It is assumed no seasonal storage is provided.

ft. = Feet
in. = Inch
MG = Million Gallons
SF = Square Feet

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ALTERNATIVE 3C
YEAR 2034 WATER BALANCE

FIGURE **5-13**

CITY OF UNION, OREGON
ALTERNATIVE 3C
WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION
SYSTEM IMPROVEMENT COMPONENTS

1. Modify Existing Wastewater Treatment Facility (WWTF) Piping
    - Connect new treated effluent line to existing Catherine Creek outfall.
    - Connect new treated effluent line to existing 10-inch effluent forcemain.
    - Abandon outfall line to Catherine Creek.
    - Modify aerobic digesters by removing the fine bubble diffusers and replacing them with coarse bubble diffusers.
2. New Treated Effluent Line from WWTF
    - Estimated 5,500 feet of 8-inch pipeline from existing WWTF effluent pump station to new storage ponds.
3. Modify Existing Effluent Pump
    - Modify existing Catherine Creek outfall pump to pump treated effluent to the new storage ponds.
4. Electrical, Controls, and Instrumentation
    - New electrical, controls, and instrumentation as required.
    - New monitoring and alarms.
5. New Effluent Storage Ponds with Lagoon Piping
    - Two new lined storage ponds.
    - Surface area of the storage ponds at 8-foot depth = 6 acres x 2 = 12 acres.
    - Approximate storage volume of the storage ponds at 8-foot depth = 31.3 million gallons.
    - Piping and control structures.
6. New Irrigation Pump Station
    - One pump with 300 gallons per minute (gpm) capacity and 15 horsepower (Hp).
    - One pump with 100 gpm capacity and 2 Hp.
    - 30-foot x 30-foot building with wetwell.
    - New 480 volt, 3-phase electrical service.
7. Fence and Signs/Security
    - New fence and signs around the new storage ponds.
8. New Effluent Reuse (Irrigation) Facility
    - 50 acres of new irrigation site.
    - One 50-acre pivot with a radius of approximately 850 feet.
    - Irrigation distribution piping.
    - Preparation and seeding of irrigation site.
9. New Pump Station at Storage Ponds
    - One pump with 100 gpm capacity and 2 Hp in a new vault.
10. New Low Head Supplemental Irrigation Water Supply Pump and Line
    - One pump with 200 gpm capacity and 1 Hp on a concrete pad.
    - Estimated 1,100 feet of 6-inch pipeline from new pump to existing 10-inch irrigation line.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ALTERNATIVE 3C - WINTER STORAGE - GOLF COURSE TURF AND ALFALFA IRRIGATION
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 138,000	All Req'd	$ 138,000
2	Modify Existing Wastewater Treatment Facility (WWTF) Piping	LS	50,000	All Req'd	50,000
3	Replace Fine Bubble Diffusers with Coarse Bubble Diffusers	LS	45,000	All Req'd	45,000
4	Treated Effluent Line from WWTF	LF	40	5,500	220,000
5	Modify Existing Effluent Outfall Pump	LS	50,000	All Req'd	50,000
6	Electrical, Controls, and Instrumentation	LS	175,000	All Req'd	175,000
7	Effluent Storage Pond, Lagoon Piping, and Transfer Structures	LS	1,500,000	All Req'd	1,500,000
8	Pump Station at Storage Ponds	LS	70,000	All Req'd	70,000
9	Irrigation Pump Station	LS	180,000	All Req'd	180,000
10	Low Head Supplemental Irrigation Water Supply Pump	LS	40,000	All Req'd	40,000
11	Polyvinyl Chloride (PVC) Irrigation Line	LF	40	3,500	140,000
12	Effluent Irrigation System Including Pivot Irrigation and Seeding	LS	100,000	All Req'd	100,000
13	Fence and Signs/Security	LF	10	10,000	100,000
14	Project Safety and Quality Control	LS	25,000	All Req'd	25,000
15	Electrical Service	LS	35,000	All Req'd	35,000
16	Dewatering	LS	35,000	All Req'd	35,000
	Subtotal Estimated Construction Cost				$ 2,903,000
	Contingencies (10% of Estimated Construction Cost)				290,000
	Total Estimated Construction Cost				**$ 3,193,000**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 639,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2014)				**$ 3,832,000**
	Other Estimated Project Costs				
	Funding Acquisition				$ 40,000
	Legal and Administration				50,000
	Environmental Review Report				20,000
	Archaeological Report				15,000
	Cultural Resource Monitoring				35,000
	Regulatory Agency Reporting and Review Fees				5,000
	Total Other Project Costs (2014 Dollars)				**$ 165,000**
	TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)				**$ 3,997,000**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 25,000
2	Fence and Signs	500
3	Power	4,000
	Total OM&R	**$ 29,500**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	401,000
	Total Present Worth (2014 Dollars)	**$ 4,398,000**
	Total Present Worth (2018 Dollars)	**$ 5,145,000**

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 3C
PRELIMINARY COST ESTIMATE

FIGURE 5-15

Job# 482-38-020 Nov. 17, 2014 lbauer

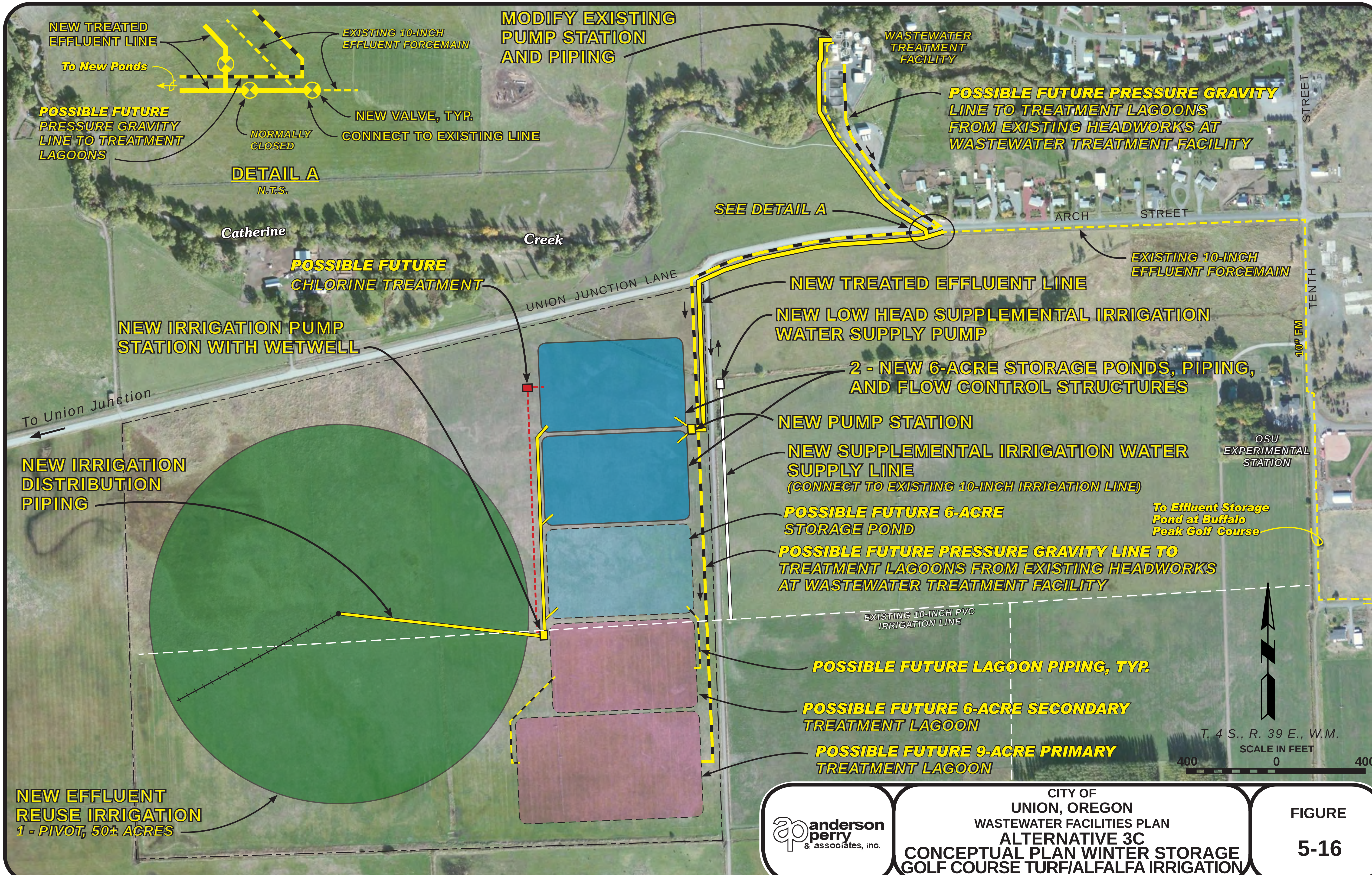
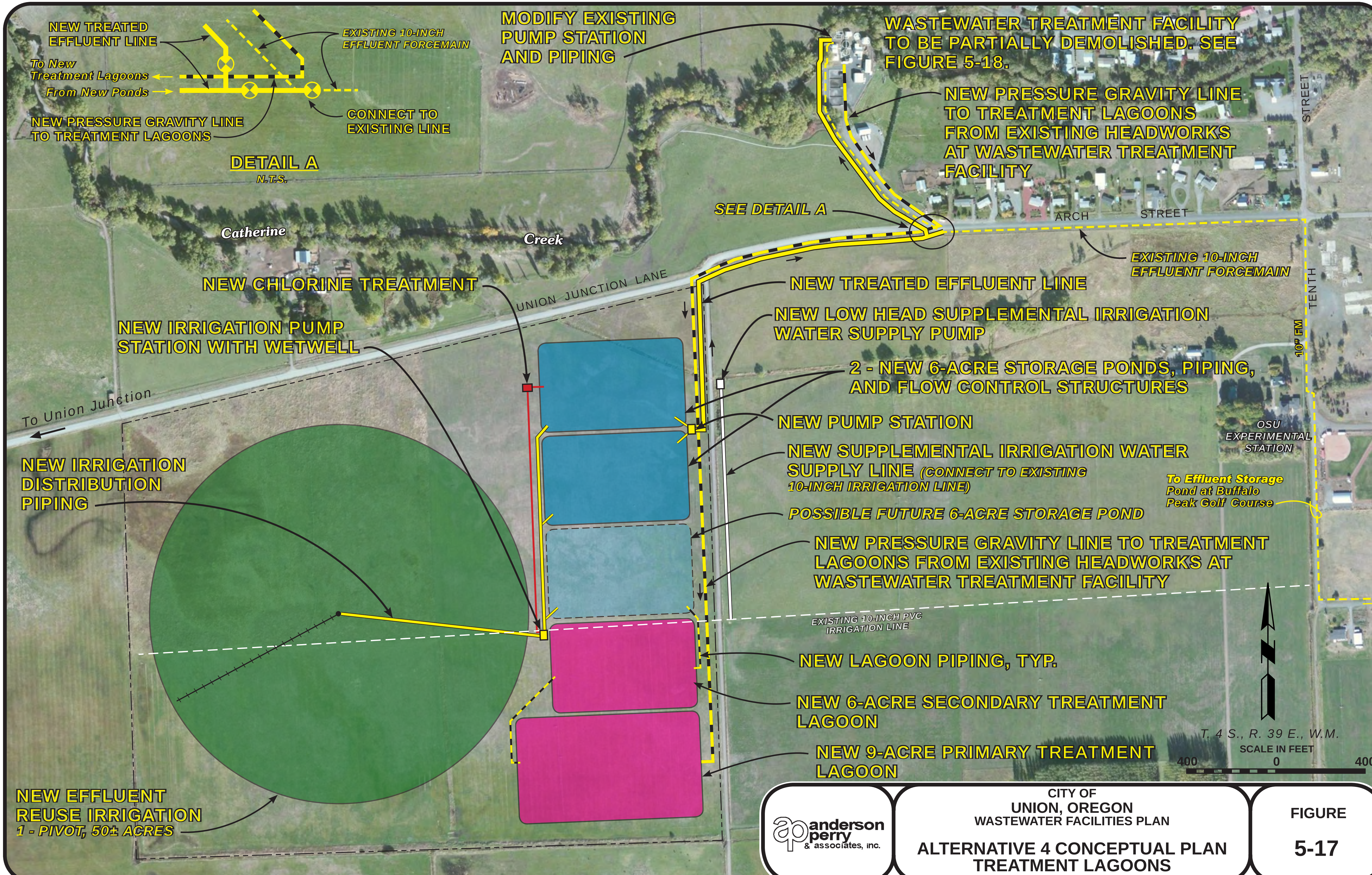


FIGURE 5-16

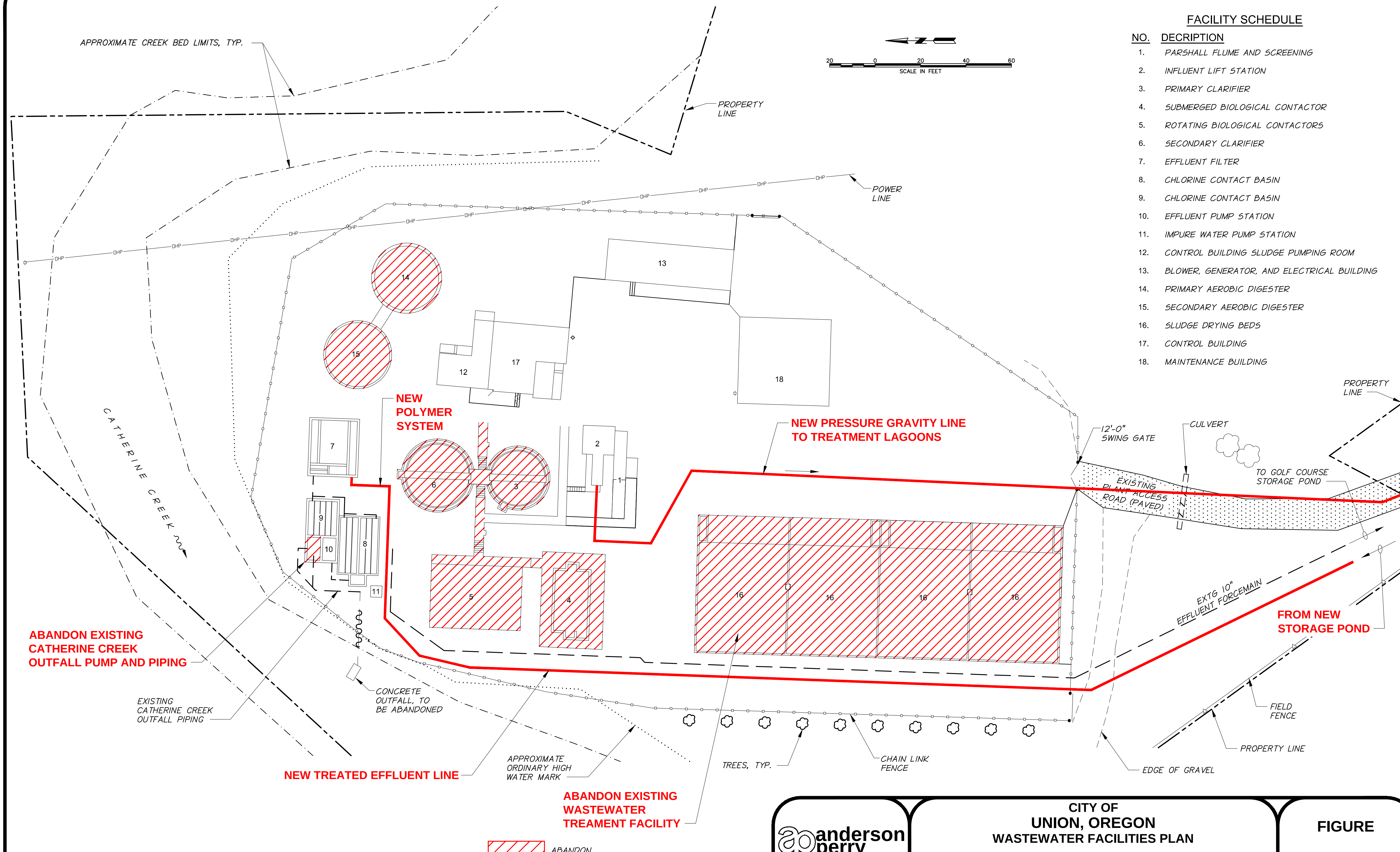


CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 4 CONCEPTUAL PLAN
TREATMENT LAGOONS

FIGURE 5-17

Job# 482-38-020 Nov. 17, 2014 lbauer



FACILITY SCHEDULE

NO.	DECRIPTION
1.	PARSHALL FLUME AND SCREENING
2.	INFLUENT LIFT STATION
3.	PRIMARY CLARIFIER
4.	SUBMERGED BIOLOGICAL CONTACTOR
5.	ROTATING BIOLOGICAL CONTACTORS
6.	SECONDARY CLARIFIER
7.	EFFLUENT FILTER
8.	CHLORINE CONTACT BASIN
9.	CHLORINE CONTACT BASIN
10.	EFFLUENT PUMP STATION
11.	IMPURE WATER PUMP STATION
12.	CONTROL BUILDING SLUDGE PUMPING ROOM
13.	BLOWER, GENERATOR, AND ELECTRICAL BUILDING
14.	PRIMARY AEROBIC DIGESTER
15.	SECONDARY AEROBIC DIGESTER
16.	SLUDGE DRYING BEDS
17.	CONTROL BUILDING
18.	MAINTENANCE BUILDING

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 4 CONCEPTUAL PLAN
TREATMENT LAGOONS

FIGURE
5-18

S:\UNION\482-38 Wastewater Facilities Plan\dwg\FIG X_Alt4.dwg, FIG X, 3/16/2015 10:28:16 AM, prichardson

CITY OF UNION, OREGON
ALTERNATIVE 4
TREATMENT LAGOONS
SYSTEM IMPROVEMENT COMPONENTS

1. Modify Existing Wastewater Treatment Facility (WWTF) Piping
   - Connect new treated effluent line to existing effluent filter.
   - Connect new treated effluent line to existing 10-inch effluent forcemain.
2. New Treated Effluent Line from New Storage Ponds
   - Estimated 5,500 feet of 8-inch pipeline from new storage ponds to existing WWTF.
3. Modify Existing Influent Lift Station
   - Modify existing influent lift station to pump treated effluent to the new storage ponds.
4. Rehabilitate Effluent Filter
   - Replace existing filter media as required.
   - Replace broken and worn parts as required.
5. Polymer Treatment
   - New polymer treatment process in an existing building.
6. Pressure Gravity Sewer Line
   - Estimated 5,500 feet of pipeline from existing influent lift station to new treatment lagoon.
7. Alfalfa Irrigation Chlorine Contact Treatment
   - New chlorine treatment building and appurtenances.
   - New chlorine contact pipe.
8. Electrical, Controls, and Instrumentation
   - New electrical, controls, and instrumentation as required.
   - New monitoring and alarms.
9. New Effluent Storage Ponds with Lagoon Piping and Transfer Structures
   - Two new lined storage ponds.
   - Surface area of the storage ponds at 8-foot depth = 6 acres x 2 = 12 acres.
   - Approximate storage volume of the storage ponds at 8-foot depth = 31.3 million gallons.
   - Piping and control structures.
10. New Effluent Treatment Lagoons, Lagoon Piping, and Transfer Structures
    - Two new lined treatment lagoons.
    - One treatment lagoon with a surface area of 9 acres and one treatment lagoon with a surface area of 6 acres at 4-foot depth.
    - Approximate storage volume of the treatment lagoons at 4-foot depth = 19.5 million gallons.
    - Piping and control structures.
11. New Irrigation Pump Station
    - One pump with 300 gallons per minute (gpm) capacity and 15 horsepower (Hp).
    - 30-foot x 30-foot building.
    - New 480 volt, 3-phase electrical service.
12. Pump Station at Storage Ponds
    - One pump with 215 gpm capacity and 5 Hp in a new vault.
13. Fence and Signs/Security
    - New fence and signs around the new storage ponds.
14. New Effluent Reuse (Irrigation) Facility
    - 50 acres of new irrigation site.
    - One 50-acre pivot.
    - Irrigation distribution piping.
    - Preparation and seeding of irrigation site.
15. New Low Head Supplemental Irrigation Water Supply Pump and Line
    - One pump with 200 gpm capacity and 1 Hp on a concrete pad.
    - Estimated 1,100 feet of 6-inch pipeline from new pump to existing 10-inch irrigation line.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ALTERNATIVE 4 - TREATMENT LAGOONS
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 272,000	All Req'd	$ 272,000
2	Modify Existing Wastewater Treatment Facility (WWTF) Piping	LS	50,000	All Req'd	50,000
3	Treated Effluent Line from New Storage Ponds	LF	40	5,500	220,000
4	Modify Existing Influent Lift Station	LS	125,000	All Req'd	125,000
5	Rehabilitate Effluent Filter	LS	50,000	All Req'd	50,000
6	Polymer Treatment	LS	30,000	All Req'd	30,000
7	Pressure Gravity Sewer Line	LF	40	5,500	220,000
8	Alfalfa Irrigation Chlorine Contact Treatment	LS	150,000	All Req'd	150,000
9	Electrical, Controls, and Instrumentation	LS	200,000	All Req'd	200,000
10	Effluent Storage Ponds, Lagoon Piping, and Transfer Structures	LS	1,500,000	All Req'd	1,500,000
11	Treatment Lagoons, Lagoon Piping, and Transfer Structures	LS	1,875,000	All Req'd	1,875,000
12	Pump Station at Storage Ponds	LS	70,000	All Req'd	70,000
13	Irrigation Pump Station	LS	180,000	All Req'd	180,000
14	Polyvinyl Chloride (PVC) Irrigation Line	LF	40	3,500	140,000
15	Effluent Irrigation System Including Pivot Irrigation and Seeding	LS	100,000	All Req'd	100,000
16	Existing WWTF Demolition	LS	250,000	All Req'd	250,000
17	Fence and Signs/Security	LF	10	10,000	100,000
18	Project Safety and Quality Control	LS	30,000	All Req'd	30,000
19	Low Head Supplemental Irrigation Water Supply Pump	LS	40,000	All Req'd	40,000
20	Electrical Service	LS	35,000	All Req'd	35,000
21	Dewatering	LS	70,000	All Req'd	70,000
	Subtotal Estimated Construction Cost				$ 5,707,000
	Contingencies (10% of Estimated Construction Cost)				571,000
	Total Estimated Construction Cost				**$ 6,278,000**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 1,256,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2014)				**$ 7,534,000**
	Other Estimated Project Costs				
	Funding Acquisition				$ 40,000
	Legal and Administration				50,000
	Environmental Review Report				20,000
	Archaeological Report				15,000
	Cultural Resource Monitoring				35,000
	Regulatory Agency Reporting and Review Fees				5,000
	Total Other Project Costs (2014 Dollars)				**$ 165,000**
	TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)				**$ 7,699,000**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 25,000
2	Testing and Materials	5,000
3	Fence and Signs	500
4	Power	4,000
	Total OM&R	**$ 34,500**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	469,000
	Total Present Worth (2014 Dollars)	**$ 8,168,000**
	Total Present Worth (2018 Dollars)	**$ 9,556,000**

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

ALTERNATIVE 4
PRELIMINARY COST ESTIMATE

FIGURE
5-20

CITY OF UNION, OREGON
EXISTING WASTEWATER SYSTEM 20-YEAR IMPROVEMENTS IMPLEMENTATION PLAN

	Description	Year of Project Implementation									
		2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Wastewater Department Budget Projections											
1	Projected Department Revenue	$500,000	$512,000	$524,000	$537,000	$550,000	$563,000	$577,000	$591,000	$605,000	$620,000
2	Current Year Operating Costs	$300,000	$312,000	$325,000	$338,000	$352,000	$367,000	$382,000	$398,000	$414,000	$431,000
3	Prior Year Carryover		$190,000	$262,000	$444,000	$353,000	$93,000	$32,000	$227,000	$60,000	$251,000
4	Amount Available for Project Funding	$200,000	$390,000	$461,000	$643,000	$551,000	$289,000	$227,000	$420,000	$251,000	$440,000
Project Funding Allocations		Year									
	Collection System	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Main Line Collection Piping Repair/Replacement		$103,000						$360,000		
2	Oregon Street Lift Station Standby Power					$49,000					
3	Oregon Street Lift Station Rehabilitation										
	Treatment Plant										
1	Headworks Screen and Flowmeter										$296,000
2	Clarifier Maintenance and Repair (Repaint)						$57,000				
3	SBC Repair/Upgrades										
4	RBC Repair/Upgrades										
5	Chlorine Contact Chamber Slide Gate and Concrete Repair		$25,000								
6	Dechlorination System - Connect to SBC Air System			$17,000							
7	Blower System - Upgrade to Increase Efficiency						$200,000				
8	Impure Water System - Replace Pumps	$10,000									
9	SCADA Telemetry Upgrades (Work in Progress)					$10,000					$10,000
10	Aerobic Digesters - Add Mechanical Mixers				$290,000						
11	Odor Control					$399,000					
	Golf Course Effluent and Irrigation System										
1	Golf Course Pump and Irrigation System Contingency										$50,000
	Sludge Disposal										
1	Sludge Truck - Replace Tank										
	Year-end Carryover	**$190,000**	**$262,000**	**$444,000**	**$353,000**	**$93,000**	**$32,000**	**$227,000**	**$60,000**	**$251,000**	**$84,000**

NOTES:

1. The projects identified in this Implementation Plan represent actions needed to remain in compliance rather than actions brought about by additional rules and regulations. The projects identified here are separate from the City's selected Alternative 3C.
2. Inflation assumed at 4 percent per year.
3. Revenues are projected to increase at 2.5 percent annually.
4. Current year operating costs include personnel services, material services, and transfers to reserves projected to increase at 4.0 percent annually.
5. Project costs include materials, seasonal employees, legal, engineering (when needed for public bid), and contingencies.
6. Main line collection piping repair/replacement arranged from high priority to low priority.
7. The dechlorination repairs/maintenance will not be needed if river discharge is discontinued.
8. This wastewater implementation plan provides an approximate guideline of costs and schedule. Project implementation is subject to change and should be adjusted annually.
9. Estimated costs have been adjusted from the costs shown in Chapter 5 to match the proposed year of construction.
10. TBD = To be determined.

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
EXISTING WASTEWATER SYSTEM 20-YEAR IMPROVEMENTS IMPLEMENTATION PLAN

FIGURE
5-21

CITY OF UNION, OREGON
EXISTING WASTEWATER SYSTEM 20-YEAR IMPROVEMENTS IMPLEMENTATION PLAN

	Description	Year of Project Implementation									
		2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
Wastewater Department Budget Projections											
1	Projected Department Revenue	$635,000	$650,000	$666,000	$682,000	$699,000	$716,000	$733,000	$751,000	$769,000	$788,000
2	Current Year Operating Costs	$449,000	$467,000	$486,000	$506,000	$527,000	$549,000	$571,000	$594,000	$618,000	$643,000
3	Prior Year Carryover	$84,000	$220,000	$290,000	$470,000	$6,000	$168,000	$22,000	$184,000	$341,000	$492,000
4	Amount Available for Project Funding	$270,000	$403,000	$470,000	$646,000	$178,000	$335,000	$184,000	$341,000	$492,000	$637,000
Project Funding Allocations		**YEAR**									
	Collection System	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	Main Line Collection Piping Repair/Replacement		$113,000								
2	Oregon Street Lift Station Standby Power										
3	Oregon Street Lift Station Rehabilitation						$263,000				
	Treatment Plant										
1	Headworks Screen and Flowmeter										
2	Clarifier Maintenance and Repair (Repaint)						$50,000				
3	SBC Repair/Upgrades				$320,000						
4	RBC Repair/Upgrades				$320,000						
5	Chlorine Contact Chamber Slide Gate and Concrete Repair										
6	Dechlorination System - Connect to SBC Air System										
7	Blower System - Upgrade to Increase Efficiency										
8	Impure Water System - Replace Pumps										
9	SCADA Telemetry Upgrades (Work in Progress)					$10,000					$10,000
10	Aerobic Digesters - Add Mechanical Mixers										
11	Odor Control										
	Golf Course Effluent and Irrigation System										
1	Golf Course Pump and Irrigation System Contingency										
	Sludge Disposal										
1	Sludge Truck - Replace Tank	$50,000									
	Year-end Carryover	**$220,000**	**$290,000**	**$470,000**	**$6,000**	**$168,000**	**$22,000**	**$184,000**	**$341,000**	**$492,000**	**$627,000**

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CITY OF
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WASTEWATER FACILITIES PLAN
EXISTING WASTEWATER SYSTEM 20-YEAR IMPROVEMENTS IMPLEMENTATION PLAN

FIGURE
5-21
CONT'D

CITY OF UNION, OREGON
ADD MECHANICAL MIXERS TO THE AEROBIC DIGESTERS
SYSTEM IMPROVEMENT COMPONENTS

Purchase and Install Mixers

- Construct mounting framework.
- Modify digester covers.
- Install mixers.
- Modify electrical and controls.
- Add alarms/monitoring equipment.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ADD MECHANICAL MIXERS TO THE AEROBIC DIGESTERS
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 17,000	All Req'd	$ 17,000
2	Install Mixers	LS	85,000	All Req'd	85,000
3	Mounting System	LS	50,000	All Req'd	50,000
4	Electrical, Controls, and Instrumentation	LS	25,000	All Req'd	25,000
5	Site Work	LS	5,000	All Req'd	5,000
	Subtotal Estimated Construction Cost				$ 182,000
	Contingencies (10% of Estimated Construction Cost)				18,200
	Total Estimated Construction Cost				**$ 200,200**
	Preliminary, Design, and Construction Engineering (20% of Total Estimated Construction Cost)				$ 40,000
	TOTAL ESTIMATED IMPROVEMENTS COST (2014)				**$ 240,200**
	Other Estimated Project Costs				
	Funding Acquisition				$ -
	Legal and Administration				5,000
	Environmental Review Report				-
	Archaeological Report				-
	Cultural Resource Monitoring				-
	Regulatory Agency Reporting and Review Fees				2,500
	Total Other Project Costs (2014 Dollars)				**$ 7,500**
	TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)				**$ 247,700**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 13,000
2	Power (Additional Power for Blower)	7,000
3	Miscellaneous Repairs	2,000
	Total OM&R	**$ 22,000**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	299,000
	Total Present Worth (2014 Dollars)	**$ 546,700**
	Total Present Worth (2018 Dollars)	**$ 640,000**

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ADD MECHANICAL MIXERS TO THE AEROBIC DIGESTERS
PRELIMINARY COST ESTIMATE

FIGURE 5-23

CITY OF UNION, OREGON
ADD ODOR CONTROL BIOFILTER TO THE AEROBIC DIGESTERS
SYSTEM IMPROVEMENT COMPONENTS

BIOFILTER PACKAGE

Package Includes:

- Biofilter media.
- Foul air blower.
- Foul air pipe.
- Pipe bedding gravel.
- Containment liner.
- Irrigation and humidification systems.

PROJECT ASSUMES INSTALLATION OF BIOFILTER IN TRAVELLING BRIDGE EFFLUENT FILTER BUILDING

Package Includes:

- Remove effluent filter components.
- Modify to accept biofilter media, piping, and other components.
- Modify electrical and controls.
- Install alarms and monitoring devices.

SITE WORK

Includes:

- Connection to aerobic digesters.
- Pipe foul air to biofilter from digesters.

CITY OF UNION, OREGON
PRELIMINARY COST ESTIMATE
ADD ODOR CONTROL BIOFILTER TO THE AEROBIC DIGESTERS
(YEAR 2014 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization	LS	$ 12,000	All Req'd	$ 12,000
2	Biofilter, Media, Blower, etc.	LS	150,000	All Req'd	150,000
3	Effluent Filter Demolition	LS	25,000	All Req'd	25,000
4	Foul Air Ducting and Connection to Digesters	LS	40,000	All Req'd	40,000
5	Electrical Controls and Instrumentation	LS	10,000	All Req'd	10,000
6	Site Work	LS	5,000	All Req'd	5,000
				Subtotal Estimated Construction Cost	$ 242,000
				Contingencies (10% of Estimated Construction Cost)	24,000
				Total Estimated Construction Cost	**$ 266,000**
				Preliminary Design and Construction Engineering (20% OF Total Estimated Construction Cost)	$ 54,000
				TOTAL ESTIMATED IMPROVEMENTS COST (2014)	**$ 320,000**
				Other Estimated Project Costs	
				Funding Acquisition	$ -
				Legal and Administration	5,000
				Environmental Review Report	-
				Archaeological Report	-
				Cultural Resource Monitoring	-
				Regulatory Agency Reporting and Review Fees	2,500
				Total Other Project Costs (2014 Dollars)	**$ 7,500**
				TOTAL ESTIMATED CAPITAL COST (2014 DOLLARS)	**$ 327,500**

PRESENT WORTH ANALYSIS (2014 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 13,000
2	Power (Additional Power for Blower)	3,000
3	Miscellaneous Repairs	5,000
	Total OM&R	**$ 21,000**
	Present Worth Operation and Maintenance Cost (4%, 20 years)	286,000
	Total Present Worth (2014 Dollars)	**$ 613,500**
	Total Present Worth (2018 Dollars)	**$ 718,000**

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CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
ADD ODOR CONTROL BIOFILTER TO THE AEROBIC DIGESTERS PRELIMINARY COST ESTIMATE

FIGURE 5-25

Chapter 6 - Selected Improvements

Introduction

This chapter presents the selected improvements alternative to meet the City of Union's wastewater collection, treatment, and effluent disposal/reuse needs for the 20-year planning period. These improvements were selected by the City after careful consideration of the various impacts, objectives, and criteria discussed in Chapters 2, 3, 4, and 5 and review, evaluation, and consideration of associated cost estimates.

General

The City of Union's City Council selected Alternative 3C as the preferred alternative to upgrade the City's wastewater treatment facility (WWTF) to meet anticipated National Pollution Discharge Elimination System (NPDES) Permit limits for ammonia. Alternative 3C continues utilizing the WWTF to treat wastewater and ensure Class C effluent. Treated wastewater effluent generated during the growing season will be sent directly to the Buffalo Peak Golf Course storage pond through the existing effluent pump station, while treated wastewater effluent generated during the non-growing season will be transferred to a two-cell pond and stored for land application on an alfalfa field during the growing season. For purposes of discussion, the growing season is generally considered to be May through September, while the non-growing season is generally considered to be October through April. Some variation is expected to match annual climatic conditions.

The City has indicated that they would like the ability to decommission portions of the existing WWTF at a future date and that they would like to replace biological treatment components of the WWTF with facultative wastewater treatment lagoons at that time (as described in Chapter 5, Alternative 4). Alternative 3C has been preliminarily laid out so facultative wastewater treatment lagoons and associated components can be added with the fewest conflicts possible. A conceptual plan of Alternative 3C is shown on Figure 5-16.

Public Involvement

The public was invited to two workshops and one City Council meeting to provide input on the proposed WWTF improvements. The workshops were held in the City Council chambers on April 7, 2014, and August 8, 2014. The City Council meeting was held on August 11, 2014. The Wastewater Facilities Plan (WWFP) was adopted by the Council on October 13, 2014. The resolution adopting the WWFP is included in Appendix G.

Alternative 3C - Treatment Facility Improvements

The treatment facility improvements include disconnecting the treated effluent outfall from Catherine Creek and reconnecting the outfall to a new treated effluent transfer pipeline. The effluent transfer pipe will begin at the effluent pump station and run along the western boundary of the WWTF site, across Union Junction Lane/Arch Street, and terminate at a new two-cell effluent storage pond. The effluent transfer pipe has been initially sized as 8-inch diameter and will be approximately 5,500 feet long. The effluent storage pond will be sited on Eastern Oregon Agricultural Research Center (EOARC) property.

The new effluent storage ponds are preliminarily designed to contain treated effluent generated during the non-growing season. The water balances (Figures 5-12 and 5-13) show that approximately 12 acres of storage will be needed to contain non-growing season effluent production. The pond will be divided into two 6-acre cells to allow maintenance and inventory management. As part of the land application addition to the WWTF, a pivot irrigation system and two transfer pump stations will also be constructed. One 15 horsepower (Hp) pump will transfer stored treated effluent from the storage ponds to the pivot irrigation system, and a second 2 Hp pump will return stored treated effluent to the effluent pump station for transfer to the Buffalo Peak Golf Course storage pond. Providing two separate methods to beneficially utilize the treated wastewater effluent provides redundancy and allows the operator the flexibility to land-apply effluent and control the stored wastewater inventory.

The land application component of the WWTF is currently shown on EOARC land. Discussions with EOARC show that they would find additional irrigation capacity beneficial and that the proposed storage pond and associated irrigation system will fit with their planned land use. The water balances were used to predict the available amount of treated wastewater effluent for the golf course and the EOARC land. Water balances consider the effects of average precipitation, evaporation, pond seepage (if applicable), and irrigation water available from Prescott Ditch, Godley Ditch, and the tile drain discussed below. Two water balances were developed for Alternative 3C: one to predict current conditions (2014) and one to predict future conditions at the end of the WWTF analysis period (2034). Prescott Ditch water was eliminated from the water balance so a conservative estimate would result and to provide added flexibility to provide irrigation to the golf course and EOARC.

Land Application Plan for Irrigation and Treated Wastewater Effluent

The initial irrigation plan continues land-applying treated wastewater effluent to approximately 60 acres of turf at the golf course. EOARC's irrigation water (preliminarily confirmed availability by water rights listed on Table 6-1) would be utilized on the 50-acre alfalfa land application site on EOARC land through approximately July 15 each year. Treated wastewater effluent would be utilized on the alfalfa site for the remainder of the growing season (after July 15). Water rights would need to be transferred to the land application site and supplement alfalfa irrigation after July 15; a water right transfer should be further evaluated before this alternative is implemented.

2014 Water Balance Evaluation

The total treated wastewater effluent production during 2014 is predicted to be 56.12 million gallons (MG). The water balance adds precipitation and subtracts pond seepage and evaporation. The net treated effluent production for 2014 is predicted to be 49.52 MG.

Of the available 49.52 MG, 42.75 MG is dedicated to turf irrigation at the golf course, leaving 6.77 MG available for land application at the EOARC site. Initially 50 acres of alfalfa would be irrigated at the EOARC site. The irrigation demand for 50 acres of alfalfa is predicted to be 38.32 MG. Subtracting the 6.77 MG available treated wastewater effluent from the total demand nets 31.55 MG of irrigation water that would be needed to successfully complete the irrigation of 50 alfalfa acres. Based on the water balance, EOARC would need to provide 17.2 MG from Godley Ditch and 14.3 MG from a ditch fed from a tile drain from an up-gradient source. EOARC irrigation water rights, based on Transfer No. 11420, dated April 2, 2012, are summarized on Table 6-1. The gross volume required from the combined sources equals 38.3 MG, which approximately meets the forecast demand amount.

2034 Water Balance Evaluation

The total treated wastewater effluent production during 2034 is predicted to be 66.35 MG. As with the 2014 water balance, the 2034 water balance adds precipitation and subtracts pond seepage and evaporation. The net treated effluent production for 2034 is predicted to be 59.75 MG.

Of the available 59.75 MG, 42.75 MG is dedicated to turf irrigation at the golf course, leaving 17 MG available for land application at the EOARC site. Initially, 50 acres of alfalfa would be irrigated at the EOARC site. The irrigation demand for 50 acres of alfalfa is predicted to be 38.32 MG. Subtracting the 17 MG available treated wastewater effluent from the total demand nets 21.32 MG of irrigation water that would be needed to successfully complete the irrigation of 50 acres of alfalfa. 17.24 MG of irrigation water can be made up from Godley Ditch, and 4.08 MG of irrigation water can be made up from a ditch fed from a tile drain from an up-gradient source. The gross volume required from the combined sources equals 38.32 MG, which approximately meets the water balance forecast demand.

Treated Effluent and Irrigation Water Evaluation Summary

The required irrigation capacity is available with a combination of EOARC water rights and treated wastewater effluent. As the City grows, less dependence will be placed on existing irrigation water rights. EOARC would like access to treated wastewater effluent primarily after July 15 each year, because their water rights are junior to other water rights in the area and are often subject to stop water orders by July 15. It should be noted that neither the 2014 nor the 2034 water balance evaluations included water from Prescott Ditch. Prescott Ditch currently provides part of the irrigation water to the golf course. If this use is continued, additional treated wastewater effluent could be provided to EOARC for irrigating alfalfa.

Table 6-1
Eastern Oregon Agricultural Research Center
Irrigation Water Right Summary

Water Right No./ Permit No.	Permitted Flow Rate (cfs)	Annual Volume Limit (MG)
41056/30419	2.41	133
64476/43256	0.71	28

cfs = cubic feet per second

Irrigation Water and Treated Wastewater Effluent Regulatory Evaluation

Oregon Administrative Rule 340-055 defines classes of treated effluent and lists setback distances for the defined classes. The WWTF currently produces Class C effluent. Alternative 3C continues using the current treatment mechanisms, adding a land application option to the end of the overall wastewater treatment process. Based on this information, it is realistic to expect that the WWTF will continue producing Class C effluent. Class C effluent has a 70-foot setback from the property line.

Irrigation water from Godley Ditch and other sources does not have a setback restriction. As requested by EOARC to comply with the regulation while irrigating the most land practicable, it is anticipated that electronic controls will be utilized to reduce the number of operating sprinklers when applying Class C treated effluent. Sprinklers will be taken off line, as needed, to maintain the 70-foot setback for effluent and meet the required setback distances.

Implementation Plan

In conjunction with the WWTF analysis, an Implementation Plan was developed (see Figure 5-21). This Implementation Plan is designed to address portions of the wastewater treatment system and collection system that are currently in service and will require maintenance during the next 20 years. The Implementation Plan provides an estimated cost and year of occurrence. The Implementation Plan is intended to be a tool for the City administrator to budget projected needs in keeping with the City Council's pay-as-you-go directive.

Some items included in the Implementation Plan were requested by City personnel, City Council, and the Oregon Department of Environmental Quality (DEQ). Unpleasant odors were common concerns of all three groups and the primary source of public comment. While most maintenance items, such as recoating the clarifiers or maintaining a pump, do not require formal discussion, odor issues associated with the aerobic digesters do require formal discussion. Several options have been considered to correct the odor problem. It is expected that the ultimate solution will be phased, beginning with the least-cost options. Options considered include:

Additional Instrumentation to Gather Aerobic Digester Operating Data

A phased approach has the potential to support fiscal responsibility and should save money by identifying the most cost-effective odor control solution. The first step toward odor control adds instrumentation to the aerobic digesters. The additional instrumentation will gather dissolved oxygen (DO), temperature, and pH data. The City has proactively installed the instrumentation and is gathering the information needed through the telemetry system to design a sound engineering solution.

Coarse Bubble Diffusers

Coarse bubble diffusers offer the second and potentially least-cost odor management solution. In similar applications where coarse bubble diffusers were utilized, less offensive odors resulted. It is hypothesized that the larger bubbles reduce fizzing and frothing, which should effectively reduce foaming while ensuring appropriate DO content.

The DEQ requested inclusion of coarse bubble diffusers in the selected alternative described in this chapter as a condition of their approval of this WWFP. To satisfy this request, coarse bubble diffuser estimated costs have been added to Alternative 3C, Figures 5-14 and 5-15. Adding coarse bubble diffusers to the selected alternative provides a proactive approach to odor control.

Mechanical Mixing to Mitigate Foam

Currently, air is used to entrain DO and mix the sludge inventory. The resulting mixing process violently agitates the sludge, in turn producing foam. Since the amount of air required for DO entrainment is about 15 percent of the air required for mixing, replacing air mixing with moderate mechanical mixing should reduce foaming. With less foam, more air can be entrained in the sludge, which will support a healthier biomass. Improving sludge digestion through a healthy biomass should also reduce foam. With better digestion, unpleasant odors will be reduced and foaming will decrease.

Odor Control Biofilter

Adding an odor control biofilter to the WWTF will reduce unpleasant odors. However, the cost estimate for this option is high ($320,000), and a biofilter neither addresses the reason for unpleasant odors nor improves the aerobic digestion operation.

To summarize, odor reduction and management will occur in a phased approach, beginning with the least expensive potential modification. This approach is intended to identify and implement the most cost-effective solution, simultaneously improving aerobic digester performance.

The Implementation Plan also addresses remedial needs identified in the collection system. Needed collection system improvements were identified during a City-wide collection system televising event completed by the City of Union with City equipment. The identified needs have been prioritized as high, medium, and low. Collection system repairs have been scheduled in accordance with their priority, beginning with the high priority, or worst, sections first.

Summary

The Union City Council has chosen Alternative 3C as their preferred alternative, with the provision that facultative wastewater treatment lagoons and decommissioning of the WWTF are planned for. The Implementation Plan provides a planning tool for collection system repairs, WWTF repairs, and odor control. This WWFP and the Implementation Plan are considered "living" documents that should be updated periodically to match the City's needs as they develop. The Implementation Plan supports the City Council’s pay-as-you-go directive for annual capital expenditures.

Chapter 7 - Project Financing and Implementation

Introduction

This chapter evaluates the financial status of the City's Sewer Department fund and outlines alternatives for financing Union's proposed wastewater system improvements. A summary of state and federal funding programs is presented, including a review of funding options available to the City for the selected wastewater system improvements project. In order to design and construct the proposed improvements, a financing plan must be developed that is acceptable to the citizens of Union. Financing resources should include local funding and loan/grant funding, if available, to make it feasible for the City to implement the improvements.

Although a detailed analysis of Union's current sewer rate structure is beyond the scope of this Wastewater Facilities Plan (WWFP), some discussion of the existing rate structure, and current and future sewer system budgets, is included. As a general rule, most utility rate structures include funding for periodic minor system improvements and maintenance items, payroll costs for staff, and a set-aside for future improvements. A summary of the current sewer rate structure is presented hereafter.

Current Sewer Rates and Revenue

The operation and maintenance of the existing sewer system is financed through the City's annual budget. Revenue is obtained primarily from sewer user and connection fees. Shown below are the current sewer rates (per month), which have been in effect since July 1, 2013.

TABLE 7-1

Sewer Rate Fee Schedule

Sewer Base Charge:	$40.61
Vacation/Disconnection Charge:	$21.78

The rates were set by Ordinance No. 50.068. A copy of the City of Union's Sewer Rate Ordinance, rate structure, and Sewer Use Regulations is presented in Appendix H. As of May 2014, the City of Union billed the following number of sewer service accounts:

TABLE 7-2

Sewer Service Accounts

Account Type	Total Number of Accounts
Residential	898
Commercial	72
Vacation/Disconnection	48
Industrial	0
TOTAL	**1,018**

Revenue generated from the City's sewer rates and connection fees is presented on Table 7-3. Revenue has increased at an average annual rate of approximately 3.7 percent per year from 2007-08 through 2012-13. Using an annual sewer revenue amount of approximately $491,500 for fiscal year 2012-13 and assuming 1,018 accounts, the City currently has an average monthly sewer revenue of approximately $40.23 per account.

Annual tax revenue averaged approximately $12,000 over the period from 2007-08 through 2012-13. Using the City's 1,018 sewer service accounts, this equated to an average monthly tax related to the wastewater system of approximately $0.98 per account. This tax revenue is used to help pay loan payments associated with the refinance of an older bond. Adding the tax revenue to the $40.23 per account, the total sewer revenue is approximately $41.21 per account.

TABLE 7-3

Sewer Department Revenue

Fiscal Year	Total Revenue from Sewer Rates, Connection Fees, and Interest Income	Total Revenue from Property Taxes, Delinquent Property Taxes, and Interest Income
2007-08	$409,783	$15,215
2008-09	$424,740	$14,573
2009-10	$439,341	$12,396
2010-11	$452,539	$3,105
2011-12	$473,841	$13,269
2012-13	$491,501	$15,379
2013-14	$477,700*	$15,750*
2014-15	$492,200*	$15,750*

** Projected revenue is shown for fiscal years 2013-14 and 2014-15.*

Current Financial Status

The annual cost of operating and maintaining the Union wastewater system is summarized on Figure 7-1. The costs presented were obtained from the City's financial statements and include all costs for the wastewater system, such as operation and maintenance (O&M), personnel services, capital outlay, and sewer revenue bond, but does not include sewer bonds paid through property tax.

Historical and Projected Budget Trends

The annual cost of operating and maintaining the Union wastewater treatment and collection system for fiscal year 2012-13 was $424,609. Annual wastewater system O&M costs, not including inter-fund transfers, have varied from approximately $206,467 in fiscal year 2008-09 to $424,609 in fiscal year 2012-13. The City sewer budget, showing revenues and expenditures from fiscal year 2007-08 through 2012-13, is shown on Figure 7-2. Based on the average trend of O&M cost data, including capital outlay and transfers to reserve, it is projected that O&M costs are expected to be approximately $550,000 in fiscal year 2015-16. Per discussions with the City, the high O&M costs are associated with high capital outlay and are based on approved budgets, not historical data. A more realistic projection for O&M costs would be $300,000; this O&M costs was used to determine the available funds for the Existing Wastewater System 20-Year Improvements Implementation Plan (Implementation Plan) shown on Figure 5-21.

For the purpose of the analysis, sewer accounts have been separated into four types based on the City's billing methodology: residential, commercial, vacation/disconnection, and industrial, as illustrated on the following Table 7-4.

TABLE 7-4
Sewer Accounts Revenue Summary

Type of Account	Number of Accounts	Average Annual Revenue	Average Monthly Revenue
Residential	898	$438,000	$36,500
Commercial	72	$36,000	$3,000
Vacation/Disconnection	48	$12,000	$1,000
Industrial	0	$0	$0
Total	**1,018**	**$486,000**	**$40,500**

The City of Union has a U.S. Department of Agriculture (USDA) bond serviced by wastewater system revenues. The bond was created in 2000 with a total principal amount of $2,629,000, a 40-year repayment period, and an annual percentage rate of 4.5 percent compounded annually. The current annual loan payment amount is approximately $42,000 in principal and $102,000 in interest, with approximately $2,200,000 in principal remaining.

The City also has two USDA Rural Development (RD) bonds created in 2008 that are a refinance of older bonds served from additional tax rates. Both bonds have an interest rate of 5 percent compounded semiannually. One bond has a loan amount of approximately $64,235, with total annual payments of $7,348 ending in 2019. The other bond has a loan amount of approximately $33,850, with total annual payments of $4,664 ending in 2017.

State and Federal Grant and Loan Programs

Financing of public improvement projects is a complex issue that must be resolved before a project can move beyond the planning stage. The cost of providing local financing for wastewater system improvements often exceeds the financial capability of local businesses and residents. Federal and state financing programs are in place that may allow the City to access low interest loans and, possibly, grants. Federal and state programs are designed to keep monthly user rates at an affordable level, simultaneously making the improvements project possible.

A number of state and federal grant and loan programs can provide assistance for municipal improvement projects to Oregon cities. These programs offer various levels of funding aimed at different types of projects. These include programs administered by RD, the U.S. Economic Development Administration (EDA), Business Oregon's Infrastructure Finance Authority (IFA), the Oregon Department of Environmental Quality (DEQ), and others. These agencies can provide low interest loan funding and possibly grant funding to assist rural communities with public works projects. Most of these agencies will require sewer rates that equal or exceed Union's Affordability Index (AI) of $41.27 per month to support a loan for wastewater system improvements both as a condition of receiving monies and prior to being considered for grant funds.

The following section briefly summarizes the primary funding programs available to assist the City with a wastewater system improvements project. It should be noted that the monthly user rates discussed in this section can represent a combination of monthly usage fees and taxes.

Summary of Federal Grant and Loan Programs

U.S. Department of Agriculture, Rural Development

This agency can provide financial assistance to communities with a population under 10,000 through both loans and direct grants. Under the loan program, the agency purchases local bonds. The interest rate for these bonds is dependent on the Median Household Income (MHI) of the community and other factors, and varies from year to year based on other economic factors nationally. Due to past changes in the funding environment and an increased competition for funds, RD now sets a limit on the maximum amount of loan dollars a community can request. Currently the maximum loan amount is 25 percent of the total funding available state-wide, which would result in a maximum project loan in the range of $4,500,000. For the City of Union, the MHI is $39,615 based on the 2008-12 five-year average, which would qualify the City for a current intermediate interest rate of 3.25 percent with a repayment period of up to 40 years. Application for this type of funding is a fairly lengthy process involving development of an Environmental Report and a detailed funding application.

The agency presently requires communities to establish average residential user costs in the range of $45 to $50 per month before the community qualifies for grant funds. It should be noted that loans without grant funds may be acquired from RD that may not require rates to reach this level, depending on the results of an RD funding analysis. The user costs must provide sufficient revenue to pay for all system operation, maintenance, and replacement (OM&R) costs and pay for the local debt service incurred as a result of the project. All project costs above this level may be paid for by grant funds, up to given limits, which are usually not more than 45 percent of the total project cost. The objective of the RD loan/grant program is to keep the cost for utilities in small, rural communities at a level that is similar to what other communities are paying.

Another of the agency's requirements is that loan recipients establish a reserve fund of 10 percent of the bond repayment during the first 10 years of the project, which can make the net interest rate a little higher. The RD program requires either revenue or general obligation bonds to be established through the agency for the project (refer to the Local Financing Options section of this chapter for further discussion). These bonds can usually be purchased for a period of 40 years if grant funding is also received. A loan and possibly grant funds from RD are likely options for the City to implement wastewater system improvements and are evaluated later in this chapter.

U.S. Economic Development Administration

The EDA has grant and loan funds similar to those available through the IFA's Special Public Works Fund (SPWF) program. Monies are available to public agencies to fund projects that stimulate the economy of an area, and the overall goal of the program is to create or retain jobs. The EDA has invested a great deal of money in Oregon to fund public works improvement projects in areas where new industries were locating or planned to locate in the future. In addition, the agency has a program known as the Public Works Impact Program to fund projects in areas with extremely high rates of unemployment. This program is targeted toward creating additional jobs and reducing the unemployment rate in the area. Unless the City's wastewater system improvements can be linked directly to industrial expansion or job retention, the City will not be in a competitive position to receive funding under EDA programs.

Summary of State Grant and Loan Programs

Infrastructure Finance Authority Finance Programs

Special Public Works Fund

The SPWF program was established by the Oregon Legislature in 1985 to provide primarily loan funding for municipally-owned infrastructure and other facilities that support economic and community development. Loans and grants are available to municipalities for planning, designing, purchasing, improving, and constructing municipally-owned facilities.

For design and construction projects, loans are primarily available; however, grants are available for projects that will create and/or retain traded-sector jobs. A traded-sector industry sells its goods or services into nationally or internationally competitive markets. Loans range in size from less than $100,000 to $10 million. The SPWF is able to offer very attractive interest rates that reflect tax-exempt market rates for very good quality creditors. Loan terms can be up to 25 years or the useful life of the project, whichever is less. Grants are limited to projects associated with job creation/retention. The maximum grant award is $500,000 or 85 percent of the project cost, whichever is less. The grant amount per project is based on up to $5,000 per eligible job created or retained. Unless the City of Union can tie the needed improvements to job creation, the SPWF is not a likely funding source for wastewater system improvements.

Water/Wastewater Financing Program

This is a loan and grant program that provides for the design and construction of public infrastructure when needed to ensure compliance with the Safe Drinking Water Act or the Clean Water Act. To be eligible, a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency associated with the Safe Drinking Water Act or the Clean Water Act.

While primarily a loan program, grants are available for municipalities that meet the eligibility criteria. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources, current and projected utility rates, and other factors). The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. Loan amounts are determined by financial review and may be offered through a combination of direct and/or bond funded loans. Loans are generally repaid with utility revenues or voter approved bond issues. A limited tax general obligation pledge may also be required. "Credit worthy" borrowers may be funded through sale of state revenue bonds. The maximum grant is $750,000 per project based on a financial analysis. An applicant is not eligible for grant funds if the applicant's annual MHI is equal to or greater than 100 percent of the state average MHI for the same year. The Water/Wastewater program is a potential funding source for Union's proposed wastewater system improvements project.

Community Development Block Grant (CDBG) Program

The primary objective of the program is the development of viable (livable) urban communities by expanding economic opportunities and providing decent housing and a suitable living environment principally for persons of low and moderate income.

This is a grant program. The state receives an annual allocation from Housing and Urban Development (HUD) for the CDBG program. Grant funding is subject to the applicant need, availability of funds, and any other restrictions in the state's Method of Distribution (i.e., program guidelines). It is not possible to determine how much, if any, grant funds may be awarded prior to an analysis of the application and financial information.

Eligibility for the CDBG program requires a low to moderate percent income of greater than 51 percent. The City of Union's percentage of low to moderate income is 45.1 percent based on the IFA's 2013 HUD Low/Moderate Income Summary Data, so funding from the CDBG program does not appear to be available to Union.

For IFA Programs – Contact Regional Coordinator

Since program eligibility and funds availability may change from year to year, potential applicants are encouraged to contact their respective Regional Coordinator to obtain the most accurate and up-to-date information for each program.

Oregon Department of Environmental Quality

Clean Water State Revolving Fund (CWSRF) Program

This program, administered by the DEQ, provides low interest rate loans to public agencies for the planning, design, and construction of water pollution control facilities (e.g., wastewater treatment facilities), as well as for some publicly-owned estuary management and non-point source control projects. Priority in the agency's ranking process is always given to projects addressing documented water quality problems and health hazards.

Under the CWSRF program rules, interest rates on all standard design and/or construction loans are set at 65 percent of the municipal bond rate as of the quarter preceding signing of the loan agreement. In addition, fees are assessed to cover program administration costs by the DEQ. A servicing fee of 0.5 percent of the outstanding balance is added to the interest rate, for a total interest rate between 2 and 3 percent, and a loan reserve equal to 50 percent of the annual debt service is also to be set aside in a separate fund. This program has low interest rates with variable repayment periods. The DEQ loan program is an attractive low interest loan source for the City of Union, although priority in the agency's ranking process would need to be sought by the City.

There are multiple funding scenarios available through the CWSRF program. Two are evaluated later in this chapter: a design/construction loan with a 20-year repayment period, and a bond purchase option with a 30-year repayment period. Both scenarios would provide design/construction funding; the difference is one scenario utilizes a bond purchase while the other is a loan.

Funding Program Summary

It appears that more than one funding source is available to the City, potentially including the Water/Wastewater Financing Program, CWSRF, and RD. In order to qualify for grant funds from these agencies, the City will need to be willing to raise the monthly residential sewer cost to be $45 to $50 per month. Monthly costs may need to be raised higher than this depending on the amount of grant funds, if any, available to the City.

It is important for the City to consult with funding agencies early in the project development stages to ascertain under which funding programs the City would be eligible to receive funding for their proposed improvements. This consultation with funding agencies may be done at a "One Stop" meeting, which is described in more detail later in this chapter. The remainder of this chapter focuses on evaluating loan capacities and funding options for the City’s wastewater system improvements project.

Preliminary Equivalent Residential Unit Analysis

When projecting future revenue for a sewer system, an Equivalent Residential Unit (ERU) analysis is usually completed. One ERU is intended to represent the average residential wastewater flow for a "typical" user. As an example, generally, each residential connection in Union would represent one ERU. A commercial or industrial connection user with wastewater flows similar to the average residential flow would also be considered one ERU. A commercial connection such as a café, with three times the typical wastewater flows as an average residential sewer connection, would be considered three ERUs.

The City of Union does not bill wastewater accounts based on usage but, instead, bills a flat rate per connection type. Residential and commercial accounts are billed the base charge, while vacation/disconnection accounts are charged a separate rate. For the purposes of this WWFP, each connection is considered one ERU.

The City of Union has 970 sewer base accounts and 48 vacation/disconnection accounts. The ERU determination is intended to equitably distribute sewer system costs among all users. The ERU determination helps funding agencies determine the maximum loan (debt) amount a city can incur prior to being considered for grant funds for their wastewater system project. The City of Union will need both loan and grant funds to complete the wastewater system improvements project discussed in Chapter 6, should the City wish to implement the project. The analysis presented hereafter for the City’s future sewer rate revenue and estimated loan capacity is based on the preliminary determination of the estimated ERUs.

Debt Repayment Options and Loan Capacity

Debt Repayment Using Sewer User Fees

One method for repayment of loans is through increased sewer user fees. Sewer user fee increases would be determined by the annual debt service cost of the proposed improvements selected by the City of Union and annual operation and maintenance costs for the wastewater treatment facility and collection system. Figure 7-3 was prepared to determine the City’s capacity for repayment of loans with sewer user fees given different funding options (refer to subsequent sections for funding option discussions). Several assumptions were made to develop the analysis presented on Figure 7-3.

1. Monthly sewer rates are for residential, commercial, and vacation/disconnection users. It is assumed the vacation/disconnection users pay $16.25 per month less than the sewer base charge to still cover sewer debt service.

2. O&M costs for 2018 were set at $300,000 per year. For the purpose of the analysis, it has been assumed that the City would put $25,000 in a replacement fund account to pay for future equipment replacement, etc. Therefore, the total estimated OM&R cost for 2018 is $325,000. The total annual expenditures without existing debt service are $325,000. The year 2018 was used because this is the time period in which the project would most likely begin.

3. Ten percent of the net annual funds available to service debt was set aside under the RD scenario to create a reserve account in accordance with RD requirements. IFA does not require reserve funds to be set aside.

Debt Repayment Using Property Tax Revenue

Under the Oregon Property Tax Limitation-Measure 5, property tax rates can be used to repay wastewater system improvements costs through property tax revenues. Figure 7-4 lists the increases in property tax rates required to finance loan amounts solely with property taxes.

It should be noted that debt repayment may also be achieved by some combination of sewer user fees and property taxes.

Project Funding

General

The funding alternatives presented below should be considered worst-case scenarios and are based solely on funding the selected improvement alternative, Alternative 3C. Funding for the Implementation Plan shown on Figure 5-21 was determined based on current revenues and O&M costs and is not included in the funding alternatives. There may be opportunities for the City to apply for grants or principal forgiveness. If an improvements project is pursued, it is recommended that the City thoroughly investigate potential funding sources to ensure the best funding package is obtained for the project. The "One Stop" meeting, described later in this chapter, would provide the City with the range of options available to fund an improvements project.

Project Funding Scenarios

Scenario A - CWSRF 30-Year Bond Purchase

Scenario A considers funding the entire proposed project with a 30-year bond purchase through the CWSRF. The interest rate effective between July 1 and September 30, 2014, is 1.73 percent with a fee amount of 0.5 percent. If the City obtained a bond for the entire 2018 proposed project cost of $5,145,000 from CWSRF then, as shown on Figure 7-3, this would equate to an approximate average monthly residential sewer rate of $58 to $59. Under this alternative, the City would pay approximately $1,966,500 in interest over the life of the bond. Refer to Table 7-5 for a summary of the analysis under this alternative.

Scenario B - CWSRF 20-Year Design/Construction Loan

Scenario B considers funding the entire proposed project with a 20-year design/construction loan through the CWSRF. The interest rate effective between July 1 and September 30, 2014, is 1.73 percent with a fee amount of 0.5 percent. If the City obtained a loan for the entire 2018 proposed project cost of $5,145,000 from CWSRF then, as shown on Figure 7-3, this would equate to an approximate average monthly residential sewer rate of $65 to $66. Under this alternative, the City would pay approximately $1,288,500 in interest over the life of the loan. Refer to Table 7-5 for a summary of the analysis under this alternative.

Scenario C - RD 40-Year Design/Construction Loan

Scenario C considers funding the entire proposed project with a 40-year design/construction loan through RD. As stated previously, the current interest rate is 3.25 percent. If the City obtained a loan for the entire 2018 proposed project cost of $5,145,000 from RD then, as shown on Figure 7-3, this would equate to an approximate average monthly residential sewer rate of $60 to $61. Under this alternative, the City would pay approximately $4,122,000 in interest over the life of the loan. Refer to Table 7-5 for a summary of the analysis under this alternative.

TABLE 7-5
Funding Scenarios Comparison

	Scenario A	Scenario B	Scenario C
Funding through CWSRF	$5,145,000 Loan	$5,145,000 Loan	None
Funding through USDA RD Loan	None	None	$5,145,000
Annual Loan Payments and Number of Years	$237,000 for 30 Years	$321,500 for 20 Years	$231,500 for 40 Years
Approximate Interest Paid	$1,966,500	$1,288,500	$4,122,000
Approximate Average Monthly Rate for Sewer Use[1]	$58 to $59	$65 to $66	$60 to $61
Estimated Annual Tax Rate Increase Per $100,000[1]	$286	$388	$280

[1] Depending on the selected funding package, monthly rates will increase or annual taxes will increase as shown on Table 7-5, or a combination of monthly rates and taxes may also be used.

Project "One Stop" Meeting

If the City chooses to finance the wastewater system improvements project through funding sources presented by IFA, a "One Stop" meeting must be scheduled. The "One Stop" meeting provides a forum to evaluate funding opportunities and find the most suitable funding package for the City. After the "One Stop" meeting with representatives of the major funding agencies, IFA may invite the community to submit a funding application to the best fit funding program identified by IFA.

Local Financing Options

Regardless of the ultimate project scope and agency from which loan and grant funds are obtained, the City may need to develop authorization to incur debt, i.e., bonding, for the needed project improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City charter. The RD program requires a city to obtain authorization to incur debt; however, IFA does not require bonding.

There are generally two options the City may use for its bonding authority: general obligation bonds and revenue bonds. General obligation bonds require a vote of the people to give the City the authority to repay the debt service through tax assessments, sewer rate revenues, or a combination of both. The taxing authority of the City provides the guarantee for the debt. Revenue bonds are financed through revenues of the wastewater system. Authority to issue revenue bonds can come in two forms. One is through a local bond election similar to that needed to sell a general obligation bond; the second is through Council action authorizing the sale of revenue bonds, if the City charter allows. If citizens do not object to the bonding authority resolution during a 60-day remonstrance period, the City would have authority to sell these revenue bonds.

The RD program accepts either revenue bonds or general obligation bonds. As mentioned above, bonding is not required for IFA programs. Due to current tax measure limitations in the State of Oregon, careful consultation with experienced, licensed bonding attorneys needs to be made if the City begins the process of obtaining bonding authority for the proposed wastewater system improvements project.

Project Implementation

The City of Union needs to perform the following action items and implementation steps to implement the proposed wastewater system improvements project. The steps outlined are general in nature and include the major steps that need to be undertaken.

Action Items

1. The City needs to consult with IFA and set up a "One Stop" meeting to initiate funding discussions.

2. The City of Union's charter, Chapter XI, regulates financing of the sewage disposal system and limits indebtedness. To successfully fund a wastewater system improvements project, the City will need to maintain good communications with City residents. A bond election may also be necessary. Once a debt mechanism has been selected (revenue bond or general obligation bond), a bonding attorney should be consulted and the appropriate resolution paperwork should be prepared and considered for implementation.

3. The City will need to hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for the required sewer rate increase.

Implementation Steps

Should the City wish to proceed with a wastewater system improvements project, the following plan outlines the key steps the City would need to undertake to proceed with project implementation.

	ITEM	Completion Date
1.	Initiate funding discussions with DEQ, IFA, RD, and other appropriate funding agencies.	Spring 2015
2.	Consult with IFA and attend a "One Stop" meeting with funding agencies.	Summer 2015
3.	Hold public information meetings.	Summer 2015/Fall 2015
4.	Public vote authorizing additional indebtedness.	Fall 2015
5.	Prepare and submit appropriate funding applications.	Winter 2015
6.	Complete and submit the necessary Environmental Report.	Winter 2016
7.	Finalize landowner agreement for land application.	Winter 2016
8.	Finalize project funding.	Spring 2016
9.	Complete project design.	Winter 2017/Spring 2018
10.	Bid and award construction contract.	Spring 2018
11.	Complete project construction.	Spring/Summer 2018
12.	Close out project.	Fall 2018/Spring 2019*

** Additional construction time may be needed for inclement weather.*

The key to implementing part or all of the wastewater system improvements project, as outlined in this chapter, is the ability of the City to acquire low interest loans. The City will have to work closely with its citizens to inform them of the system needs and the necessity for increased sewer user costs. Depending on the scope of improvements and the ultimate funding package selected, the City may need to plan on average user costs being in the range of approximately $58 to $66 per month, or annual property taxes increasing to approximately $286 to $388 per $100,000 of tax assessed value (or some combination of the two).

Wastewater system improvements as outlined in this WWFP will provide the City with a reliable, quality wastewater system that would meet the needs of the City for many years to come. The upgraded treatment facility would provide safer, more reliable operation and compliance with present and anticipated ammonia and temperature requirements.

CITY OF
UNION, OREGON

HISTORICAL SEWER SYSTEM FUNDS

Fiscal Year	Total Revenue[1]	Personnel Services	Materials and Services	Capital Outlay	Transfers to Reserve	Total O&M Expenditures	Annual Debt Service[2]	Transfer to Sewer Debt Service[3]	Total Expenditures	Net Operating Income[4]
2007-08	$409,783	$100,584	$116,819	$0	$0	$217,403	$145,728	$0	$363,131	$46,652
2008-09	$424,740	$104,990	$101,477	$0	$0	$206,467	$144,000	$0	$350,467	$74,273
2009-10	$439,341	$104,495	$119,560	$0	$100,000	$324,055	$144,000	$0	$468,055	($28,714)
2010-11	$452,539	$113,686	$116,307	$0	$14,800	$244,793	$144,000	$0	$388,793	$63,746
2011-12	$473,841	$124,651	$133,081	$82,954	$35,000	$375,686	$142,887	$12,500	$531,073	($57,232)
2012-13	$491,501	$132,521	$138,390	$143,698	$10,000	$424,609	$142,887	$12,500	$579,996	($88,495)
2013-14[5]	$477,700	$291,464	$388,536	$334,000	$64,000	$1,078,000	$147,000	$0	$1,225,000	($747,300)
2014-15[5]	$492,200	$320,690	$315,185	$322,000	$14,000	$971,875	$144,300	$0	$1,116,175	($623,975)

1 Total Revenue includes receipts from sewer use fees and labs conducted for nearby wastewater treatment facilities.

2 In the 2008-09 and 2009-10 fiscal years the Annual Debt Service was transferred to the Sewer Debt Service account, but in 2010-11 the Sewer Revenue bond was transferred to the Sewer Department account where it is now paid. For the purposes of this WWFP, it is shown under Annual Debt Service. Approximately an additional $13,500 of debt service is paid by property tax and bond interest under the Sewer Debt Service account.

3 Transferred to the Sewer Debt Service account that receives property tax and bond interest revenue.

4 Parentheses indicate a deficit in net operating income.

5 Approved budget, not historical data.

O&M = operation and maintenance

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CITY OF
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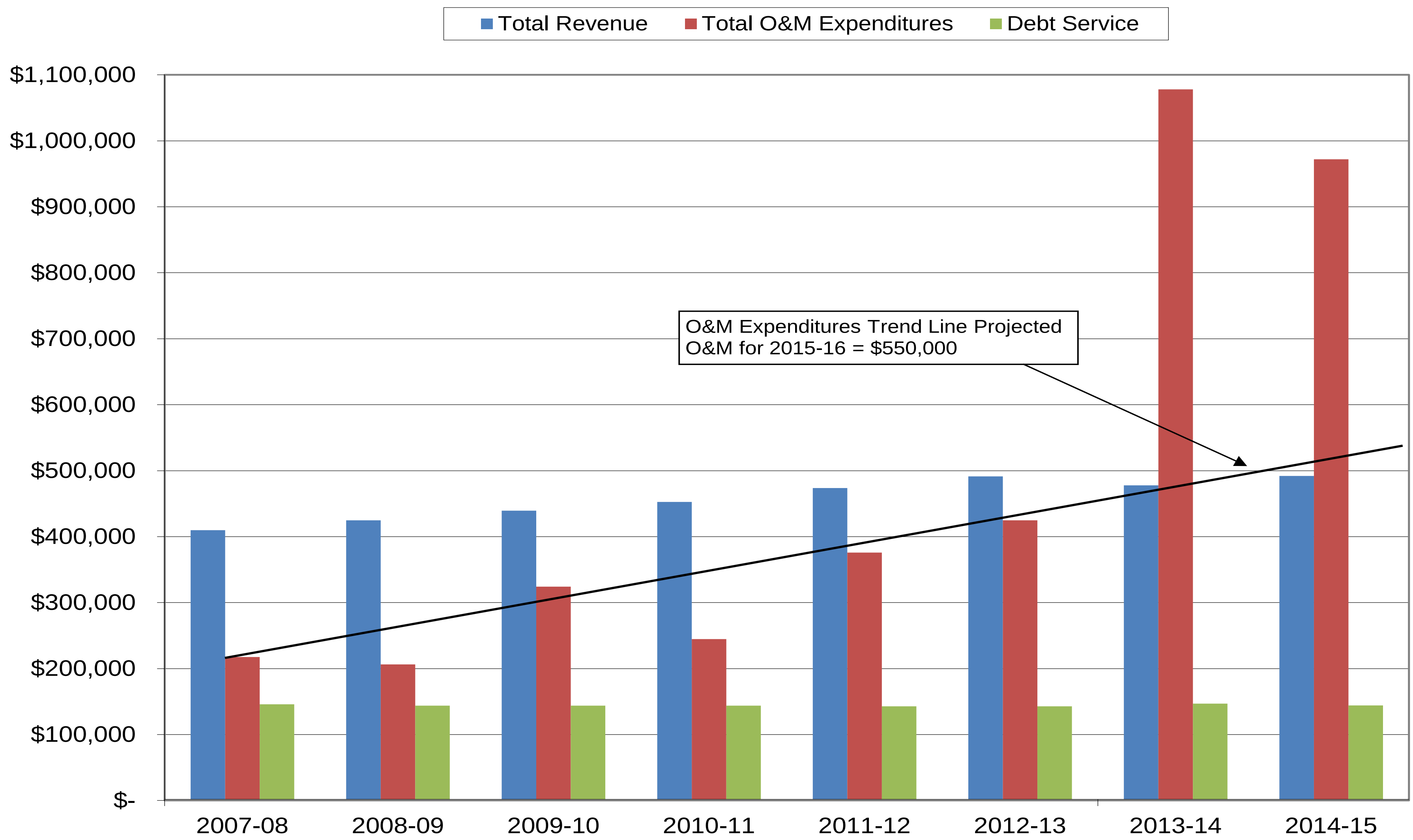
WASTEWATER FACILITIES PLAN
HISTORICAL SEWER SYSTEM FUNDS

FIGURE 7-1



Note: The data shown for the 2013-14 and 2014-15 budget years reflect the approved budget, not historical data.

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CITY OF
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WASTEWATER FACILITIES PLAN

HISTORICAL AND PROJECTED SEWER BUDGET

FIGURE
7-2

Preliminary Sewer Rate Analysis
for Loan Capacity

Rates		Expenditures				Net Annual Funds (Revenue Less	Annual Loan Payment (Net Annual Funds Less 10%	CWSRF Funds				Rural Development Funds	
								30-Year Bond Purchase[3]		20-Year Design/Construction Loan[4]		40-Year Design/Construction Loan[5]	
Average Monthly Residential	Annual Revenue[1]	Estimated O&M Costs[2]	Estimated Replacement Costs	Approximate Existing Debt Service	Total Expenditures			Loan Capacity	Estimated Interest Paid	Loan Capacity	Estimated Interest Paid	Loan Capacity	Estimated Interest Paid
$ 40	$ 479,280	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 9,280	$ 8,352	$ 201,414	$ 76,986	$ 148,427	$ 37,173	$ 185,485	$ 148,595
$ 41	$ 491,496	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 21,496	$ 19,346	$ 466,550	$ 178,330	$ 343,812	$ 86,108	$ 429,653	$ 344,203
$ 42	$ 503,712	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 33,712	$ 30,341	$ 731,687	$ 279,673	$ 539,198	$ 135,042	$ 673,822	$ 539,810
$ 43	$ 515,928	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 45,928	$ 41,335	$ 996,824	$ 381,016	$ 734,583	$ 183,977	$ 917,990	$ 735,418
$ 44	$ 528,144	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 58,144	$ 52,330	$ 1,261,961	$ 482,359	$ 929,969	$ 232,911	$ 1,162,158	$ 931,026
$ 45	$ 540,360	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 70,360	$ 63,324	$ 1,527,098	$ 583,702	$ 1,125,355	$ 281,845	$ 1,406,327	$ 1,126,633
$ 46	$ 552,576	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 82,576	$ 74,318	$ 1,792,234	$ 685,046	$ 1,320,740	$ 330,780	$ 1,650,495	$ 1,322,241
$ 47	$ 564,792	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 94,792	$ 85,313	$ 2,057,371	$ 786,389	$ 1,516,126	$ 379,714	$ 1,894,663	$ 1,517,849
$ 48	$ 577,008	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 107,008	$ 96,307	$ 2,322,508	$ 887,732	$ 1,711,512	$ 428,648	$ 2,138,832	$ 1,713,456
$ 49	$ 589,224	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 119,224	$ 107,302	$ 2,587,645	$ 989,075	$ 1,906,897	$ 477,583	$ 2,383,000	$ 1,909,064
$ 50	$ 601,440	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 131,440	$ 118,296	$ 2,852,782	$ 1,090,418	$ 2,102,283	$ 526,517	$ 2,627,168	$ 2,104,672
$ 51	$ 613,656	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 143,656	$ 129,290	$ 3,117,918	$ 1,191,762	$ 2,297,669	$ 575,451	$ 2,871,337	$ 2,300,279
$ 52	$ 625,872	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 155,872	$ 140,285	$ 3,383,055	$ 1,293,105	$ 2,493,054	$ 624,386	$ 3,115,505	$ 2,495,887
$ 53	$ 638,088	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 168,088	$ 151,279	$ 3,648,192	$ 1,394,448	$ 2,688,440	$ 673,320	$ 3,359,674	$ 2,691,494
$ 54	$ 650,304	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 180,304	$ 162,274	$ 3,913,329	$ 1,495,791	$ 2,883,825	$ 722,255	$ 3,603,842	$ 2,887,102
$ 55	$ 662,520	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 192,520	$ 173,268	$ 4,178,466	$ 1,597,134	$ 3,079,211	$ 771,189	$ 3,848,010	$ 3,082,710
$ 56	$ 674,736	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 204,736	$ 184,262	$ 4,443,602	$ 1,698,478	$ 3,274,597	$ 820,123	$ 4,092,179	$ 3,278,317
$ 57	$ 686,952	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 216,952	$ 195,257	$ 4,708,739	$ 1,799,821	$ 3,469,982	$ 869,058	$ 4,336,347	$ 3,473,925
$ 58	$ 699,168	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 229,168	$ 206,251	$ 4,973,876	$ 1,901,164	$ 3,665,368	$ 917,992	$ 4,580,515	$ 3,669,533
$ 59	$ 711,384	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 241,384	$ 217,246	$ 5,239,013	$ 2,002,507	$ 3,860,754	$ 966,926	$ 4,824,684	$ 3,865,140
$ 60	$ 723,600	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 253,600	$ 228,240	$ 5,504,150	$ 2,103,850	$ 4,056,139	$ 1,015,861	$ 5,068,852	$ 4,060,748
$ 61	$ 735,816	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 265,816	$ 239,234	$ 5,769,286	$ 2,205,194	$ 4,251,525	$ 1,064,795	$ 5,313,020	$ 4,256,356
$ 62	$ 748,032	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 278,032	$ 250,229	$ 6,034,423	$ 2,306,537	$ 4,446,911	$ 1,113,729	$ 5,557,189	$ 4,451,963
$ 63	$ 760,248	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 290,248	$ 261,223	$ 6,299,560	$ 2,407,880	$ 4,642,296	$ 1,162,664	$ 5,801,357	$ 4,647,571
$ 64	$ 772,464	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 302,464	$ 272,218	$ 6,564,697	$ 2,509,223	$ 4,837,682	$ 1,211,598	$ 6,045,526	$ 4,843,178
$ 65	$ 784,680	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 314,680	$ 283,212	$ 6,829,834	$ 2,610,566	$ 5,033,067	$ 1,260,533	$ 6,289,694	$ 5,038,786
$ 66	$ 796,896	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 326,896	$ 294,206	$ 7,094,970	$ 2,711,910	$ 5,228,453	$ 1,309,467	$ 6,533,862	$ 5,234,394
$ 67	$ 809,112	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 339,112	$ 305,201	$ 7,360,107	$ 2,813,253	$ 5,423,839	$ 1,358,401	$ 6,778,031	$ 5,430,001
$ 68	$ 821,328	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 351,328	$ 316,195	$ 7,625,244	$ 2,914,596	$ 5,619,224	$ 1,407,336	$ 7,022,199	$ 5,625,609
$ 69	$ 833,544	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 363,544	$ 327,190	$ 7,890,381	$ 3,015,939	$ 5,814,610	$ 1,456,270	$ 7,266,367	$ 5,821,217
$ 70	$ 845,760	$ 300,000	$ 25,000	$ 145,000	$ 470,000	$ 375,760	$ 338,184	$ 8,155,518	$ 3,117,282	$ 6,009,996	$ 1,505,204	$ 7,510,536	$ 6,016,824

[1] Revenue = (898R + 72R+((48R-$16.25)))x 12 months
[R = Residential/Commercial Rate, $16.25 is the reduction for Vacation/Disconnection Accounts]

[2] Projected costs for year 2018.

[3] This column applies to the loan portion of Scenario A, 30-year bond purchase with an interest rate of 2.23 percent.

[4] This column applies to the loan portion of Scenario B, 20-year design/construction loan with an interest rate of 2.23 percent.

[5] This column applies to the loan portion of Scenario C, 40-year design/construction loan with an interest rate of 3.25 percent.

anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
PRELIMINARY SEWER RATE ANALYSIS FOR LOAN CAPACITY

FIGURE
7-3

PRELIMINARY PROPERTY TAX BONDING CAPACITY ANALYSIS

Typical CWSRF Loan

Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Annual Tax Increase for a $100,000 Home	
					Monthly	Annual
$1,000,000	2.23%	30 Yrs	$46,074	$0.56	$4.67	$56.00
$2,000,000	2.23%	30 Yrs	$92,149	$1.11	$9.25	$111.00
$3,000,000	2.23%	30 Yrs	$138,223	$1.67	$13.92	$167.00
$4,000,000	2.23%	30 Yrs	$184,297	$2.22	$18.50	$222.00
$5,000,000	2.23%	30 Yrs	$230,372	$2.78	$23.17	$278.00
$6,000,000	2.23%	30 Yrs	$276,446	$3.34	$27.83	$334.00
$7,000,000	2.23%	30 Yrs	$322,520	$3.89	$32.42	$389.00
$8,000,000	2.23%	30 Yrs	$368,595	$4.45	$37.08	$445.00
$9,000,000	2.23%	30 Yrs	$414,669	$5.00	$41.67	$500.00

Typical CWSRF Loan

Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Annual Tax Increase for a $100,000 Home	
					Monthly	Annual
$1,000,000	2.23%	20 Yrs	$62,523	$0.75	$6.25	$75.00
$2,000,000	2.23%	20 Yrs	$125,045	$1.51	$12.58	$151.00
$3,000,000	2.23%	20 Yrs	$187,568	$2.26	$18.83	$226.00
$4,000,000	2.23%	20 Yrs	$250,090	$3.02	$25.17	$302.00
$5,000,000	2.23%	20 Yrs	$312,613	$3.77	$31.42	$377.00
$6,000,000	2.23%	20 Yrs	$375,135	$4.53	$37.75	$453.00
$7,000,000	2.23%	20 Yrs	$437,658	$5.28	$44.00	$528.00
$8,000,000	2.23%	20 Yrs	$500,180	$6.04	$50.33	$604.00
$9,000,000	2.23%	20 Yrs	$562,703	$6.79	$56.58	$679.00

Typical RD Loan

Loan Amount	Interest Rate[1]	Loan Period	Estimated Annual Payment	Estimated Annual Tax Rate Increase per $1,000[2]	Estimated Annual Tax Increase for a $100,000 Home	
					Monthly	Annual
$1,000,000	3.25%	40 Yrs	$45,028	$0.54	$4.50	$54.00
$2,000,000	3.25%	40 Yrs	$90,056	$1.09	$9.08	$109.00
$3,000,000	3.25%	40 Yrs	$135,084	$1.63	$13.58	$163.00
$4,000,000	3.25%	40 Yrs	$180,112	$2.17	$18.08	$217.00
$5,000,000	3.25%	40 Yrs	$225,140	$2.72	$22.67	$272.00
$6,000,000	3.25%	40 Yrs	$270,168	$3.26	$27.17	$326.00
$7,000,000	3.25%	40 Yrs	$315,196	$3.80	$31.67	$380.00
$8,000,000	3.25%	40 Yrs	$360,224	$4.35	$36.25	$435.00
$9,000,000	3.25%	40 Yrs	$405,251	$4.89	$40.75	$489.00

1 Actual loan interest rates could vary.

2 The annual tax rate increase is based on the City of Union's 2013-14 assessed valuation of $82,851,264. It was also assumed that 100 percent of taxes would be collected. Typically, a small percentage of taxes are not paid, which would require the estimated tax rate to be increased slightly higher than what is shown herein.

CWSRF = Clean Water State Revolving Fund
RD = Rural Development

anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILTIES PLAN
PRELIMINARY PROPERTY TAX
BONDING CAPACITY ANALYSIS

FIGURE
7-4

Appendices Table of Contents

APPENDIX A
Catherine Creek Flows

OREGON

Water Resources Department

STATISTICAL SUMMARY

CATHERINE CR AT UNION, OR
Gaging Station Number 13320300

Gaging Station Information

State	OREGON	County	UNION
Basin	GRANDE RONDE	Hydrologic Unit	17060104
Latitude	45° 12′ 42.89″ * *	Longitude	-117° 52′ 32.43″ * *
T-R-S-QQ	4.00S-39.00E-13-SE-SE	* North American Datum 1983	
Period of Record	10/01/1996 - 09/30/2012	Complete WYs	15
Area	111.00 square miles	Elevation	2760.00 feet

Download type Tab-Delimited Text Download Report

Calculations Based on the Period: 10/01/1996 - 09/30/2012

Average Discharge: 103 cfs 12.60 in/yr 74620 acre-ft/yr

Monthly and Annual Statistics

Based on Mean Daily Discharge
Streamflows in Cubic Feet per Second

Month	Count	Mean	Minimum	Min Year	Maximum	Max Year	Std Dev	% Ann Runoff
10	16	16.6	5.8	2003	26	2001	5.69	1.33
11	16	30.9	11	2003	48	2007	11.0	2.41
12	15	33.1	20	2001	51	2000	10.8	2.66
1	15	47.0	22	2004	122	2011	28.6	3.79
2	15	49.1	25	2001	83	1997	17.1	3.60
3	16	90.7	44	2008	148	2004	31.6	7.30
4	16	238	94	2008	380	1997	87.1	18.6
5	16	407	191	2007	748	1998	143	32.8
6	16	286	61	2001	694	2011	166	22.3
7	16	52.8	2.9	2007	239	2011	55.5	4.25
8	16	6.60	0.61	2001	25	2011	6.71	0.53
9	16	6.79	1.1	1999	16	2004	4.84	0.53
Annual	15	103	55	2001	183	2011	33.0	100

Flow Duration Statistics

Based on Mean Daily Discharge

Discharge Which was Equaled or Exceeded for the Indicated Percent of the Time

Month	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	Count
10	4.4	5.7	7.1	8.1	9.0	11	14	16	18	21	22	24	25	26	31	496
11	10	14	16	18	19	21	24	27	30	34	36	38	40	46	62	480
12	14	17	18	19	20	22	24	27	32	37	40	45	50	57	69	469
1	19	21	23	25	26	28	32	35	40	45	49	54	59	73	107	466
2	25	27	29	30	32	34	37	40	45	56	64	71	76	83	96	425
3	32	36	40	44	48	51	57	64	82	109	121	131	148	174	221	496
4	67	82	94	107	119	128	157	196	235	281	309	340	389	460	593	480
5	171	203	217	230	245	264	299	333	381	444	491	560	633	728	884	496
6	50	73	89	108	130	155	193	238	295	358	393	442	491	571	681	480
7	1.7	3.3	4.7	6.3	8.3	11	17	25	39	58	69	81	101	130	178	496
8	0.38	0.72	1.1	1.3	1.6	1.9	2.5	3.2	4.0	5.7	6.9	9.6	13	17	24	496
9	0.52	0.79	1.1	1.5	1.9	2.3	3.3	4.9	6.8	8.8	10	11	13	17	22	480
Annual	1.8	3.9	7.0	12	16	20	27	37	52	88	123	173	236	326	479	5760

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Appendix B
NPDES Permit

Expiration Date: October 31, 2009
Permit Number: 101624
File Number: 90800

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Eastern Region - Pendleton Office
700 SE Emigrant, Suite 330, Pendleton, OR 97801
Telephone: (541) 276-4063

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

City of Union
P.O. Box 529
Union, Oregon 97883

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 16.8
Reclaimed Water Reuse	002	

FACILITY TYPE AND LOCATION:

Rotating & Submerged Biological Contactors
Wastewater Treatment Plant
West of 10th Street
Union

Treatment System Class: Level II
Collection System Class: Level II

RECEIVING STREAM INFORMATION:

Basin: Grande Ronde
Sub-Basin: Upper Grande Ronde

Receiving Stream: Catherine Creek
LLID: 1178722453139 RM 16.8 D
County: Union

EPA REFERENCE NO: OR-002993-9

Issued in response to Application No. 984527 received May 1, 2003.

This permit is issued based on the land use findings in the permit record.

D. Mitch Wolgamott, Water Quality Manager
Eastern Region

November 24, 2004
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 and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Page

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Treated Effluent Outfall 001

(1) October 1 – June 30 when flow in Catherine Creek is 17 cfs or greater:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily Maximum lbs
BOD_5	30 mg/L	45 mg/L	91	140	180
TSS	30 mg/L	45 mg/L	91	140	180

* The average dry weather design flow to the facility equals 0.365 MGD. Mass load limits are based upon this design flow to the facility.

(2)

Other parameters (year-round)	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 ml monthly geometric mean. No single sample shall exceed 406 organisms per 100 ml. (See Note 1)
pH	Shall be within the range of 6.0 - 9.0
BOD_5 and TSS Removal Efficiency	Shall not be less than 85% monthly average for BOD_5 and 85% monthly for TSS.
Total chlorine residual	Shall not exceed 0.07 mg/l daily maximum or 0.03 mg/l monthly average
Maximum Daily Temperature	October 1 through June 15 When the background creek temperature is equal to or greater than 12.8°C (55°F): 1. the effluent temperature does not exceed 14°C (57.2°F), and the creek flow is 17 cfs or more, then discharge is allowed; or 2. the effluent temperature does not exceed 12.94°C (55.3°F) at the edge of the mixing zone, then discharge is allowed. (See Notes 2 and 3) When the background creek temperature is less than 12.8°C (55°F): 1. the effluent temperature is equal to or less than the creek temperature, then discharge is allowed; or 2. discharge is allowed if either of the following are met:

Other parameters (year-round)	Limitations
	a. If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use is 10°C to 12.8°C (50°F to 55°F), the allowable increase is 0.5°C (0.9°F) above the 60 day average at the end of the mixing zone. (See Notes 4 and 5) b. If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use is less than 10°C (50°F), the allowable increase is 1.0°C (1.8°F) above the 60 day average at the end of the mixing zone. (See Notes 4 and 6) June 16 through June 30 When the background creek temperature is equal to or greater than 16°C (60.8°F): 1. the effluent temperature does not exceed 17°C (62.6°F), and the creek flow is 17 cfs or more, then discharge is allowed; or 2. the effluent temperature does not exceed 16.14°C (61.05°F) at the edge of the mixing zone, then discharge is allowed. (See Notes 2 and 3) When the background creek temperature is less than 16°C (60.8°F): 1. the effluent temperature is equal to or less than the creek temperature, then discharge is allowed; or 2. the effluent temperature does not exceed 16.14°C (61.05°F) at the edge of the mixing zone, then discharge is allowed. (See Notes 2 & 3)

(3) Except as provided for in OAR 340-045-0080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-041 except in the following defined mixing zone:

The allowable mixing zone is that portion of Catherine Creek one hundred and fifty (150) feet downstream from the outfall. The Zone of Immediate Dilution (ZID) shall be defined as that portion of the allowable mixing zone that is within fifteen (15) feet of the point of discharge.

b. Reclaimed Wastewater Outfall 002

(1) No discharge to state waters is permitted. All reclaimed water shall be distributed on land, for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices so as to prevent:

a. Prolonged ponding of treated reclaimed 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.

(2) Prior to land application of the reclaimed water, it shall receive at least level II treatment as defined in OAR 340-055 to:

Reduce Total Coliform to 240 organisms per 100 mL in two consecutive samples, and a 7-day median of 23 organisms per 100 mL.

(3) Irrigation shall conform to the irrigation management plan approved by the Department.

NOTES:

1/ If a single sample exceeds 406 organisms per 100 mL, then five consecutive re-samples may be taken at no greater than four-hour intervals beginning within 48 hours after the original sample was taken. If the geometric mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.

2/ Catherine Creek and effluent temperatures shall be assessed as the 7-day running averages of the daily maximums. The temperature of the effluent resulting from the calculation using the formula provided shall be applied to the discharge occurring during the 24 hour period following when the creek's temperature reading was taken.

3/ $Te = Tr_7 + 0.14[(Qe+0.25Qr) \div Qe]$

Te = effluent temperature in °C
Qr = creek flow volume in cfs
Qe = effluent flow volume in cfs
Tr_7 = creek temperature in °C

4/ The rolling 60 day average maximum ambient water temperature is calculated by averaging the sums of the daily maximum temperatures during the spawning period beginning on October 1. Do not include temperature data from dates before or after the spawning period. Consequently, the 60-day rolling average will not change during the first sixty days, and again during the last sixty days, of the spawning period.

5/ $Te = Tr_{60} + 0.5[(Qe+Qr) \div Qe]$

Te = effluent temperature in °C
Qr = creek flow volume in cfs
Qe = effluent flow volume in cfs
Tr_{60}= 60 day avg. creek temperature in °C

6/ $Te = Tr_{60} + 1.0[(Qe+Qr) \div Qe]$

Te = effluent temperature in °C
Qr = creek flow volume in cfs
Qe = effluent flow volume in cfs
Tr_{60}= 60 day avg. creek temperature in °C

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall 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 shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent - The facility influent sampling locations are taken at the headworks.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
BOD_5	Weekly	Composite 1/
TSS	Weekly	Composite 1/
pH	2/Week	Grab

b. Treated Effluent Outfall 001 (when discharging)

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
BOD_5	Weekly	Composite 1/ 2/
TSS	Weekly	Composite 1/ 2/
pH	2/Week	Grab 2/
E. coli	Weekly	Grab 2/ 3/
Pounds Discharged (BOD_5 and TSS)	Weekly	Calculation
Temperature, Daily Maximum	Daily	Grab 2/
Temperature, Average of Daily Maximums	Weekly	Calculation
Chlorine Residual	Daily	Grab 2/
Quantity Chlorine Used	Daily	Measurement
Average Percent Removed (BOD_5 and TSS)	Monthly	Measurement Calculation

5/ $Te = Tr_{60} + 0.5[(Qe+0.25Qr) \div Qe]$

Te = effluent temperature in °C
Qr = creek flow volume in cfs
Qe = effluent flow volume in cfs
Tr_{60}= 60 day avg. creek temperature in °C

6/ $Te = Tr_{60} + 1.0[(Qe+0.25Qr) \div Qe]$

Te = effluent temperature in °C
Qr = creek flow volume in cfs
Qe = effluent flow volume in cfs
Tr_{60}= 60 day avg. creek temperature in °C

See letter dated Feb. 22, 2007 for corrected permit pages.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall 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 shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent - The facility influent sampling locations are taken at the headworks.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
BOD_5	Weekly	Composite 1/
TSS	Weekly	Composite 1/
pH	2/Week	Grab

b. Treated Effluent Outfall 001 (when discharging)

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
BOD_5	Weekly	Composite 1/ 2/
TSS	Weekly	Composite 1/ 2/
pH	2/Week	Grab 2/
E. coli	Weekly	Grab 2/ 3/
Pounds Discharged (BOD_5 and TSS)	Weekly	Calculation
Temperature, Daily Maximum	Daily	Grab 2/
Temperature, Average of Daily Maximums	Weekly	Calculation
Chlorine Residual	Daily	Grab 2/
Quantity Chlorine Used	Daily	Measurement
Average Percent Removed (BOD_5 and TSS)	Monthly	Measurement Calculation

c. Reclaimed Water Outfall 002 (when discharging)

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Quantity Irrigated (inches/acre)	Monthly	Calculation
Area Applied	Daily	Record
TKN	Annually	Grab
NO2+NO3-N	Annually	Grab
Chlorine Residual	Daily	Grab 4/
Quantity Chlorine Used	Daily	Measurement
Total Coliform	Weekly	Grab 4/

d. Catherine Creek (when discharging from Outfall 001; see note 5/)

Item or Parameter	Minimum Frequency	Type of Sample
Stream Flow (above Outfall 001)	Daily	Measurement
Temperature, Daily Maximum	Daily	Measurement

e. Storage Pond Site

Item or Parameter	Minimum Frequency	Type of Sample
Perimeter Inspection 6/	Daily	Observation
Depth of Wastewater	Weekly	Measurement

NOTES:

1/ Composite samples shall consist of no less than 6 samples collected over a 24-hour period, and apportioned according to the volume of flow at the time of sampling.

2/ All effluent parameters shall be monitored at the end of the disinfection process.

3/ *E. coli* monitoring must be conducted according to any of the following test procedures as specified in **Standard Methods for the Examination of Water and Wastewater, 19th Edition**, or according to any test procedure that has been authorized and approved in writing by the Director or his authorized representative:

Method	Reference	Page	Method Number
mTEC agar, MF	Standard Methods, 19th Edition	9-28	9213 D
NA-MUG, MF	Standard Methods, 19th Edition	9-63	9222 G

Method	Reference	Page	Method Number
Chromogenic Substrate MPN	Standard Methods, 19th Edition	9-65	9223 B
Colilert QT	Idexx Laboratories, Inc		

4/ Chlorine residual and total coliform shall be measured in the wetwell located at the treatment facilities site.

5/ Reading to be taken from Oregon Water Resources Dept. flow gage and temperature measuring device upstream of the City. Daily maximum temperature shall be obtained.

6/ A perimeter inspection is a sight surveillance of the lagoon dikes looking for the presence of muskrats, gophers, ground hogs, and other rodents whose burrowing activities could threaten the structural integrity of the dike.

f. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Biosolids Analyses including: Total solids (% dry weight) Volatile Solids (% dry weight) pH (standard units) Biosolids nitrogen for: NH4-N; NO3-N; & TKN (% dry weight) Total phosphorus (% dry weight) Potassium (% dry weight) Biosolids trace pollutants for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se, & Zn (mg/kg)	Annually	Composite sample to be representative of the product to be land applied (See Note 7/ and 8/)
Record of % volatile solids reduction accomplished through stabilization	Annually	Calculation (See Note 9/)
Fecal coliform (per gram total solids- tons of biosolids dry weight basis)	Annually	Composite sample to be representative of the product to be land applied (See Notes 7/ and 8/)
Record of locations where biosolids are applied on each DEQ authorized land application site. (Site location maps are to be maintained at the treatment facility for review upon request by DEQ)	Each occurrence	Date, quantity (dry tons, gallons/cubic yards), and locations where biosolids were applied, recorded on site location map.

NOTES:

7/ Composite samples from each digester withdrawal line shall consist of at least 4 aliquots of equal volume collected over an 8 hour period and combined.

Inorganic pollutant monitoring shall be conducted according to **Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,** Second edition (1982) with Updates I and II and third Edition (1986) with Revision I.

8/ Composite samples from the drying bed shall be taken from reference areas in the bed pursuant to Test **Methods for Evaluating Solid Waste, Volume 2; Field Manual, Physical/Chemical Methods, November 1986, Third Edition, Chapter 9.**

Inorganic pollutant monitoring shall be conducted according to **Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,** Second edition (1982) with Updates I and II and third Edition (1986) with Revision I.

9/ Calculation of the % volatile solids reduction is to be based on comparison of a representative sample of total and volatile solids entering each digester (a weighted blend of the primary clarifier solids) and a representative composite sample of solids exiting each digester withdrawal line (as defined in Note 7/ above).

2. **Reporting Procedures**

a. Monitoring results shall be reported on Department approved forms. The reporting period is the calendar month. Reports must be submitted to the Department's Eastern Region Pendleton office by the 15th day of the following month.

b. State monitoring reports shall 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 shall also identify each system classification as found on page one of this permit.

c. Monitoring reports shall also include a record of all applicable equipment breakdowns and bypassing.

3. **Reclaimed Water Use Reporting**

By no later than April 2 of each year following completion and start-up of the reclaimed water use system, the permittee shall submit to the Department an annual report describing the effectiveness of the reclaimed water system to comply with the approved reclaimed water use plan, the rules of Division 55, and the limitations and conditions of this permit applicable to reuse of reclaimed water.

4. **Inflow/Infiltration Reduction Reporting**

An annual report shall be submitted to the Department by April 2 each year which describes in detail the wastewater collection repair and maintenance activities conducted in the previous year to reduce inflow and infiltration. The report shall also outline those I/I reduction activities planned for the current year.

5. **Biosolids Reporting**

An annual solids report shall be submitted to the Department by February 19 of each year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-050-0035(6)(a)-(e).

SCHEDULE C

Compliance Schedules and Conditions

1. By no later than **October 1, 2005**, the permittee shall submit to the Department an updated biosolids management plan in accordance with 40 CFR, Part 503 requirements and Oregon Administrative Rules (OAR) 340-050, "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage." Upon approval of the plan by the Department, the plan shall be implemented by the permittee. No substantial changes shall be made in the approved plan without written approval by the Department.

2. The permittee is expected to meet the compliance dates which 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 may revise a schedule of compliance if he/she determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in-plant control and quick and proper action in the event of a spill or accident.

2. All biosolids shall be managed in accordance with the current biosolids management plan approved by the Department and the site authorization letters issued by the Department. The biosolids management plan shall be kept current and remain on file with the permit or license. No substantial changes shall be made in solids management activities which significantly differ from operations specified under the approved plan without the prior written approval of the Department.

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

3. The permittee shall meet the requirements for use of reclaimed water under Division 55, including the following:

   a. All reclaimed water shall be managed in accordance with the approved Reclaimed Water Use Plan. No substantial changes shall be made in the plan without written approval of the Department.

   b. No reclaimed water shall be released by the permittee to another person, as defined in Oregon Revised Statute (ORS) 468.005, for use unless there is a valid contract between the permittee and that person that meets the requirements of Oregon Administrative Rule (OAR) 340-055-0015(9).

   c. The permittee shall notify the Department 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 Department offices are not open, the permittee shall report the incident of non-compliance to the Oregon Emergency Response System (Telephone Number 1-800-452-0311).

   d. No reclaimed water shall be made available to a person proposing to recycle unless the person certifies in writing that they have read and understand the provisions in these rules. This written certification shall be kept on file by the sewage treatment system owner and be made available to the Department for inspection.

4. The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification <u>and</u> grade level (equal to or greater) that corresponds with the classification (collection and /or treatment) of the system to be supervised as specified on page one of this permit.

   Note: A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the

permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.

b. The permittee's wastewater system may not be without supervision (as required by Special Condition 4 a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified in the proper classification <u>and</u> at grade level I or higher.

c. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

d. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program (see address on page one). This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

e. Upon written request, the Department may grant the permittee reasonable time, not to exceed 180 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 4 b. above.

5. The permittee shall notify the DEQ Region office (541) 276-4063, in accordance with the response times noted in the General Conditions of this permit, of any malfunction so corrective action can be coordinated between the permittee and the Department.

6. The permittee shall have in place an ongoing program to identify and reduce inflow and infiltration into the wastewater collection system.

7. The permittee shall not be required to perform a hydrogeologic characterization or groundwater monitoring during the term of this permit provided:

a. The facilities are operated in accordance with the permit conditions, and;

b. There are no adverse groundwater quality impacts (complaints or other indirect evidence) resulting from the facility's operation.

If warranted, at permit renewal the Department may evaluate the need for a full assessment of the facilities impact on groundwater quality.

8. Prior to increasing thermal load (flow or temperature) beyond the current permit limitations, the Permittee shall notify the Department and apply for and be issued a permit modification allowing the increase.

9. The Department may reopen the permit, if necessary, to include new or revised discharge limitations, monitoring or reporting requirements, compliance conditions and schedules, and special conditions.

NPDES GENERAL CONDITIONS
(SCHEDULE F)

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final *administrative action subject to judicial review.*

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. 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.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, 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. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information which must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 μg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids.

3. mg/L means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

6. MGD means million gallons per day.

7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.

8. FC means fecal coliform bacteria.

9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.

10. CBOD means five day carbonaceous biochemical oxygen demand.

11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.

13. Month means calendar month.

14. Week means a calendar week of Sunday through Saturday.

15. Total residual chlorine means combined chlorine forms plus free residual chlorine.

16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.

17. POTW means a publicly owned treatment works.

Appendix C
Excerpts from a Plain English Guide to the EPA Part 503 Biosolids Rule

Chapter 2

Land Application of Biosolids

What Is Land Application?

Land application is the application of biosolids to land to either condition the soil or to fertilize crops or other vegetation grown in the soil. Nearly half of the biosolids production in the United States is currently being used beneficially to improve soils. This guidance document categorizes the types of land that benefit from the application of biosolids (see Figure 2-1) as follows:

- agricultural land, forests, and reclamation sites—collectively called ***nonpublic contact sites*** (areas not frequently visited by the public); and
- public parks, plant nurseries, roadsides, golf courses, lawns, and home gardens—collectively called ***public contact sites*** (areas where people are likely to come into contact with biosolids applied to land). The Part 503 rule, however, does not regard lawns and home gardens as public contact sites, and fewer types of biosolids may be land applied to these sites (i.e., CPLR biosolids are not permitted on lawns and home gardens given the considerable difficulty of tracking cumulative levels of metals in biosolids applied to such sites).

Biosolids can be either applied to land in ***bulk*** or sold or given away in ***bags or other containers*** for land application (see Figure 2-2). The term ***biosolids in bulk*** refers to biosolids that are marketed or given to manufacturers of products that contain biosolids. The term ***biosolids in bags*** generally refers to biosolids in amounts that are bagged and generally marketed for use on smaller units of land such as lawns and home gardens.

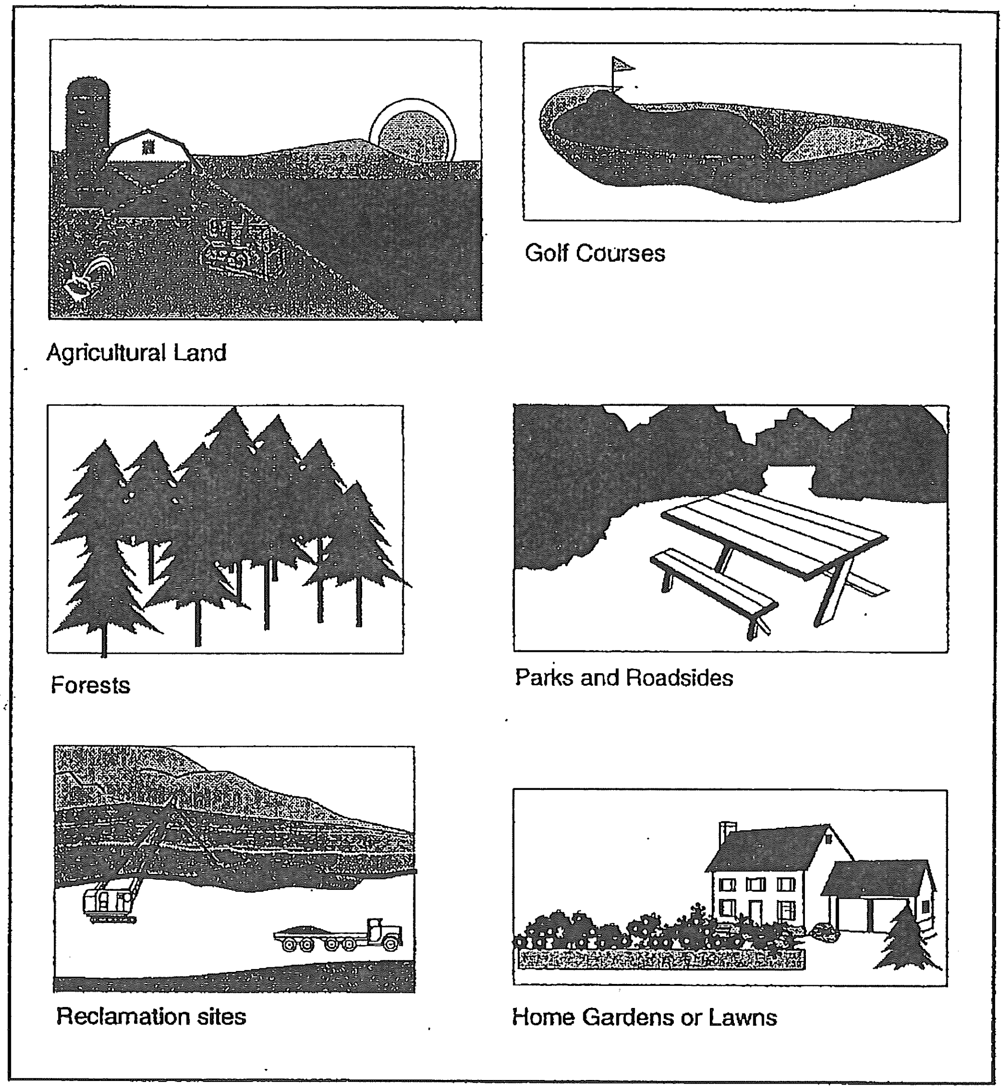


Figure 2-1. Biosolids can be beneficially land applied on agricultural land, forest land, reclamation sites, golf courses, public parks, roadsides, plant nurseries, and lawns and home gardens.

The term ***other containers*** is defined in the Part 503 rule as open or closed receptacles (e.g., buckets, boxes, or cartons) or vehicles with a load capacity of one metric ton or less. (Most pickup trucks as well as trailers pulled by an automobile would meet the regulatory definition of other containers.)

Biosolids are generally land applied using one of several techniques. The biosolids may be sprayed or spread on the soil surface and left on the surface (e.g., on pastures, range and forest land, or lawn). They also may be tilled (incorporated) into the soil after being surface applied or injected

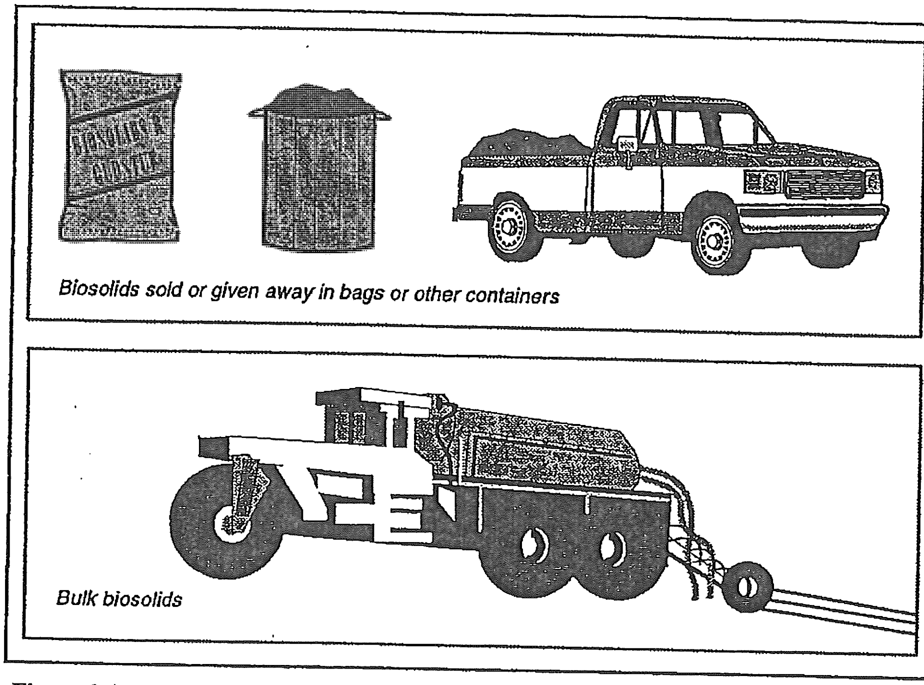


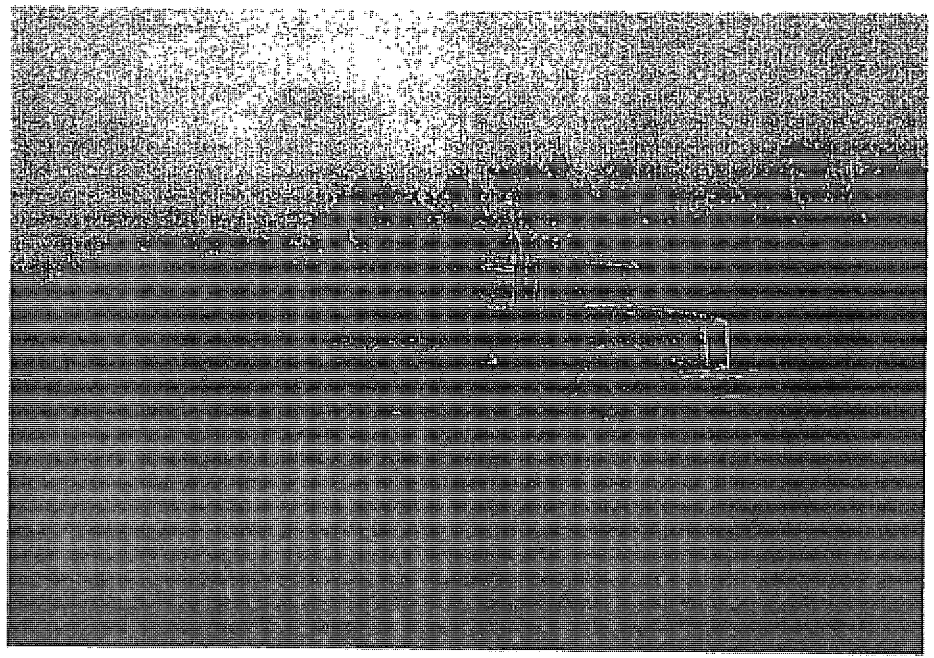
Figure 2-2. For application to the land, biosolids can be sold or given away in bags, in other containers, or they can be land applied in bulk form.

directly below the surface for producing row crops or other vegetation and for establishing lawns.

Biosolids in a liquid state can be applied using tractors, tank wagons, irrigation systems, or special application vehicles. Dewatered biosolids are typically applied to land using equipment similar to that used for applying limestone, animal manures, or commercial fertilizers. Both liquid and dewatered biosolids are applied to land with or without subsequent incorporation into the soil.

Because biosolids are typically treated before being land applied, their use poses a low degree of risk. This chapter discusses approaches for meeting the requirements of the Part 503 rule for the land application of biosolids.

The practice of growing crops or grazing animals on a biosolids surface disposal site, another form of beneficial use, is discussed in Chapter 3. This guidance document refers to this practice as ***dedicated beneficial use***. A permitting authority can allow crops to be grown on a surface disposal site and marketed or grazed if the owner/operator of the site shows that site-specific management practices are being used that will ensure protection of public health and the environment from any reasonably anticipated adverse effects of certain pollutants that can be present in biosolids.



Spreading finished biosolids product on Walt Disney World tree farm in Orlando, Florida.

To Whom the Land Application Requirements Apply

Different provisions of the Part 503 rule apply to the ***preparer*** and the ***applier*** of biosolids. The ***preparer*** of biosolids is defined as a person who either ***generates*** biosolids during the treatment of domestic sewage in a treatment works or who ***derives*** a material from biosolids (i.e., changes the quality of the biosolids prepared by a generator). Examples of materials derived from biosolids include biosolids treated by composting, pelletizing, or drying (to kill pathogens and reduce attractiveness to vectors), and mixtures of biosolids with other materials (e.g., biosolids blended with soil or fertilizer, which will usually lower pollutant concentrations). The ***applier*** is defined as the person who applies the biosolids to land. The responsibilities of preparers and appliers of biosolids under the Part 503 rule are summarized in Figure 2-8.

Landowners and leaseholders also have certain responsibilities. These are discussed at the end of this chapter.

Land Application Requirements

Biosolids applied to the land must meet risk-based pollutant limits specified in Part 503. Operational standards to control disease-causing organisms called pathogens and to reduce the attraction of vectors (e.g., flies, mosquitoes, and other potential disease-carrying organisms) to the biosolids must also be met. In addition, there are general requirements, management practices, and frequency of monitoring, recordkeeping, and reporting requirements that must be met. Each of these land application requirements is discussed below.

Pollutant Limits, Pathogen and Vector Attraction Reduction Requirements

1 All biosolids applied to the land must meet ***the ceiling concentrations for pollutants,*** listed in the first column of Table 2-1. The ceiling concentrations are the maximum concentration limits for 10 heavy metal

TABLE 2-1
Pollutant Limits

Pollutant	Ceiling Concentration Limits for All Biosolids Applied to Land (milligrams per kilogram)[a]	Pollutant Concentration Limits for EQ and PC Biosolids (milligrams per kilogram)[a]	Cumulative Pollutant Loading Rate Limits for CPLR Biosolids (kilograms per hectare)	Annual Pollutant Loading Rate Limits for APLR Biosolids (kilograms per hectare per 365-day period)
[illegible]	75	41	41	2.0
[illegible]	85	39	39	1.9
[illegible]	3,000	1,200	3,000	150
[illegible]	4,300	1,500	1,500	75
[illegible]	840	300	300	15
[illegible]	57	17	17	0.85
[illegible]	75	—	—	—
[illegible]	420	420	420	21
[illegible]	100	36	100	5.0
[illegible]	7,500	2,800	2,800	140
[illegible]	All biosolids that are land applied	Bulk biosolids and bagged biosolids[c]	Bulk biosolids	Bagged biosolids[c]
[illegible]	Table 1, Section 503.13	Table 3, Section 503.13	Table 2, Section 503.13	Table 4, Section 503.13

[a] Dry-weight basis

[b] As a result of the February 25, 1994, Amendment to the rule, the limits for molybdenum were deleted from the Part 503 rule pending EPA reconsideration.

[c] Bagged biosolids are sold or given away in a bag or other container.

pollutants in biosolids; specifically, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. If a limit for any one of the pollutants is exceeded, the biosolids cannot be applied to the land until such time that the ceiling concentration limits are no longer exceeded. The ceiling concentrations for pollutants are included in Part 503 to prevent the land application of biosolids with the highest levels of pollutants and to encourage pretreatment efforts that will result in lower levels of pollutants.

2 Biosolids applied to the land must also meet either pollutant concentration limits, cumulative pollutant loading rate limits, or annual pollutant loading rate limits for these same heavy metals.

3 Either ***Class A or Class B pathogen requirements*** (summarized in Table 2-5) ***and site restrictions*** (Figure 2-4) must be met before the biosolids can be land applied; the two classes differ depending on the level of pathogen reduction that has been obtained.

4 Finally, 1 of 10 options specified in Part 503 and summarized in Table 2-6 to achieve ***vector attraction reduction*** must be met when biosolids are applied to the land.

Options for Meeting Land Application Requirements

This guidance document groups the Part 503 requirements into four options for meeting pollutant limits and pathogen and vector attraction reduction operational standards when biosolids are applied to the land. The options include:

- the Exceptional Quality (EQ) Option
- the Pollutant Concentration (PC) Option
- the Cumulative Pollutant Loading Rate (CPLR) Option
- the Annual Pollutant Loading Rate (APLR) Option

It is very important to realize that each option is equally protective of public health and the environment; that is, EQ, PC, CPLR, and APLR biosolids used in accordance with the Part 503 rule are equally safe. This safety is ensured by the combination of pollutant limits and management practices imposed by each option.

Whichever option is chosen, at a minimum, the ceiling concentrations for pollutants (listed in Table 2-1) and the frequency of monitoring, reporting, and recordkeeping requirements (see Tables 2-7 and 2-8) must be met. The four options are summarized in Table 2-2, illustrated in Figure 2-3, and discussed in detail below.

Depending on the land application option under consideration, site restrictions (Figure 2-4), general requirements (Figure 2-8), and management practices (Figure 2-9) also apply. These additional restrictions,

TABLE 2-2
Options for Meeting Pollutant Limits and Pathogen and Vector Attraction Reduction Requirements for Land Application

Option*	Pollutant Limits	Pathogen Requirements	Vector Attraction Reduction Requirements
[illegible]	Bulk or bagged biosolids meet pollutant concentration limits in Table 2-1	Any 1 of the Class A requirements in Table 2-5	Any 1 of the requirements in options 1 through 8 in Table 2-6
[illegible]	Bulk biosolids meet pollutant concentration limits in Table 2-1	Any 1 of the Class B requirements in Table 2-5 and Figure 2-4	Any 1 of the 10 requirements in Table 2-6
		Any 1 of the Class A requirements in Table 2-5	Requirements 9 or 10 in Table 2-6
[illegible]	Bulk biosolids applied subject to cumulative pollutant loading rate (CPLR) limits in Table 2-1	Any 1 of the Class A or Class B requirements in Table 2-5 and Figure 2-4	Any 1 of the 10 requirements in Table 2-6
[illegible]	Bagged biosolids applied subject to annual pollutant loading rate (APLR) limits in Table 2-1	Any 1 of the Class A requirements in Table 2-5	Any 1 of the first 8 requirements in Table 2-6

* Each of these options also requires that the biosolids meet the ceiling concentrations for pollutants listed in Table 2-1, and that the frequency of monitoring requirements in Table 2-7 and recordkeeping and reporting requirements in Table 2-8 be met. In addition, the general requirements in Figure 2-8 and the management practices in Figure 2-9 have to be met when biosolids are land applied (except for EQ biosolids).

requirements, and practices are summarized in Tables 2-3 and 2-4 and discussed in greater detail at the end of this chapter.

Rather than presenting the four options in the order described in the Part 503 rule, this document presents them in order of increasing regulatory requirements. Table 2-3 graphically displays the level of required regulatory control for each option. The types of land onto which these different biosolids may be applied are listed in Table 2-4.

Option 1: Exceptional Quality (EQ) Biosolids

For biosolids to qualify under the EQ option, the following requirements must be met:

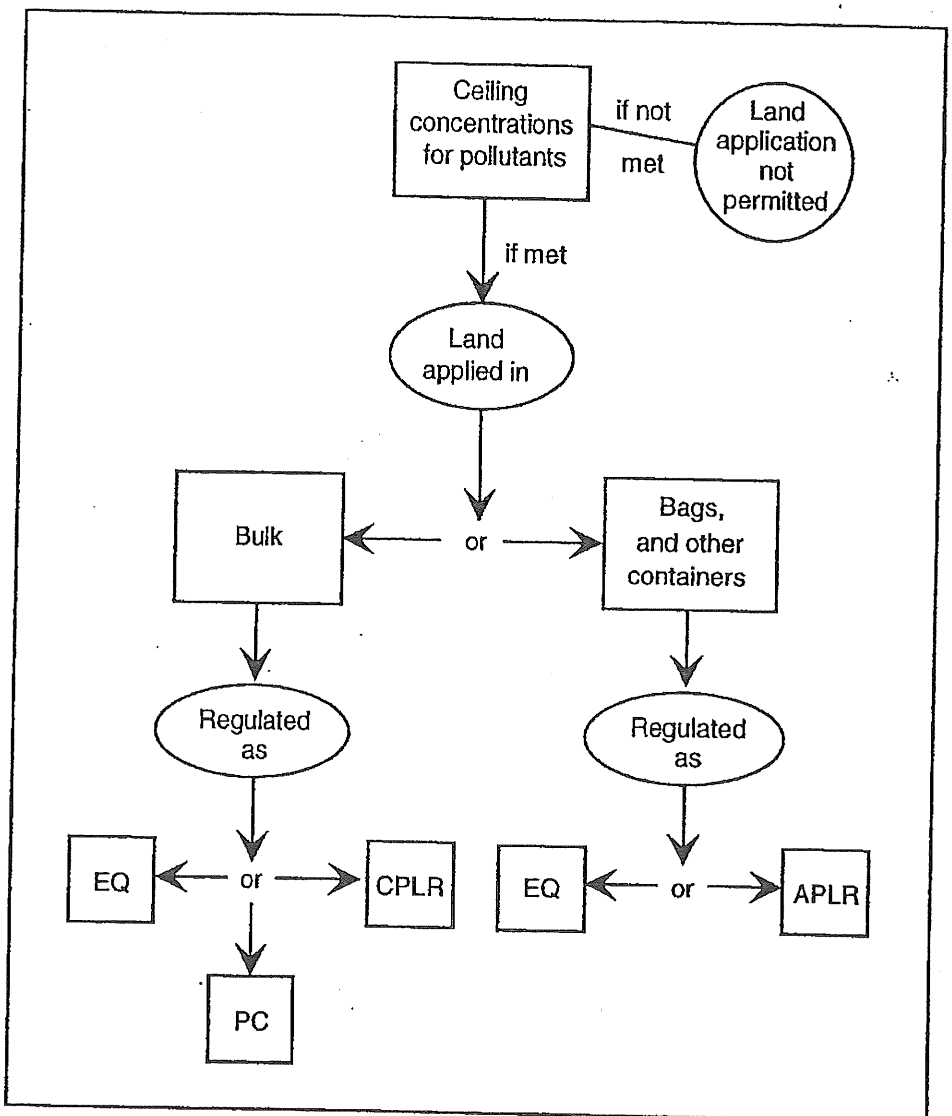
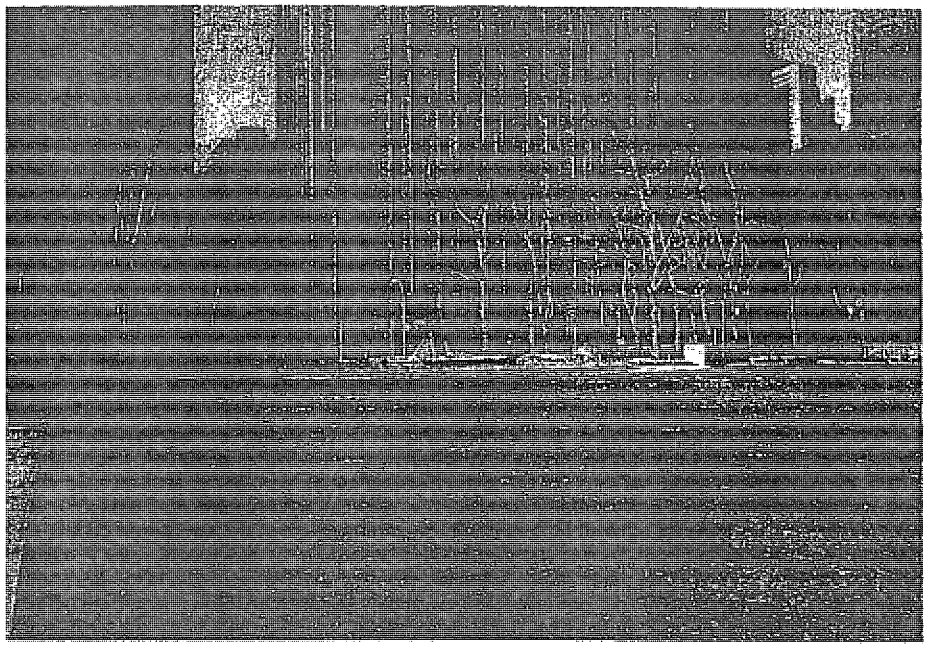


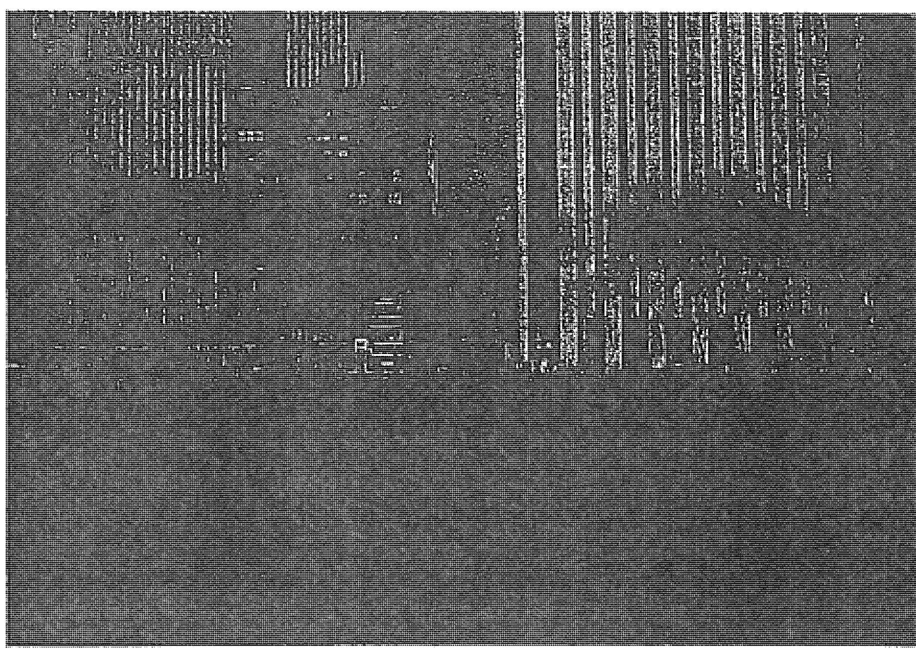
Figure 2-3. Options for meeting certain Part 503 land application requirements

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.
- The pollutant concentration limits in Table 2-1 may not be exceeded.
- One of the Class A pathogen requirements in Table 2-5 must be met.
- One of the first eight vector attraction reduction options in Table 2-6 must be achieved.

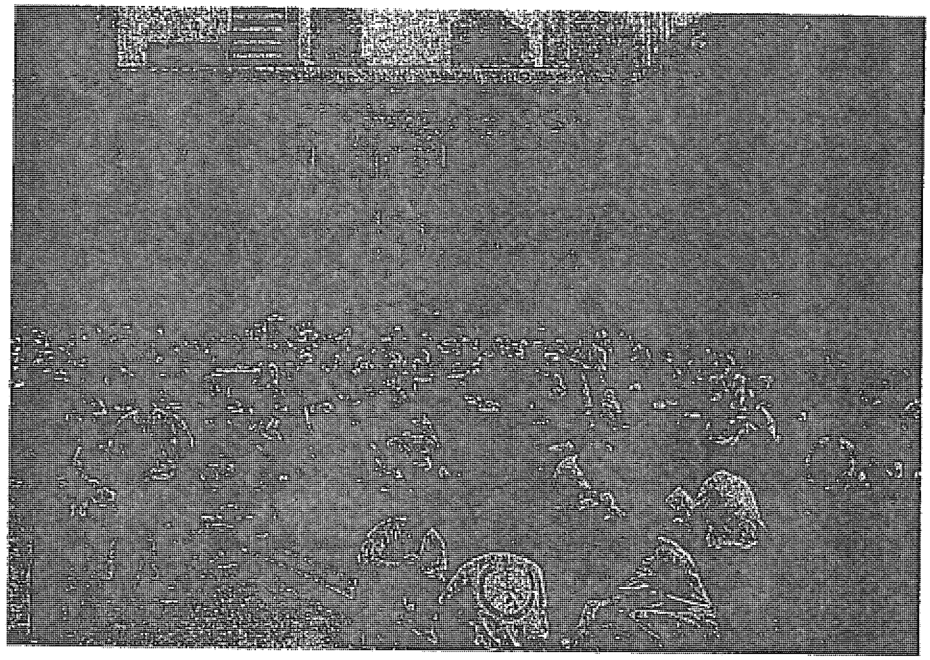
Methods that typically achieve the pathogen and vector attraction reduction requirements and allow biosolids to meet EQ requirements include alkaline stabilization, composting, and heat drying. The Part 503 frequency of



Use of biosolids on parkland in Manhattan, New York. Biosolids compost is piled on barren site to be spread for soil conditioning.



Use of biosolids on parkland in Manhattan, New York (continued). One month after spreading of biosolids, the turf is vigorously established.



Use of biosolids on parkland in Manhattan, New York (continued). Different view showing public enjoying the park.

monitoring, recordkeeping, and reporting requirements (see Tables 2-7 and 2-8) also must be met for EQ biosolids.

Once biosolids meet EQ requirements, they are not subject to the land application general requirements and management practices in Part 503, with one possible exception—if the Regional Administrator or the State Director determines, on a case-by-case basis, that such requirements are necessary to protect public health and the environment (this exception applies only to bulk biosolids). Once biosolids have been established as meeting EQ requirements, whether in bulk form or in bags or other containers, they can generally be applied as freely as any other fertilizer or soil amendment to any type of land. While not required by the Part 503 rule, EQ biosolids should be applied at a rate that does not exceed the agronomic rate that supplies the nitrogen needs of the plants being grown, just as for any other commercial fertilizer or soil amending material that contains nitrogen.

Option 2: Pollutant Concentration (PC) Biosolids

To qualify under the PC option, biosolids must meet several requirements, including:

- The ceiling concentration for pollutants in Table 2-1 may not be exceeded.

TABLE 2-3
Summary of Regulatory Requirements for Different Types of Biosolids

Type of Biosolids and Class of Pathogens	Meet Ceiling Concentration for Pollutants	Meet Pollutant Concentration Limits	Site Restrictions	General Requirements and Management Practices	Track Added Pollutants
EQ Bag or Bulk Class A				No	
PC Bulk Only Class A[a]			No		No
PC Bulk Only Class B					No
CPLR Bulk Only Class A		No	No		
CPLR Bulk Only Class B		No			
APLR Bag Only Class A		No	No		Yes[c]

[a] Biosolids meeting Class A pathogen reduction requirements but following options 9 or 10 vector attraction reduction requirements are also considered PC biosolids.

[b] The only general and management practice requirement that must be met is a labeling requirement.

[c] The amount of biosolids that can be applied to a site during the year must be consistent with the annual whole sludge application rate (AWSAR) for the biosolids that does not cause any of the ALPRs to be exceeded.

Note: See Chapter Two text for explanation of biosolids types.

- The pollutant concentration limits in Table 2-1 may not be exceeded (same requirement as for EQ biosolids, discussed above).
- One of three Class B pathogen requirements must be met (see Table 2-5), as well as Class B site restrictions (see Figures 2-4 and 2-5).
- One of 10 vector attraction reduction options must be achieved (see Table 2-6).
- Frequency of monitoring (see Table 2-7), as well as recordkeeping and reporting requirements (see Table 2-8) must be met.

TABLE 2-4
Types of Land onto Which Different Types of Biosolids May Be Applied

Biosolids Option	Pathogen Class	VAR[a] Options	Type of Land	Other Restrictions
	A	1-8	All[b]	None
	A	9 or 10	All except lawn and home gardens[c]	Management practices
	B	1-10	All except lawn and home gardens[c]	Management practices and site restrictions
	A	1-10	All except lawn and home garden[d]	Management practices
	B	1-10	All except lawn and home garden[c,d]	Management practices and site restrictions
	A	1-8	All, but most likely lawns and home gardens	Labeling management practice

[a] VAR means vector attraction reduction.

[b] Agricultural land, forest, reclamation sites, and lawns and home gardens.

[c] It is not possible to impose site restrictions on lawns and home gardens.

[d] It is not possible to track cumulative additions of pollutants on lawns and home gardens.

- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

Class A biosolids meeting vector attraction reduction requirements 9 and 10 in Table 2-6 are another type of biosolids material that would fit in the PC category.

Thus, PC biosolids must meet more requirements than EQ biosolids, but are subject to fewer requirements than CPLR biosolids. Currently, the majority of biosolids in the United States could be characterized as PC biosolids, as defined in this guidance document.

Option 3: Cumulative Pollutant Loading Rate (CPLR) Biosolids

The third option for meeting land application requirements allows bulk biosolids that do not meet the pollutant concentration limits in Table 2-1 to

TABLE 2-5
Summary of Class A and Class B Pathogen Reduction Requirements

CLASS A

In addition to meeting the requirements in one of the six alternatives listed below, fecal coliform or *Salmonella* sp. bacteria levels must meet specific density requirements at the time of biosolids use or disposal or when prepared for sale or give-away (see Chapter Five of this guidance)

Alternative 1: Thermally Treated Biosolids

Use one of four time-temperature regimens

Alternative 2: Biosolids Treated in a High pH-High Temperature Process

Specifies pH, temperature, and air-drying requirements

Alternative 3: For Biosolids Treated in Other Processes

Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration

Alternative 4: Biosolids Treated in Unknown Processes

Demonstration of the process is unnecessary. Instead, test for pathogens—*Salmonella* sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova—at the time the biosolids are used or disposed of or are prepared for sale or give-away

Alternative 5: Use of PFRP

Biosolids are treated in one of the Processes to Further Reduce Pathogens (PFRP) (see Table 5-4)

Alternative 6: Use of a Process Equivalent to PFRP

Biosolids are treated in a process equivalent to one of the PFRPs, as determined by the permitting authority

CLASS B

The requirements in one of the three alternatives below must be met

Alternative 1: Monitoring of Indicator Organisms

Test for fecal coliform density as an indicator for all pathogens at the time of biosolids use or disposal

Alternative 2: Use of PSRP

Biosolids are treated in one of the Processes to Significantly Reduce Pathogens (PSRP) (see Table 5-7)

Alternative 3: Use of Processes Equivalent to PSRP

Biosolids are treated in a process equivalent to one of the PSRPs, as determined by the permitting authority

Note: Details of each alternative for meeting the requirements for Class A and Class B designations are provided in Chapter Five.

TABLE 2-6
Summary of Vector Attraction Reduction Options

Requirements in one of the following options must be met:

Option 1:	Reduce the mass of volatile solids by a minimum of 38 percent
Option 2:	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit
Option 3:	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit
Option 4:	Meet a specific oxygen uptake rate for aerobically treated biosolids
Option 5:	Use aerobic processes at greater than 40°C (average temperatures 45°C) for 14 days or longer (e.g., during biosolids composting)
Option 6:	Add alkaline materials to raise the pH under specified conditions
Option 7:	Reduce moisture content of biosolids that do not contain unstabilized solids from other than primary treatment to at least 75 percent solids
Option 8:	Reduce moisture content of biosolids with unstabilized solids to at least 90 percent
Option 9:	Inject biosolids beneath the soil surface within a specified time, depending on the level of pathogen treatment
Option 10:	Incorporate biosolids applied to or placed on the land surface within specified time periods after application to or placement on the land surface.

Note: Details of each vector attraction reduction option are provided in Chapter Five.

FIGURE 2-4
Restrictions for the Harvesting of Crops and Turf, Grazing of Animals, and Public Access on Sites Where Class B Biosolids Are Applied

Restrictions for the harvesting of crops and turf:*

1. Food crops, feed crops, and fiber crops, whose edible parts do not touch the surface of the soil, shall not be harvested until *30 days* after biosolids application.
2. Food crops with harvested parts that touch the biosolids/soil mixture and are totally above ground shall not be harvested until *14 months* after application of biosolids.
3. Food crops with harvested parts below the land surface where biosolids remain on the land surface for 4 months or longer prior to incorporation into the soil shall not be harvested until *20 months* after biosolids application.
4. Food crops with harvested parts below the land surface where biosolids remain on the land surface for less than 4 months prior to incorporation shall not be harvested until *38 months* after biosolids application.
5. Turf grown on land where biosolids are applied shall not be harvested until *1 year* after application of the biosolids when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

Restriction for the grazing of animals:

1. Animals shall not be grazed on land until *30 days* after application of biosolids to the land.

Restrictions for public contact:

1. Access to land with a high potential for public exposure, such as a park or ballfield, is restricted for *1 year* after biosolids application. Examples of restricted access include posting with no trespassing signs, and fencing.
2. Access to land with a low potential for public exposure (e.g., private farmland) is restricted for *30 days* after biosolids application. An example of restricted access is remoteness.

* Examples of crops impacted by Class B pathogen requirements are listed in Figure 2-5.

be land applied as safely as EQ and PC biosolids. To qualify as CPLR biosolids, the following requirements must be met:

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.
- Cumulative Pollutant Loading Rates (CPLRs) listed in Table 2-1 may be not be exceeded.

FIGURE 2-5
Examples of Crops Impacted by Site Restrictions for Class B Biosolids

Usually Do Not Touch the Soil/Biosolids Mixture	Usually Touch the Soil/Biosolids Mixture	Are Below the Soil/Biosolids Mixture
Peaches	Melons	Potatoes
Apples	Strawberries	Yams
Oranges	Eggplant	Sweet Potatoes
Grapefruit	Squash	Rutabaga
Corn	Tomatoes	Peanuts
Wheat	Cucumbers	Onions
Oats	Celery	Leeks
Barley	Cabbage	Radishes
Cotton	Lettuce	Turnips
Soybeans		Beets

- Either the Class A or Class B pathogen requirements in Table 2-5 must be met.
- One of the 10 vector attraction reduction options in Table 2-6 must be met.
- Frequency of monitoring (see Table 2-7), as well as recordkeeping and reporting requirements (see Table 2-8) must be met.
- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

The CPLR is the maximum amount of regulated pollutants in biosolids that can be applied to a site considering all biosolids applications made after July 20, 1993. When the CPLR for any one of the 10 heavy metals listed in Table 2-1 is reached at a site, no additional bulk biosolids, subject to the CPLR limits, may be applied to the site.

Option 4: Annual Pollutant Loading Rate (APLR) Biosolids

The fourth option only applies to biosolids that are sold or given away in a bag or other container for application to land. Under this option, the following requirements must be met:

- The ceiling concentrations for pollutants in Table 2-1 may not be exceeded.

- The Annual Pollutant Loading Rates (APLRs) listed in Table 2-1 may not be exceeded.
- The Class A pathogen requirements in Table 2-5 must be met.
- One of the first eight vector attraction reduction options in Table 2-6 must be met.
- The frequency of monitoring as well as recordkeeping and reporting requirements in Tables 2-7 and 2-8 must be met.
- Applicable site restrictions, general requirements, and management practices must be met (summarized in Tables 2-3 and 2-4 and listed in Figures 2-4, 2-8, and 2-9).

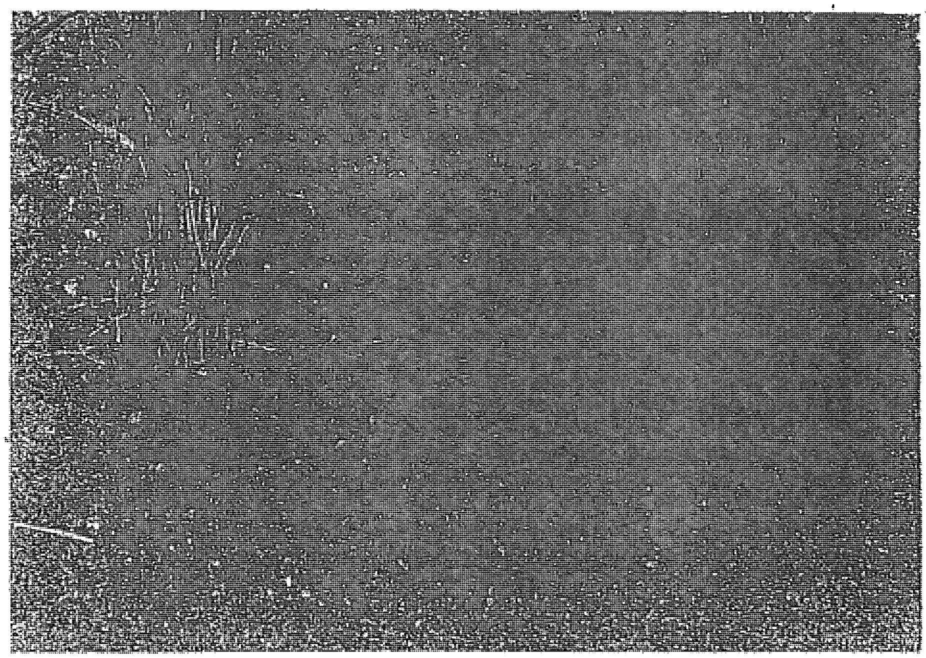
An APLR is the maximum amount of regulated pollutants in biosolids that can be applied to a site in any 1 year. APLRs rather than CPLRs are used for biosolids sold or given away in a bag or other container because tracking the amount of pollutants applied in biosolids is not feasible in this situation.

A labeling requirement for bagged or containerized APLR biosolids is discussed in Figure 2-9. To meet the labeling requirement, the preparer of biosolids must calculate the amount of biosolids that can be applied to a site during the year so that none of the APLRs are exceeded. This amount of biosolids is referred to as the annual whole sludge application rate (AWSAR). The AWSAR can be determined once the pollutant concentrations in the biosolids are known. The procedure for determining the AWSAR is explained in Figure 2-6. The AWSAR must be calculated for each of the 10 metals listed in Table 2-1, and the lowest AWSAR for the 10 metals is the allowable AWSAR for the biosolids. The AWSAR on the required label or information sheet has to be equal to or less than the AWSAR calculated using the procedure in Figure 2-6.

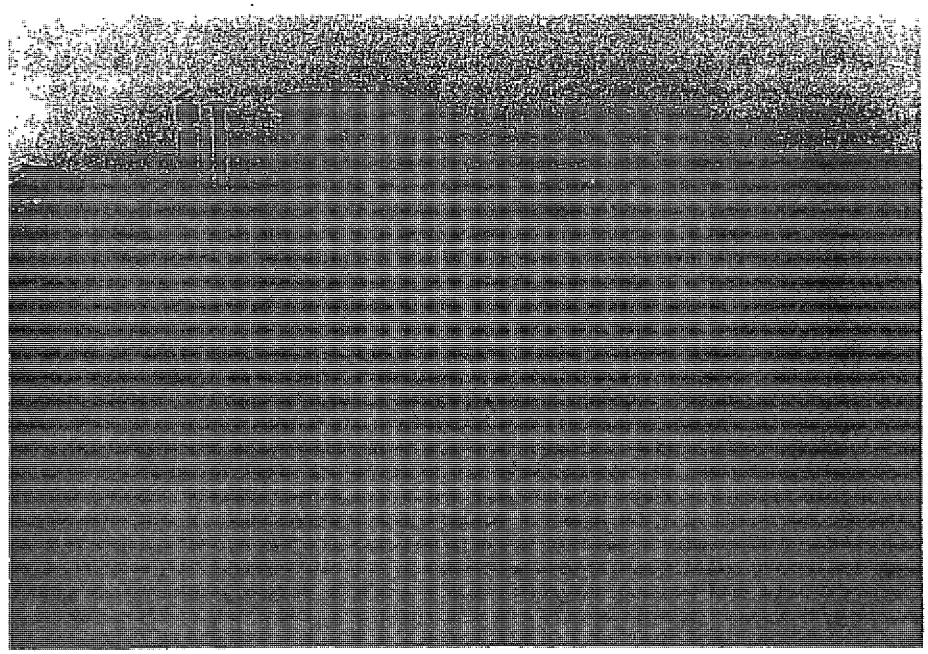
While not required by the Part 503 rule, it would also be good practice to provide information about the nitrogen content of the biosolids as well as the AWSAR on the label or information sheet that accompanies the biosolids. Figure 2-7 shows calculations that can be useful for determining how much nitrogen is being applied to land relative to the AWSAR and the nitrogen requirements of the plants being grown.

General Requirements and Management Practices

The Part 503 general requirements and management practices must be met for all but EQ biosolids. The specific general requirements and kinds of management practices that apply to each type of biosolids are given in Figures 2-8 and 2-9, respectively. Several of the management practices are singled out for a bit more discussion below.



Grain growing in sandy soil without (left) and with (right) anaerobically digested biosolids in Yuma, Arizona.



Biosolids are applied on a semi-arid rangeland demonstration study site in Rio Puerco, New Mexico.

FIGURE 2-6

Procedure To Determine the Annual Whole Sludge (Biosolids) Application Rate for Biosolids Sold or Given Away in a Bag or Other Container

1. Analyze a sample of the biosolids to determine the concentration of each of the 10 regulated metals in the biosolids.
2. Using the pollutant concentrations from Step 1 and the APLRs from Table 2-1, calculate an AWSAR for each pollutant using equation (1) below:

$$AWSAR = \frac{APLR}{C \cdot 0.001}$$ where:

$AWSAR$ = Annual whole sludge (biosolids) application rate (dry metric tons of biosolids/hectare/year)

$APLR$ = Annual pollutant loading rate (in Table 2-1) (kg of pollutant/ha/yr)

C = Pollutant concentration (mg of pollutant/kg of biosolids, dry weight)

0.001 = A conversion factor

3. The AWSAR for the biosolids is the lowest AWSAR calculated for each pollutant in Step 2.

Example:

1. Biosolids to be applied to land are analyzed for each of the 10 metals regulated in Part 503. Analysis of the biosolids indicates the pollutant concentration in the second column of the table below.
2. Using these test results and the APLR for each pollutant from Table 2-1, the AWSAR for all the pollutants are calculated as shown in the fourth column of the table below.
3. The AWSAR for the biosolids is the *lowest* AWSAR calculated for all 10 metals. In our example, the lowest AWSAR is for copper at 20 metric tons of biosolids/hectare/year. Therefore, the controlling AWSAR to be used for the biosolids is 20 metric tons per hectare/year. The 20 metric tons of biosolids/hectare is the same as 410 pounds of biosolids/1,000 square feet (20 metric tons × 2,205 lb per metric ton/107,600 square feet per hectare). The AWSAR on the label or information sheet would have to be equal to or less than 410 pounds per 1,000 square feet.

Metal	Biosolids Concentrations (milligrams/kilogram)	APLR* (kilograms/ hectare/year)	AWSAR = APLR / Conc. in Biosolids (0.001) = metric tons/hectare
[redacted]	10	2.0	2 / (10 x 0.001) = 200
[redacted]	10	1.9	1.9 / (10 x 0.001) = 190
[redacted]	1,000	150	150 / (1,000 x 0.001) = 150
[redacted]	3,750	75	75 / (3,750 x 0.001) = 20
[redacted]	150	15	15 / (150 x 0.001) = 100
[redacted]	2	0.85	0.85 / (2 x 0.001) = 425
[redacted]	100	21	21 / (100 x 0.001) = 210
[redacted]	15	5.0	5 / (15 x 0.001) = 333
[redacted]	2,000	140	140 / (2,000 x 0.001) = 70

* Annual Pollutant Loading Rate from Table 2-1 of this guide and Table 4 of the Part 503 rule.

FIGURE 2-7
Procedure for the Applier To Determine the Amount of Nitrogen Provided by the AWSAR Relative to the Agronomic Rate

In Figure 2-6, the AWSAR for the biosolids in the example calculation was determined to be 410 pounds of biosolids per 1,000 square feet of land. If biosolids were to be placed on a lawn that has a nitrogen requirement of about 200 pounds* of available nitrogen per acre per year, the following steps would determine the amount of nitrogen provided by the AWSAR relative to the agronomic rate if the AWSAR was used:

1. The nitrogen content of the biosolids indicated on the label is 1 percent total nitrogen and 0.4 percent available nitrogen the first year.
2. The AWSAR is 410 pounds of biosolids per 1,000 square feet, which is 17,860 pounds of biosolids per acre:

$$\frac{410 \text{ lb}}{1{,}000 \text{ sq ft}} \times \frac{43{,}560 \text{ sq ft}}{\text{acre}} \times 0.001 = \frac{17{,}860 \text{ lb}}{\text{acre}}$$

3. The available nitrogen from the biosolids is 71 pounds per acre:

$$\frac{17{,}860 \text{ lb biosolids}}{\text{acre}} \times .004 = \frac{71 \text{ lb}}{\text{acre}}$$

4. Since the biosolids application will only provide 71 pounds of the total 200 pounds of nitrogen required, in this case the AWSAR for the biosolids will not cause the agronomic rate for nitrogen to be exceeded and an additional 129 pounds per acre of nitrogen would be needed from some other source to supply the total nitrogen requirement of the lawn.

*Assumptions about crop nitrogen requirement, biosolids nitrogen content, and percent of that nitrogen that is available are for illustrative purposes only.

TABLE 2-7
Frequency of Monitoring for Pollutants, Pathogen Densities, and Vector Attraction Reduction

Greater than zero but less than 290	>0 to <0.85	>0 to <320	Once per year
Equal to or greater than 290 but less than 1,500	0.85 to <4.5	320 to <1,650	Once per quarter (4 times per year)
Equal to or greater than 1,500 but less than 15,000	4.5 to <45	1,650 to <16,500	Once per 60 days (6 times per year)
Equal to or greater than 15,000	≥45	≥16,500	Once per month (12 times per year)

* Either the amount of bulk biosolids applied to the land or the amount of biosolids received by a person who prepares biosolids for sale or give-away in a bag or other container for application to the land (dry-weight basis).

FIGURE 2-8
Part 503 Land Application General Requirements

For EQ Biosolids

None (unless set by EPA or State permitting authority on a case-by-case basis for bulk biosolids to protect public health and the environment).

For PC and CPLR Biosolids

The *preparer** must notify and provide information necessary to comply with the Part 503 land application requirements to the person who applies bulk biosolids to the land.

The *preparer* who provides biosolids to another person who further prepares the biosolids for application to the land must provide this person with notification and information necessary to comply with the Part 503 land application requirements.

The *preparer* must provide written notification of the total nitrogen concentration (as N on a dry-weight basis) in bulk biosolids to the applier of the biosolids to agricultural land, forests, public contact sites, or reclamation sites.

The *applier* of biosolids must obtain information necessary to comply with the Part 503 land application requirements, apply biosolids to the land in accordance with the Part 503 land application requirements, and provide notice and necessary information to the owner or leaseholder of the land on which biosolids are applied.

Out of State Use

The *preparer* must provide written notification (prior to the initial application of the bulk biosolids by the applier) to the permitting authority in the State where biosolids are proposed to be land applied when bulk biosolids are generated in one State and transferred to another State for application to the land. The notification must include:

- the location (either street address or latitude and longitude) of each land application site;
- the approximate time period the bulk biosolids will be applied to the site;
- the name, address, telephone number, and National Pollutant Discharge Elimination System (NPDES) permit number for both the preparer and the applier of the bulk biosolids; and
- additional information or permits in both States, if required by the permitting authority.

Additional Requirements for CPLR Biosolids

The *applier* must notify the permitting authority in the State where bulk biosolids are to be applied prior to the initial application of the biosolids. This is a one-time notice requirement for each land application site each time there is a new applier. The notice must include:

- the location (either street address or latitude and longitude) of the land application site; and
- the name, address, telephone number, and NPDES permit number (if appropriate) of the person who will apply the bulk biosolids.

The *applier* must obtain records (if available) from the previous applier, landowner, or permitting authority that indicate the amount of each CPLR pollutant in biosolids that have been applied to the site since July 20, 1993. In addition:

- when these records are available, the *applier* must use this information to determine the additional amount of each pollutant that can be applied to the site in accordance with the CPLRs in Table 2-1;
- the *applier* must keep the previous records and also record the additional amount of each pollutant he or she is applying to the site; and
- when records of past known CPLR applications since July 20, 1993, are not available, biosolids meeting CPLRs cannot be applied to that site. However, EQ or PC biosolids could be applied.

If biosolids meeting CPLRs have not been applied to the site in excess of the limit since July 20, 1993, the CPLR limit for each pollutant in Table 2-1 will determine the maximum amount of each pollutant that can be applied in biosolids if:

- all applicable management practices are followed; and
- the applier keeps a record of the amount of each pollutant in biosolids applied to any given site.

The *applier* must not apply additional biosolids under the cumulative pollutant loading concept to a site where any of the CPLRs have been reached.

* The preparer is either the person who generates the biosolids or the person who derives a material from biosolids.

FIGURE 2-9
Part 503 Land Application Management Practice Requirements

For EQ Biosolids

None (unless established by EPA or the State permitting authority on a case-by-case basis for bulk biosolids to protect public health and the environment).

For PC and CPLR Biosolids

These types of biosolids cannot be applied to flooded, frozen, or snow-covered agricultural land, forests, public contact sites, or reclamation sites in such a way that the biosolids enter a wetland or other waters of the United States (as defined in 40 CFR Part 122.2, which generally includes tidal waters, interstate and intrastate waters, tributaries, the territorial sea, and wetlands adjacent to these waters), except as provided in a permit issued pursuant to Section 402 (NPDES permit) or Section 404 (Dredge and Fill Permit) of the Clean Water Act, as amended.

These types of biosolids cannot be applied to agricultural land, forests, or reclamation sites that are 10 meters or less from U.S. waters, unless otherwise specified by the permitting authority.

If applied to agricultural lands, forests, or public contact sites, these types of biosolids must be applied at a rate that is equal to or less than the agronomic rate for nitrogen for the crop to be grown. Biosolids applied to reclamation sites may exceed the agronomic rate for nitrogen as specified by the permitting authority.

These types of biosolids must not harm or contribute to the harm of a threatened or endangered species or result in the destruction or adverse modification of the species' critical habitat when applied to the land. Threatened or endangered species and their critical habitats are listed in Section 4 of the Endangered Species Act. Critical habitat is defined as any place where a threatened or endangered species lives and grows during any stage of its life cycle. Any direct or indirect action (or the result of any direct or indirect action) in a critical habitat that diminishes the likelihood of survival and recovery of a listed species is considered destruction or adverse modification of a critical habitat.

For APLR Biosolids

A label must be affixed to the bag or other container, or an information sheet must be provided to the person who receives APLR biosolids in other containers. At a minimum, the label or information sheet must contain the following information:

- the name and address of the person who prepared the biosolids for sale or giveaway in a bag or other container;
- a statement that prohibits application of the biosolids to the land except in accordance with the instructions on the label or information sheet;
- an AWSAR (see Figure 2-6) for the biosolids that do not cause the APLRs to be exceeded; and
- the nitrogen content.

There is no labeling requirement for EQ biosolids sold or given away in a bag or other container.

Endangered Species

The Part 503 rule prohibits the application of bulk biosolids to land if it is likely to adversely affect endangered or threatened species or their designated critical habitat. Any direct or indirect action that reduces the likelihood of survival and recovery of an endangered or threatened species is considered an "adverse effect." Critical habitat is any place where an endangered or threatened species lives and grows during its life cycle. The U.S. Department of Interior, Fish and Wildlife Service (FWS) publishes a list of endangered and threatened species at 50 CFR 17.11 and 17.12.

Practices that involve applying biosolids to lands (subjected to normal tillage, cropping, and grazing practices, or mining, forestry, and other activities that by their nature are associated with turning the soil and affecting vegetation) are not likely to result in any increase in negative impacts on endangered species and in fact may be beneficial given the nutritive and soil-building properties of biosolids. It is the responsibility of the land applier, however, to determine if the application of biosolids might cause an adverse effect on an endangered species or its critical habitat. Moreover, the Part 503 rule requires the land applier to certify (Figure 2-10) that the applicable management practices have been met, including the requirement concerning endangered species, and that records are kept indicating how the applicable management practices have been met.

One recommended step for making the threatened and endangered species determination is to contact the FWS Endangered Species Protection Program in Washington, DC (703-358-2171), or one of the FWS Field Offices, listed in Appendix C, for more information about the general area being considered for land application. State fish and game departments also can be contacted for specific state requirements.

Flooded, Frozen, or Snow-Covered Land

Application of biosolids to flooded, frozen, or snow-covered land is not prohibited by the Part 503 rule. Appliers must ensure, however, that biosolids applied to such land does not enter surface waters or wetlands unless specifically authorized by a permit issued under Sections 402 or 404 of the Clean Water Act (CWA). Some common runoff controls include slope restrictions, buffer zones/filter strips, tillage to create a roughened soil surface, crop residue or vegetation, berms, dikes, silt fences, diversions, siltation basins, and terraces.

Distance to U.S. Waters

Bulk biosolids may not be applied within 10 meters (33 feet) of any waters of the United States (e.g., intermittent following streams, creeks, rivers, wetlands, or lakes) unless otherwise specified by the permitting authority. Permitting authorities can allow exceptions to this requirement if the application of biosolids is expected to enhance the local environment. For example, biosolids application may help revegetate a stream bank and otherwise minimize erosion. Approval of such biosolids application could be given via letters of authorization under Section 308 of the CWA, a settlement agreement, or a permit.

Agronomic Rate

The ***agronomic rate*** for biosolids application is a rate that is designed to provide the amount of nitrogen needed by a crop or vegetation to attain a desired yield while minimizing the amount of nitrogen that will pass below the root zone of the crop or vegetation to the ground water. Crop-available nitrogen in biosolids that is applied in excess of the agronomic rate could result in nitrate contamination of the ground water. The Part 503 rule requires that the rate of land application for bulk biosolids be equal to or less than the agronomic rate, except in the case of a reclamation site where a different rate of application is allowed by the permitting authority. Approval could be given via letters of authorization under Section 308 of the CWA, a settlement agreement, or a permit.

Although the preparer is required to supply the land applier with information on the nitrogen content of the biosolids, the land applier is responsible for determining that the biosolids are applied at a rate that does not exceed the agronomic rate for that site. Procedures for the design of the agronomic rate differ depending on such factors as the total and available nitrogen content of the biosolids, nitrogen losses, nitrogen from sources other than biosolids (including estimates or measurements of available nitrogen already present in the soil), and the requirements for the expected yield of crop or vegetation. Assistance in designing the agronomic rate should be obtained from a knowledgeable person, such as the local extension agent or the soil testing department at the Land Grant University in each state. (A sample calculation of the nitrogen supplied by biosolids based on the AWSAR is provided in Figure 2-7.)

Frequency of Monitoring Requirements

Pollutants, pathogen densities, and vector attraction reduction must be monitored when biosolids are applied to the land. This monitoring ensures that pollutant limits and pathogen and vector attraction reduction requirements are being met. Chapter Six describes the sampling and analytical procedures to be followed. The required frequency of monitoring is 1, 4, 6, or 12 times per year, depending on the number of metric tons (mt) (dry-weight basis) of biosolids used or disposed in that year. This frequency is presented in Table 2-7. Frequency of monitoring requirements must be met regardless of which option is chosen for meeting pollutant limits and pathogen and vector attraction reduction requirements, with the exception of Class B pathogen Alternative 2.

TABLE 2-8
Recordkeeping and Reporting Requirements

Type of Biosolids	Records That Must Be Kept	Person Responsible for Recordkeeping		Records That Must Be Reported[a]
		Preparer	Applier	
	Pollutant concentrations			
	Pathogen reduction certification and description			
	Vector attraction reduction certification and description			
	Pollutant concentrations			
	Management practice certification and description			
	Site restriction certification and description (where Class B pathogen requirements are met)			
	Pathogen reduction certification and description			
	Vector attraction reduction certification and description			
	Pollutant concentrations			
	Management practice certification and description			
	Site restriction certification and description (if Class B pathogen requirements are met)			
	Pathogen reduction certification and description			
	Vector attraction reduction certification and description			
	Other information: — Certification and description of information gathered (information from the previous applier, landowner, or permitting authority regarding the existing cumulative pollutant load at the site from previous biosolids applications) — Site location — Number of hectares — Amount of biosolids applied — Cumulative amount of pollutant applied (including previous amounts) — Date of application			
	Pollutant concentrations			
	Management practice certification and description			
	Pathogen reduction certification and description			
	Vector attraction reduction certification and description			
	The AWSAR for the biosolids			

[a] Reporting responsibilities are only for POTWs with a design flow rate equal to or greater than 1 mgd, POTWs that serve a population of 10,000 or greater, and Class I sludge management facilities.

[b] The preparer certifies and describes vector attraction reduction methods other than injection and incorporation of biosolids into the soil. The applier certifies and describes injection or incorporation of biosolids into the soil.

[c] Records that certify and describe injection or incorporation of biosolids into the soil do not have to be reported.

[d] Some of this information has to be reported only when 90 percent or more of any of the CPLRs is reached at a site.

Recordkeeping and Reporting Requirements

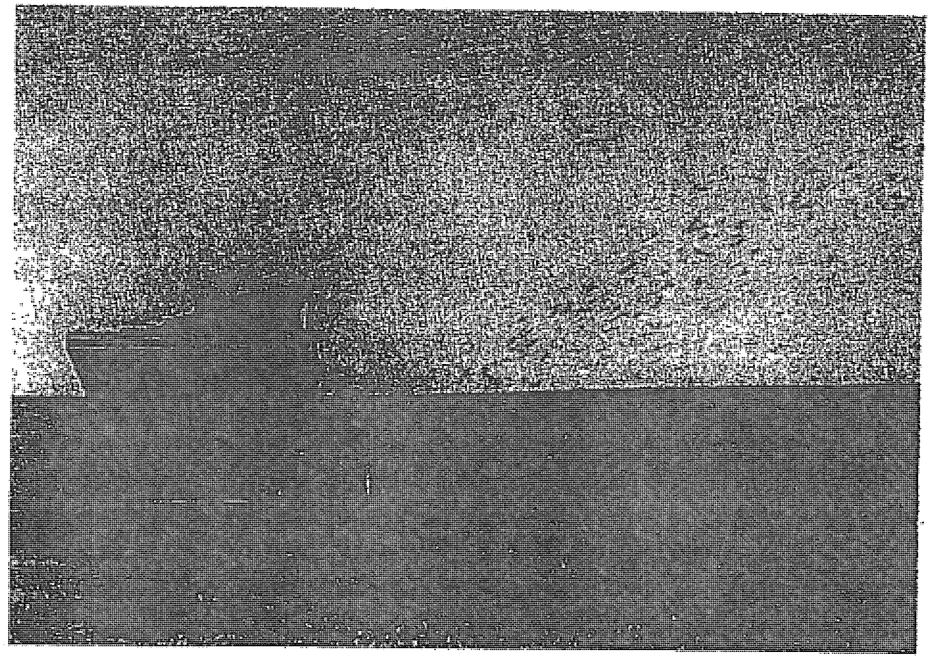
Part 503 requires that certain records be kept by the person who ***prepares*** biosolids for application to the land and the person who ***applies*** biosolids to the land. The recordkeeping and reporting requirements are summarized in Table 2-8. Some of the records that must be kept when biosolids are applied to the land include statements certifying whether certain land application requirements are met. The general certification statement that must be used is provided as Figure 2-10. This statement certifies that, among other things, the land applier and his or her employees are qualified to gather information and perform tasks as required by the Part 503 rule.

The certifier should periodically check the performance of his or her employees to verify that the Part 503 requirements are being met. Then, when a Federal or State inspector checks the employee's logs, office records, and performance in the field, the inspector should find that the required management practices are being followed and that any applicable pathogen and vector attraction reduction requirements, including associated crop harvesting, animal grazing, and site access restrictions, are being met. The inspector also should find that all other necessary records and requirements listed in Table 2-8 are in order. Even if the preparer/applier is not required to report this information, he or she must keep these records for 5 years, or indefinitely for cumulative amounts of pollutants added to any site by CPLR biosolids. These required records may be requested for review at any time by the permitting or enforcement authority.

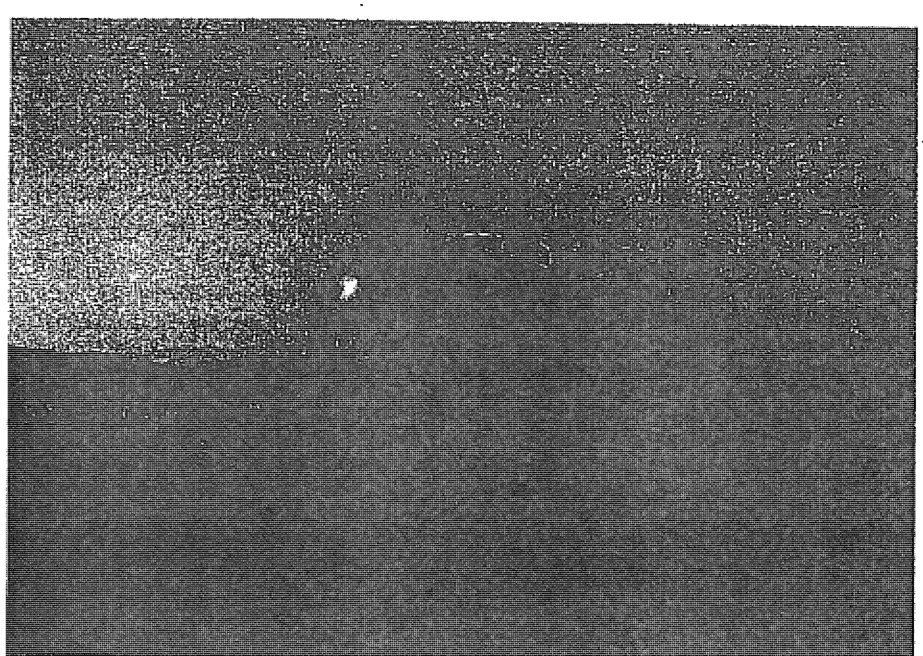
FIGURE 2-10
Certification Statement Required for Recordkeeping

"I certify under penalty of law, that the *[insert each of the following requirements that are met: Class A or Class B pathogen requirements, vector attraction reduction requirements, management practices, site restrictions, requirements to obtain information]* in *[insert the appropriate section number/s in Part 503 for each requirement met]* have/have not been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the requirements have been met. I am aware that there are significant penalties for false certification, including the possibility of fine and imprisonment."

Signature ______________________ Date ______________



Top-flinging applicator spreads dewatered biosolids from a New York City wastewater treatment works onto a site in Texas.



Anaerobically digested biosolids from Los Angeles are injected into the soil in California.

Some facilities are not subject to any Part 503 reporting requirements. However, all Class I treatment works, treatment works serving a population of 10,000 or more, and treatment works with a 1 mgd or greater design flow (as described in the first chapter of this guidance) have reporting responsibilities. Each year, facilities with reporting requirements must submit some of the information contained in their records (according to Table 2-8). The information must be submitted every February 19th to the permitting authority (either EPA or a State with an EPA-approved biosolids management program).

Domestic Septage

Part 503 imposes separate requirements for domestic septage applied to agricultural land, forest, or a reclamation site (i.e., nonpublic-contact sites). The "simplified rule" for application of domestic septage to such sites is explained in ***Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule.*** If domestic septage is applied to public contact sites or home lawns and gardens, the same requirements must be met as for bulk biosolids applied to the land (i.e., general requirements, pollutant limits, pathogen and vector attraction reduction requirements, management practices, frequency of monitoring requirements, and recordkeeping and reporting requirements).

Landowner and Leaseholder Responsibilities

If the landowner or leaseholder is also the land applier of the biosolids, that person must follow the applicable provisions of the Part 503 rule for land appliers as described in this chapter. If the land-applying operation is of sufficient size or concern to the permitting authority, the landowner or leaseholder applier might also be required to obtain a permit for the land application activities.

If the landowner or leaseholder is not the land applier (e.g., the applier is a contractor or biosolids generator/preparer), the landowner or leaseholder might wish to obtain certain information and maintain certain records even though not required by the Part 503 rule. For example, he or she might wish to keep records on information that Part 503 requires the land applier to give to the landowner or leaseholder for any site where cropping or grazing restrictions apply.

Additional information that the landowner or leaseholder should obtain from the biosolids preparer and/or land applier is the nutritive value (i.e., the amount of each available nutrient such as nitrogen, potassium, phosphorus, and lime being applied), so that he or she will not over-apply any supplemental fertilizers. Also, if biosolids are being applied to the land in accordance with the CPLR concept, it would be prudent for the landowner or leaseholder to make sure that he or she is given and retains information on the cumulative totals of pollutants that have been added to each parcel of land so that more CPLR biosolids can be applied each year until the cumulative limits for CPLR biosolids have been reached.

The landowner or leaseholder might wish to obtain assurances via an agreement that any biosolids being land applied are of an appropriate quality and have been sufficiently prepared and that the application procedures used meet the requirements of the Part 503 rule. One possible agreement between the landowner or leaseholder and land applier might be:

Contractor agrees to indemnify, defend, and hold harmless [Landowner/Leaseholder] from and against any and all claims, suits, actions, demands, losses, costs, liabilities, and expenses (including remediation costs and reasonable attorney's fees) to the extent such losses result from: (1) Contractor's or Generator/Preparer's violation of applicable laws or regulations in effect at the time of biosolids application; or (2) the negligence or willful misconduct of Contractor in delivery and application of biosolids to the undersigned Landowner/ Leaseholders' property. In the event this indemnification is enforced against the Contractor for a violation of law by a Generator/Preparer, Landowner/Leaseholder agrees to assign and subrogate to Contractor its claim against Generator/ Preparer. This indemnification shall survive termination of this Agreement until the expiration of any applicable statutes of limitations. Landowner/Leaseholder shall promptly notify Contractor in the event of a third-party claim and Contractor shall have the right to provide and oversee the defense of such claim and enter into any settlement of such claim at its discretion (holding the Landowner/Leaseholder harmless). Landowner/Leaseholder agrees to fully cooperate with Contractor in the defense against any third-party claim.

Liability Issues and Enforcement Oversight

Remember that the Part 503 rule is self-implementing and that its provisions must be followed whether or not a permit is issued. Remember also that State rules, which may be different from and more stringent than the Part 503 rule, may also apply.

EPA's Part 503 rule concerning the use or disposal of biosolids includes enforcement measures regarding the proper testing and application of biosolids. Landowners (including their lenders) and leaseholders who use biosolids beneficially as a fertilizer substitute or soil conditioner in accordance with EPA's Part 503 rule are protected from liability under the Superfund legislation (Comprehensive Environmental Response, Compensation and Liability Act—CERCLA) (see 58 *Federal Register* 9262, February 19, 1993) as well as any enforcement action from EPA under the Part 503 rule. Where the Federal requirements are not followed, appliers of biosolids are vulnerable to EPA enforcement actions or citizen-initiated suits and can be required to remediate any problems for which they are found liable.

There is concern that if for some reason the application of biosolids to farmland might result in damage to crops, livestock, or the land itself, a farmer or the farmer's lender may be exposed to significant financial loss. There is also concern about possible future loss that might occur if unanticipated hazards from previous biosolids use are discovered. While there are no guarantees, past experience with agronomic use of biosolids is very reassuring. Where biosolids have been applied in accordance with Federal and State regulations, problems have been rare and virtually the same as those that have occurred from normal farming practices. Available research indicates that the agronomic use of high-quality biosolids is sustainable.

EPA oversight of land application practices includes a program for administering permits and for monitoring, reporting, and inspecting. As with wastewater discharge standards and requirements, preparers and land appliers are required to keep detailed records and Class I biosolids management facilities must self-report on their activities during the preceding calendar year by February 19th. As described in Table 2-8, the reports must include information on biosolids quality. In the case of CPLR biosolids, a field-by-field analysis of the site activity must also be reported, including information on management practices and on the cumulative application of metals. Hence, EPA will know the quality of the biosolids and where they are going, in accordance with EPA Part 503 requirements.

EPA will not rely solely on the word of the regulated community. The Agency will conduct routine sampling and inspections of these facilities. If discrepancies are identified, enforcement actions will be taken. Enforcement actions can include fines of up to $25,000 per day per violation, injunctive relief, or criminal imprisonment.

EPA shares the concern regarding the potential for harm from the misapplication of biosolids (i.e., not in accordance with general or management practices) or the failure to meet quality or treatment requirements. Notwithstanding, EPA believes that the Part 503 rule is protective and that most land application activities will be in compliance with its requirements.

Common Questions and Answers

Q: EPA has an enforcement strategy that focuses on EQ biosolids first and then addresses biosolids meeting more burdensome requirements. Why?

A: Biosolids that meet the EQ criteria are exempt from further consideration (i.e., management practices or tracking requirements) under the rule. This means that EQ biosolids may be used to supply plant nutrients and to condition soils, such as commercial fertilizers and other soil amending products, after meeting the EQ criteria. If biosolids that are claimed as EQ do not meet these requirements, then it is not possible to know if the untracked non-EQ biosolids are being used in accordance with other applicable provisions of the Part 503 rule and there could be a potential for adverse environmental and public health impacts. Therefore, it is crucial, from a public health and environment standpoint, to ensure that biosolids truly meet these EQ requirements. That is why EPA chose to focus first on EQ biosolids.

Q: The Part 503 rule states that its requirements apply to any person who prepares [biosolids], applies [biosolids] to land, fires [biosolids] in an incinerator, or owns or operates a surface disposal site. The Part 503 rule defines a person as an individual, association, partnership, corporation, municipality, or a State or Federal agency or an agent or employee thereof. EQ biosolids are not subject to general requirements or management practices. If the biosolids are distributed as EQ and later found not to be EQ, will all the individuals who apply the biosolids to land be considered to have violated the Part 503 rule? Who is ultimately responsible?

A: The generator and/or preparer, and possibly in some unique cases the land applier, would be liable. Whom EPA targets for enforcement action would depend on the specifics of the situation. It is highly unlikely that EPA would target any individual user or land applier of such alleged EQ biosolids material. In many cases, the user or land applier might not even know that he or she was using a biosolids product.

Q: What happens to sites that reach the CPLR? Can you ever reuse or repermit that site?

A: Once a site reaches the CPLR, that site can no longer have biosolids subject to the CPLR concept applied to it. You could, however, continue to apply biosolids that meet the EQ or PC requirements.

Q: If EQ or PC biosolids are land applied, do you need to keep records of cumulative application rates? If non-EQ or non-PC biosolids are subsequently applied to the same land, do you have to consider the pollutants land applied in the EQ or PC biosolids?

A: Part 503 does not require land appliers to keep track of the cumulative amounts of pollutants in EQ or PC biosolids that are applied to a particular parcel of land. The applier of any biosolids that are subject to CPLRs are not required by Part 503 to consider the pollutant loadings already applied to the same parcel of land from EQ or PC biosolids.

Q: When biosolids from a Class I facility are land applied, exactly what information must be reported regarding biosolids pollutant levels and pathogen and vector attraction reduction?

A: On February 19 of each year, the preparer and land applier, as applicable, would be required to submit on the previous year the following information to the permitting authority:

- the concentration in biosolids of each pollutant listed in Table 2-1 of this guidance;
- the appropriate certification statement indicating the Class A and B pathogen reduction and vector attraction reduction options used; and
- a description of how the preparer/applier is meeting the requirements of the pathogen and vector attraction reduction options chosen. In general, the preparer/applier would not need to report the actual data collected on pathogens or related to vector attraction reduction; however, the preparer/applier would need to describe how the required limiting numbers have been met or exceeded and how required operating parameters have been maintained. In addition, the preparer/applier must retain the actual data collected for a minimum of 5 years and have it available for inspection by authorized permitting or regulatory authorities when requested. Pollutant loading rate information must be kept indefinitely for CPLR biosolids on a site-by-site basis.

Q: If biosolids are applied to land in accordance with the requirements of the Part 503 rule, would the landowner, leaseholder, mortgage lender, land applier, or generator/preparer be liable under CERCLA for the cost of any cleanup of soil or water contamination or loss of crops?

A: No. Application of sewage sludge for a beneficial purpose in compliance with the Part 503 rule would not give rise to CERCLA liability.

Q: Does EPA believe there is an environmental or public health problem related to the beneficial use of biosolids in accordance with the Part 503 rule?

A: It is EPA's long-standing position that the beneficial application of biosolids to provide crop nutrients or to condition the soil is not only safe but good public policy, so long as preparers and land appliers comply with all applicable requirements of the Part 503 rule. Among other things, those requirements address the quality of biosolids allowed for land application, the rates of application of biosolids under various circumstances, and monitoring. Beneficial use of biosolids reclaims a wastewater residual, converting it into a resource that is recycled to land. EPA's position on biosolids use is based on extensive research involving hundreds of successful land application projects over the past 25 years.

Chapter 5

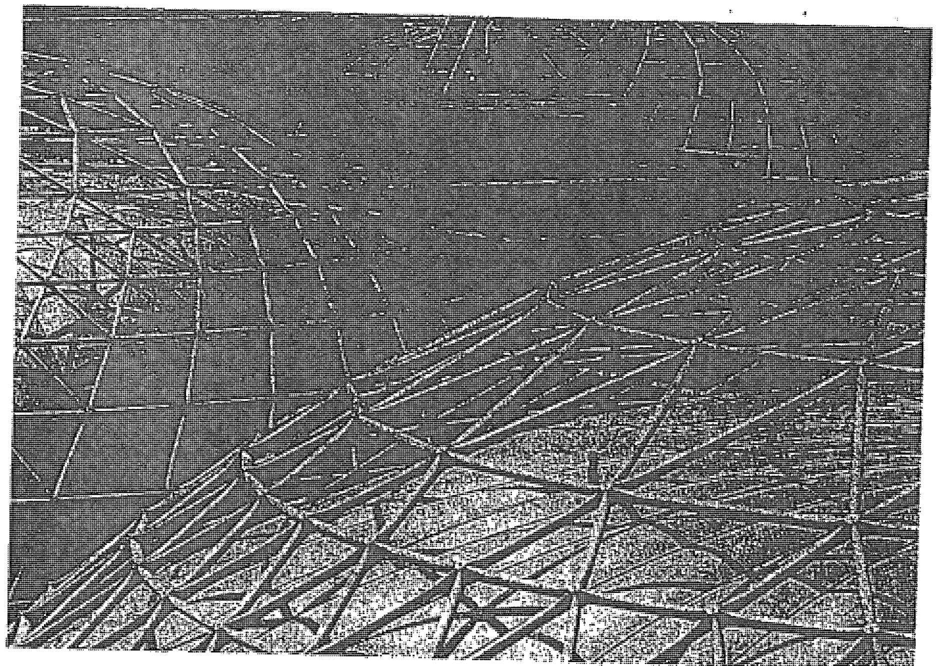
Pathogen and Vector Attraction Reduction Requirements

Why Are There Pathogen and Vector Attraction Reduction Requirements?

Pathogens are disease-causing organisms, such as certain bacteria, viruses, and parasites. Vectors are organisms, such as rodents and insects, that can spread disease by carrying and transferring pathogens. Subpart D of the Part 503 rule covers alternatives for reducing pathogens in biosolids (including domestic septage), as well as options for reducing the potential for biosolids to attract vectors.

The Subpart D alternatives concern the designation of biosolids as "Class A" or "Class B" in regard to pathogens. These classifications indicate the density (numbers/unit mass) of pathogens in biosolids where applicable. The requirements for land application or surface disposal of biosolids vary depending on the class of pathogen reduction achieved. Biosolids have to meet applicable requirements for both pathogen and vector attraction reduction to be in compliance with the rule.

This chapter describes the pathogen alternatives and vector attraction reduction options in the Part 503 rule. For more detail, the reader is referred to an EPA publication entitled, ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (EPA/625/R-92/013), December 1992.



Anaerobic digesters in Columbus, Ohio, reduce pathogens and vector attraction to produce Class B biosolids.

To Whom Do These Requirements Apply?

The pathogen and vector attraction reduction requirements in Subpart D of the Part 503 rule apply to biosolids, including domestic septage, and their application to or placement on the land for beneficial use or disposal. Domestic septage applied to nonpublic contact sites (i.e., agricultural land, forests, and reclamation sites) is covered by a simplified portion of the rule that is explained in a separate EPA guidance document (***Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule,*** EPA/832-B-92-005).

Depending on how biosolids are used or disposed and which pathogen alternative and vector attraction reduction option are relied on, compliance with the pathogen and vector attraction requirements of Subpart D is the responsibility of persons who:

- generate biosolids that are either land applied or surface disposed;
- derive a material from biosolids that are either land applied or surface disposed;
- apply biosolids to the land;
- place biosolids on a surface disposal site; and
- own or operate a surface disposal site.

Pathogen Reduction Alternatives

The Part 503 pathogen reduction alternatives ensure that pathogen levels in biosolids are reduced to levels considered safe for the biosolids to be land applied or surface disposed. Subpart D includes criteria to classify biosolids as Class A or Class B with respect to pathogens. These classifications are based on the level of pathogens present in biosolids that are used or disposed.

If pathogens (*Salmonella* sp. bacteria, enteric viruses, and viable helminth ova) are below detectable levels, the biosolids meet the Class A designation. Biosolids are designated Class B if pathogens are detectable but have been reduced to levels that do not pose a threat to public health and the environment as long as actions are taken to prevent exposure to the biosolids after their use or disposal. When Class B biosolids are land applied, certain restrictions must be met at the application site; other requirements have to be met when Class B biosolids are surface disposed. The land application restrictions allow natural processes to further reduce pathogens in the biosolids before the public has access to the site. In general, Class A corresponds to the existing 40 CFR Part 257 "Process to Further Reduce Pathogens (PFRP)" designation, and Class B roughly corresponds to the existing 40 CFR Part 257 "Process to Significantly Reduce Pathogens (PSRP)" designation. There are several important differences in approach between the existing Part 257 and the new Part 503 requirements for pathogen and vector attraction reduction:

1 Whereas Part 257 required the use of specifically listed or approved treatment technologies to treat biosolids, the Part 503 rule provides flexibility in how the pathogen and vector attraction reduction requirements are met. The pathogen reduction requirements of the Part 503 rule can be met either by:

—using certain specified technologies to treat the biosolids as before, or

—showing that the quality of the biosolids meets certain performance results.

2 The Part 503 rule requires either pathogen or pathogen indicator measurements for all Class A alternatives and pathogen indicator measurements for the first of the three Class B alternatives.

3 The Part 503 rule separates pathogen reduction requirements from vector attraction reduction requirements, as follows:

—The Class A and B designations refer only to the reductions achieved in pathogens.

—Vector attraction reduction is governed by a separate set of requirements described in a later section of this chapter.

—There is, however, still a requirement that both pathogen and vector attraction reduction requirements be met, and for Class A biosolids the pathogen reduction requirements must be met before or at the same time as most of the vector attraction reduction requirements, thereby minimizing the potential for regrowth of pathogenic bacteria.

Class A Pathogen Requirements

The Part 503 rule lists six alternatives for treating biosolids so they can be classified Class A with respect to pathogens. These alternatives are summarized in Table 5-1 and are discussed in detail below. Any one of these six alternatives may be met for the biosolids to be deemed Class A. Two of these alternatives follow closely with 40 CFR Part 257 pathogen requirements by allowing use of PFRPs and equivalent technologies.

TABLE 5-1
Summary of the Six Alternatives for Meeting Class A Pathogen Requirements

In addition to meeting the requirements in one of the six alternatives listed below, the requirements in Table 5-2 must be met for all six Class A alternatives.

Alternative 1: Thermally Treated Biosolids

Biosolids must be subjected to one of four time-temperature regimes.

Alternative 2: Biosolids Treated in a High pH-High Temperature Process

Biosolids must meet specific pH, temperature, and air-drying requirements.

Alternative 3: Biosolids Treated in Other Processes

Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration after pathogen reduction demonstration is completed.

Alternative 4: Biosolids Treated in Unknown Processes

Biosolids must be tested for pathogens—*Salmonella* sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova—at the time the biosolids are used or disposed, or, in certain situations, prepared for use or disposal.

Alternative 5: Biosolids Treated in a PFRP

Biosolids must be treated in one of the Processes to Further Reduce Pathogens (PFRP) (see Table 5-4).

Alternative 6: Biosolids Treated in a Process Equivalent to a PFRP

Biosolids must be treated in a process equivalent to one of the PFRPs, as determined by the permitting authority.

Table 5-2 lists several requirements that must be met for all six of the Class A alternatives. Perhaps the most significant of the requirements is to avoid regrowth of bacteria as indicated by the results of a fecal coliform or *Salmonella* test.

Alternative 1 for Meeting Class A: Thermally Treated Biosolids

This alternative applies when specific thermal heating procedures are used to reduce pathogens. Equations are used to determine the length of heating time at a given temperature needed to obtain Class A pathogen reduction (i.e., reduce the pathogen content to below detectable levels). The equations take into consideration the solid-liquid nature of the biosolids being heated, along with the particle size and how particles are brought into contact with the heat. The equations also take into consideration that the internal structure of the mixture can inhibit mixing. For example, a safety factor is included in the equation for Regime C (see Table 5-3) that adds more time for heating because less information is available about operational parameters that could influence the degree of pathogen destruction per unit of heat input. The rule identifies and provides equations for four different acceptable heating regimes.

The minimum indicated boundary conditions (i.e., solids content, mixing with the heat source, time of heating, and operating temperature) are given

TABLE 5-2
Pathogen Requirements for All Class A Alternatives

The following requirements must be met for ***all*** six Class A pathogen alternatives.

Either:

- the density of fecal coliform in the biosolids must be less than 1,000 most probable numbers (MPN) per gram total solids (dry-weight basis),

or

- the density of *Salmonella* sp. bacteria in the biosolids must be less than 3 MPN per 4 grams of total solids (dry-weight basis).

Either of these requirements must be met at one of the following times:

— when the biosolids are used or disposed;

— when the biosolids are prepared for sale or give-away in a bag or other container for land application; or

— when the biosolids or derived materials are prepared to meet the requirements for EQ biosolids (see Chapter 2).

Pathogen reduction must take place before or at the same time as vector attraction reduction, except when the pH adjustment, percent solids vector attraction, injection, or incorporation options are met.

below for each of the four thermal heating regimes. Any one of these four thermal heating regimes may be used. The equation specified for a particular heating regime is then used to calculate the actual time and temperature for operating the system within the boundaries of the applicable regime. In addition to the requirements for each regime, the requirements in Table 5-2 must be met.

The four regimes are listed in Table 5-3; some example calculations follow.

Example 1: Biosolids contain 10 percent solids and are heated with a biosolids dryer at 55°C. What is the required minimum time for achieving Class A pathogen status? The minimum time would be 63 hours if the operator followed Regime A in Table 5-3. Under Regime A the temperature cannot be lower than 50°C or the time shorter than 20 minutes.

$$Time = \frac{131{,}700{,}000}{10^{0.14\,(temperature)}} = \frac{131{,}700{,}000}{10^{0.14\,(55)}} = \frac{131{,}700{,}000}{50{,}118{,}723} = 2.6\ days\ [63\ hours]$$

TABLE 5-3
The Four Time-Temperature Regimes for Class A Pathogen Reduction Under Alternative 1

Regime	Applies to:	Requirement	Time-Temperature Relationship*
[illegible]	Biosolids with 7% solids or greater (except those covered by Regime B)	Temperature of biosolids must be 50°C or higher for 20 minutes or longer	$D = \frac{131{,}700{,}000}{10^{0.14t}}$ (Equation 2 of Section 503.32)
[illegible]	Biosolids with 7% solids or greater in the form of small particles and heated by contact with either warmed gases or an immiscible liquid	Temperature of biosolids must be 50°C or higher for 15 seconds or longer	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
[illegible]	Biosolids with less than 7% solids	Heated for at least 15 seconds but less than 30 minutes	$D = \frac{131{,}700{,}000}{10^{0.14t}}$
[illegible]	Biosolids with less than 7% solids	Temperature of sludge is 50°C or higher with at least 30 minutes or longer contact time	$D = \frac{50{,}070{,}000}{10^{0.14t}}$ (Equation 3 of Section 503.32)

* D = time in days; t = temperature in degrees Celsius.

Example 2: Biosolids contain 10 percent solids and are treated in a biosolids dryer for about 1.5 minutes (0.001 day). What is the required minimum temperature? The minimum temperature to achieve Class A pathogen status would be 79°C if the operator followed Regime B in Table 5-3. Under this regime, the temperature cannot be lower than 50°C or the time shorter than 15 seconds and the biosolids must be in the form of small particles (e.g., from a steam drier) in intimate contact with the drying unit. Otherwise, Regime A would apply.

$$Time = \frac{131{,}700{,}000}{10^{0.14\,(temperature)}} = 0.001$$

$$0.001 \; [10^{0.14\,(temp)}] = 131{,}700{,}000$$

$$Temperature = 79^{o}C$$

Alternative 2 for Meeting Class A: Biosolids Treated in a High pH–High Temperature Process

This alternative describes conditions of a specific temperature–pH process that is effective in reducing pathogens to below detectable levels. The process conditions required by the regulation are:

- elevating the pH to greater than 12 (measured at 25°C) for 72 hours or longer;
- maintaining the temperature above 52°C for at least 12 hours during the period that the pH is greater than 12;
- air drying to over 50 percent solids after the 72-hour period of elevated pH; and
- meeting all the requirements in Table 5-2.

Alternative 3 for Meeting Class A: Biosolids Treated in Other Known Processes

This alternative requires comprehensive monitoring of enteric viruses and viable helminth ova during each monitoring episode until demonstration has shown that the process achieves adequate reduction of pathogens. The presence of enteric viruses and viable helminth ova have to be shown in the biosolids prior to pathogen treatment to document the effectiveness of the treatment process.

The tests and requirements are:

- Once shown to be present prior to treatment, the density of enteric viruses in the biosolids after pathogen treatment must be less than 1 plaque- forming unit (PFU) per 4 grams of total solids (dry-weight basis).

- Likewise, the density of viable helminth ova in the biosolids after pathogen treatment must be less than 1 per 4 grams of total solids (dry-weight basis).
- All the requirements in Table 5-2 must be met.

Acceptable pathogen testing procedures are given in Chapter 6 and in the document ***Control of Pathogens and Vector Attraction in Sewage Sludge*** noted earlier in this chapter.

Alternative 3 is useful for demonstrating that a new process fully meets Class A pathogen requirements under the tested set of operating parameters. Subsequent testing for enteric viruses and viable helminth ova is unnecessary whenever the tested set of operating parameters has been met. It is important to realize that the tested set of operating parameters may have included ranges of values.

If no enteric viruses or viable helminth ova are present before treatment, then the tested batch of biosolids can be considered Class A. The tests, however, must be repeated during each subsequent monitoring episode until:

- pathogens are detected before the process and demonstrated to have been reduced to below detectable levels after the process, or
- after 2 years of testing with no detection of pathogens before the process, the permitting authority modifies the monitoring requirements for enteric viruses and viable helminth ova. (The permitting authority may choose not to modify the monitoring requirements, but if it does, in no case could the monitoring frequency for enteric viruses and viable helminth ova be less than once per year.)

Once the process has been demonstrated to process achieve the required pathogen reduction, the process must be operated under the same conditions that were used during the demonstration.

As already mentioned, monitoring for fecal coliform or *Salmonella* sp. bacteria is always required in accordance with the requirements listed in Table 5-2.

Alternative 4 for Meeting Class A: Biosolids Treated in Unknown Processes

This alternative is used in situations where:

- a biosolids treatment process is unknown, or
- the biosolids were treated in a process operating under less-stringent conditions than those under which the biosolids could qualify as Class A under any of the other alternatives.

This alternative requires that the biosolids be analyzed for *Salmonella* sp. bacteria, enteric viruses, and viable helminth ova at each of the following times:

- when the biosolids (or materials derived from biosolids) are used or disposed;
- when biosolids are prepared for sale or for give-away in a bag or other container for application to the land; or
- when the biosolids are prepared to meet the EQ requirements (see Chapter 2).

As in Alternative 3, the required test results for this alternative are:

- The density of viruses in the biosolids must be less than 1 PFU per 4 grams of total solids (dry-weight basis).
- The density of viable helminth ova in the biosolids must be less than 1 per 4 grams of total solids (dry-weight basis).
- All the requirements in Table 5-2 must be met.

Although biosolids must meet the same pathogen test results as in Alternative 3, Alternative 4 requires testing of each batch of the biosolids that is used or disposed, rather than just monitoring the operating parameters, after the demonstration that the process reduces pathogens.

Alternative 5 for Meeting Class A: Biosolids Treated in a PFRP

Alternative 5 provides continuity with the 40 CFR Part 257 regulation. This alternative states that biosolids are considered to be Class A if:

- they are treated in one of the PFRPs listed in Table 5-4, and
- all requirements in Table 5-2 are met.

To meet these requirements, the biosolids treatment processes must be operated according to the conditions listed in Table 5-4. This list is very similar to the list of PFRP technologies in 40 CFR Part 257, with two major differences:

- All requirements related to vector attraction reduction have been removed (see the vector attraction reduction requirements discussed later in this chapter).
- The three processes listed in Part 257 that are PFRP only if combined with a PSRP (gamma ray irradiation, high-energy irradiation, and pasteurization) are PFRPs under Part 503.

Under this alternative, treatment processes classified under 40 CFR Part 257 can continue to be operated; however, microbiological monitoring (as described in Table 5-2) must now be performed to ensure that pathogen density levels are below detection limits and that pathogen regrowth has not resulted in detectable levels being present at the time of use or disposal.

TABLE 5-4
Processes to Further Reduce Pathogens (PFRPs) Listed in Appendix B of 40 CFR Part 503

1. Composting

Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the biosolids is maintained at 55°C or higher for 3 days.

Using the windrow composting method, the temperature of the biosolids is maintained at 55°C or higher for 15 days or longer. During the period when the compost is maintained at 55°C or higher, the windrow is turned a minimum of five times.

2. Heat Drying

Biosolids are dried by direct or indirect contact with hot gases to reduce the moisture content of the biosolids to 10 percent or lower. Either the temperature of the biosolids particles exceeds 80°C or the wet bulb temperature of the gas in contact with the biosolids as the biosolids leave the dryer exceeds 80°C.

3. Heat Treatment

Liquid biosolids are heated to a temperature of 180°C or higher for 30 minutes.

4. Thermophilic Aerobic Digestion

Liquid biosolids are agitated with air or oxygen to maintain aerobic conditions, and the mean cell residence time of the biosolids is 10 days at 55° to 60°C.

5. Beta Ray Irradiation

Biosolids are irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20°C).

6. Gamma Ray Irradiation

Biosolids are irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at room temperature (ca. 20°C).

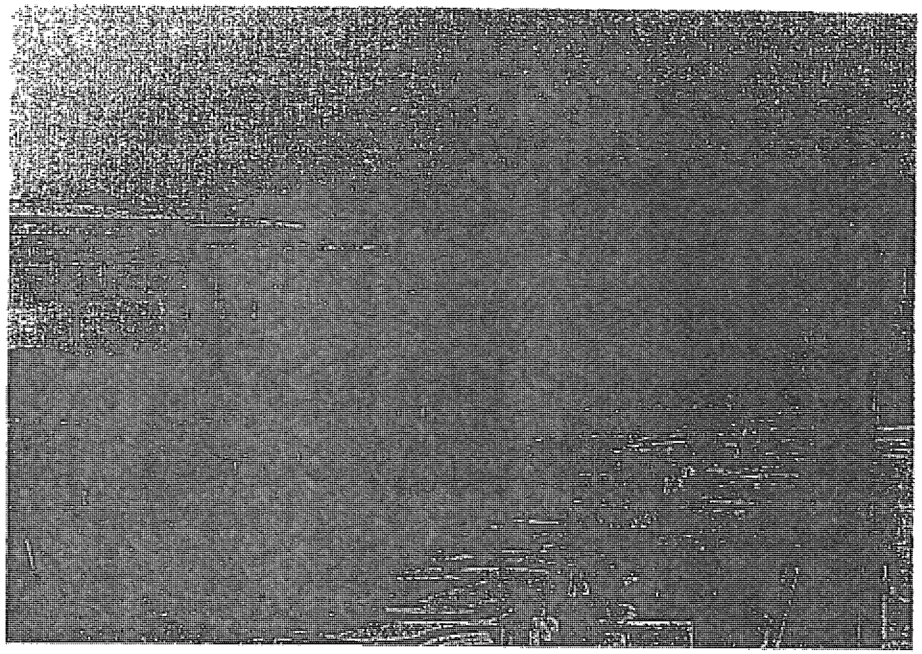
7. Pasteurization

The temperature of the biosolids is maintained at 70°C or higher for 30 minutes or longer.

Alternative 6 for Meeting Class A: Biosolids Treated in a Process Equivalent to a PFRP

Under Alternative 6, biosolids are considered to be Class A if:

- they are treated by any process determined to be equivalent to a PFRP by the permitting authority, and
- all requirements in Table 5-2 are met.



Composting can eliminate pathogens in biosolids (Columbus, Ohio).

The Part 503 rule gives the permitting authority responsibility for determining equivalency. To be equivalent, a treatment process must be able ***to consistently reduce*** pathogens to levels comparable to the reduction achieved by listed PFRPs. The process must be equivalent in its ability to achieve Class A status with respect to enteric viruses and viable helminth ova as long as it is operated under the same conditions that produced the required reductions.

Equivalency determinations can be made both on a site-specific and a national basis. A site-specific equivalency determination only pertains to one particular operation run at one location under the specified conditions. It cannot be assumed to apply to the same process performed at a different location, or for any modification of the process. A process that is able to consistently produce the required pathogen reductions at different locations across the country, however, may qualify for a recommendation of national equivalency (i.e., a recommendation that the process will likely be equivalent wherever it is operated in the United States).

The EPA's Pathogen Equivalency Committee (PEC) is available as a resource to provide recommendations on equivalency determinations to the permitting authority and guidance to the regulated community. See ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (noted earlier in this chapter) for more details about the PEC.

Class B Pathogen Requirements

Class B pathogen requirements can be met using one of three alternatives, as listed in Table 5-5 and described below. Unlike a Class A biosolids, in which pathogens are at levels below detectable limits, Class B biosolids may contain some pathogens. For this reason, the Class B requirements for land application of biosolids also include site restrictions that prevent crop harvesting, animal grazing, and public access for a certain period of time until environmental conditions have further reduced pathogens. The land application site restrictions for Class B biosolids are summarized in Table 5-6. Management practices rather than site restrictions prevent exposure to the pathogens in biosolids for surface disposed Class B biosolids.

Alternative 1 for Meeting Class B: The Monitoring of Indicator Organisms

Alternative 1 requires that seven samples of treated biosolids be collected shortly before biosolids use or disposal, *and* that the geometric mean fecal coliform density of these samples be less than 2 million colony-forming units (CFU) or most probable number (MPN) per gram of biosolids (dry-weight basis). EPA suggests that these seven samples be collected over a 2-week period. This approach uses fecal coliform density as an indicator of the average density of bacterial and viral pathogens. Acceptable pathogen testing procedures are given in Chapter 6.

EPA recommends that seven samples be taken over the 2-week period preceding use or disposal because the test methods used to determine fecal coliform density (membrane filter methods and the multiple tube dilution method) have poor precision and biosolids quality can vary. Using at least seven samples should provide a sufficiently representative sampling of the biosolids.

TABLE 5-5
Summary of the Three Alternatives for Meeting Class B Pathogen Requirements

Alternative 1: The Monitoring of Indicator Organisms

Test for fecal coliform density as an indicator for all pathogens. The geometric mean of seven samples shall be less than 2 million MPNs per gram per total solids or less than 2 million CFUs per gram of total solids at the time of use or disposal.

Alternative 2: Biosolids Treated in a PSRP

Biosolids must be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) (see Table 5-7).

Alternative 3: Biosolids Treated in a Process Equivalent to a PSRP

Biosolids must be treated in a process equivalent to one of the PSRPs, as determined by the permitting authority.

TABLE 5-6
Site Restrictions for Class B Biosolids Applied to the Land

Food Crops with Harvested Parts That Touch the Biosolids/Soil Mixture

Food crops with harvested parts that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of biosolids.

Food Crops with Harvested Parts Below the Land Surface

Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of biosolids when the biosolids remain on the land surface for 4 months or longer prior to incorporation into the soil.

Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of biosolids when the biosolids remain on the land surface for less than 4 months prior to incorporation into the soil.

Food Crops with Harvested Parts That Do Not Touch the Biosolids/Soil Mixture, Feed Crops, and Fiber Crops

Food crops with harvested parts that do not touch the biosolids/soil mixture, feed crops, and fiber crops shall not be harvested for 30 days after application of biosolids.

Animal Grazing

Animals shall not be grazed on the land for 30 days after application of biosolids.

Turf Growing

Turf grown on land where biosolids are applied shall not be harvested for 1 year after application of the biosolids when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

Public Access

Public access to land with a high potential for public exposure shall be restricted for 1 year after application of biosolids.

Public access to land with a low potential for public exposure shall be restricted for 30 days after application of biosolids.

Alternative 2 for Meeting Class B: Biosolids Treated in a PSRP

Class B Alternative 2 provides continuity with the 40 CFR Part 257 regulation. Under this alternative, biosolids are considered to be Class B if they are treated in one of the PSRPs listed in Table 5-7. The listed processes are similar to the PSRPs listed in the Part 257 regulation, except that all conditions related to reduction of vector attraction have been removed.

TABLE 5-7
Processes to Significantly Reduce Pathogens (PSRPs) Listed in Appendix B of 40 CFR Part 503

1. Aerobic Digestion

Biosolids are agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20°C and 60 days at 15°C.

2. Air Drying

Biosolids are dried on sand beds or on paved or unpaved basins. The biosolids dry for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0°C.

3. Anaerobic Digestion

Biosolids are treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35°C to 55°C and 60 days at 20°C.

4. Composting

Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the biosolids is raised to 40°C or higher and maintained for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds 55°C.

5. Lime Stabilization

Sufficient lime is added to the biosolids to raise the pH of the biosolids to 12 after 2 hours of contact.

Under this alternative, biosolids treated in processes included in 40 CFR Part 257 are Class B with respect to pathogens. Unlike the comparable Class A requirement, this alternative does not require microbiological monitoring for regrowth of fecal coliform or *Salmonella* sp. bacteria.

Alternative 3 for Meeting Class B: Biosolids Treated in a Process Equivalent to a PSRP

The Part 257 regulation allowed the biosolids to be treated in a process determined to be *equivalent to* a PSRP. Under Alternative 3, biosolids treated by any process determined to be equivalent to a PSRP by the permitting authority are considered to be Class B biosolids.

Part 503 gives the permitting authority responsibility for determining equivalency. The EPA Pathogen Equivalency Committee is available as a resource to provide recommendations on equivalency determinations to the permitting authorities. As with Class A, the Class B equivalency determination can be made on either a site-specific or a national basis. See ***Control of Pathogens and Vector Attraction in Sewage Sludge*** (noted earlier in this chapter) for more details about the PEC.

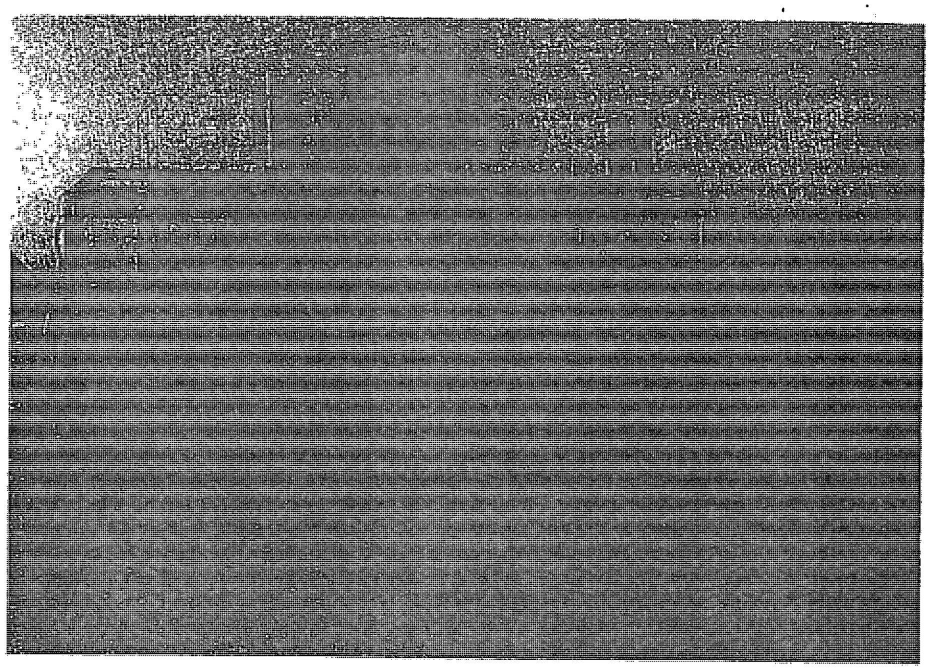
Requirements for Reducing Vector Attraction

The pathogens in biosolids pose a disease risk when they are brought into contact with humans or other susceptible hosts (plant or animal). Vectors, which include flies, mosquitoes, fleas, rodents, and birds, can transmit pathogens to humans and other hosts physically through contact or biologically by playing a specific role in the life cycle of the pathogen. Reducing the attractiveness of biosolids to vectors reduces the potential for transmitting diseases from pathogens in biosolids.

The Part 503 rule contains 12 options, which are summarized in Table 5-8 and described below, for demonstrating reduced vector attraction for biosolids. (Note: Option 12 only applies to domestic septage.) These requirements are designed to either reduce the attractiveness of biosolids to vectors (Options 1 through 8 and Option 12) or prevent vectors from coming in contact with the biosolids (Options 9 through 11).

TABLE 5-8
Summary of Options for Meeting Vector Attraction Reduction

Option 1:	Meet 38 percent reduction in volatile solids content.
Option 2:	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit.
Option 3:	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
Option 4:	Meet a specific oxygen uptake rate for aerobically digested biosolids.
Option 5:	Use aerobic processes at greater than 40°C for 14 days or longer.
Option 6:	Alkali addition under specified conditions.
Option 7:	Dry biosolids with no unstabilized solids to at least 75 percent solids.
Option 8:	Dry biosolids with unstabilized solids to at least 90 percent solids.
Option 9:	Inject biosolids beneath the soil surface.
Option 10:	Incorporate biosolids into the soil within 6 hours of application to or placement on the land.
Option 11:	Cover biosolids placed on a surface disposal site with soil or other material at the end of each operating day. (Note: Only for surface disposal.)
Option 12:	Alkaline treatment of domestic septage to pH 12 or above for 30 minutes without adding more alkaline material.



Open-air windrow composting operation near Los Angeles, California.

Option 1: Reduction in Volatile Solids Content

Under this option, vector attraction is reduced if the mass of volatile solids in the biosolids is reduced by at least 38 percent during the treatment of the biosolids. This percentage is the amount of volatile solids reduction that is attained by anaerobic or aerobic digestion plus any additional volatile solids reduction that occurs before the biosolids leave the treatment works, such as through processing in drying beds or lagoons, or by composting.

Option 2: Additional Digestion of Anaerobically Digested Biosolids

Frequently, biosolids have been recycled through the biological wastewater treatment section of a treatment works or have resided for long periods of time in the wastewater collection system. During this time, they undergo substantial biological degradation. If the biosolids are subsequently treated by anaerobic digestion for a period of time, they are adequately reduced in vector attraction. Because they will have entered the digester already partially stabilized, however, the volatile solids reduction after treatment is frequently less than 38 percent.

Under these circumstances, the 38 percent reduction required by Option 1 might not be possible. Option 2 allows the operator to demonstrate vector attraction reduction by testing a portion of the previously digested biosolids in a bench-scale unit in the laboratory. Vector attraction reduction is demonstrated if after anaerobic digestion of the biosolids for an additional 40 days at a temperature between 30° and 37°C, the volatile solids in the biosolids are reduced by less than 17 percent from the beginning to the end of the bench test.

Option 3: Additional Digestion of Aerobically Digested Biosolids

This option is appropriate for aerobically digested biosolids that cannot meet the 38 percent volatile solids reduction required by Option 1. This includes biosolids from extended aeration plants, where the minimum residence time of biosolids leaving the wastewater treatment processes section generally exceeds 20 days. In these cases, the biosolids will already have been substantially degraded biologically prior to aerobic digestion.

Under this option, aerobically digested biosolids with 2 percent or less solids are considered to have achieved vector attraction reduction if, in the laboratory after 30 days of aerobic digestion in a batch test at 20°C, volatile solids are reduced by less than 15 percent. This test is only applicable to liquid aerobically digested biosolids.

Option 4: Specific Oxygen Uptake Rate (SOUR) for Aerobically Digested Biosolids

Frequently, aerobically digested biosolids are circulated through the aerobic biological wastewater treatment process for as long as 30 days. In these cases, the biosolids entering the aerobic digester are already partially digested, which makes it difficult to demonstrate the 38 percent reduction required by Option 1.

The specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry-weight basis) in the biosolids. Reduction in vector attraction can be demonstrated if the SOUR of the biosolids that are used or disposed, determined at 20°C, is equal to or less than 1.5 milligrams of oxygen per hour per gram of total biosolids (dry-weight basis). This test is based on the fact that if the biosolids consume very little oxygen, their value as a food source for microorganisms is very low and therefore microorganisms are unlikely to be attracted to them. Other temperatures can be used for this test, provided the results are corrected to a 20°C basis. This test is only applicable to liquid aerobic biosolids withdrawn from an aerobic process.

Option 5: Aerobic Processes at Greater Than 40°C

This option applies primarily to composted biosolids that also contain partially decomposed organic bulking agents. The biosolids must be aerobically treated for 14 days or longer, during which time the temperature always must be over 40°C and the average temperature must be higher than 45°C.

This option can be applied to other aerobic processes, such as aerobic digestion, but Options 3 and 4 are likely to be easier to meet for the other aerobic processes.

Option 6: Addition of Alkaline Material

Biosolids are considered to be adequately reduced in vector attraction if sufficient alkaline material is added to achieve the following:

- raise the pH to at least 12, measured at 25°C, and without the addition of more alkaline material, maintain a pH of at least 12 for 2 hours; and
- maintain a pH of at least 11.5 without addition of more alkaline material for an additional 22 hours.

The conditions required under this option are designed to ensure that the biosolids can be stored for at least several days at the treatment works, transported, and then used or disposed without the pH falling to the point where putrefaction occurs and vectors are attracted.

Option 7: Moisture Reduction of Biosolids Containing No Unstabilized Solids

Under this option, vector attraction is considered to be reduced if the biosolids do not contain unstabilized solids generated during primary treatment and if the solids content of the biosolids is at least 75 percent before the biosolids are mixed with other materials. Thus, the reduction must be achieved by removing water, not by adding inert materials.

It is important that the biosolids not contain unstabilized solids because the partially degraded food scraps likely to be present in such biosolids would attract birds, some mammals, and possibly insects, even if the solids content of the biosolids exceeded 75 percent.

Option 8: Moisture Reduction of Biosolids Containing Unstabilized Solids

The ability of any biosolids to attract vectors is considered to be adequately reduced if the solids content of the biosolids is increased to 90 percent or greater, regardless of whether this increase was for biosolids from primary treatment. The solids increase should be achieved by removal of water and not by dilution with inert solids. Drying to this extent severely limits biological activity and strips off or decomposes the volatile compounds that attract vectors.

The way dried biosolids are handled, including their storage before use or disposal, can create or prevent vector attraction. If dried biosolids are exposed to high humidity, the outer surface of the biosolids will gain in moisture content and possibly attract vectors. This should be properly guarded against.

Option 9: Biosolids Injection

Vector attraction reduction can be demonstrated by injecting the biosolids below the ground surface. Under this option, no significant amount of biosolids can be present on the land surface within 1 hour of injection, and if the biosolids are Class A with respect to pathogens, they must be injected within 8 hours after discharge from the pathogen-reducing process.

The reason for this special consideration for Class A biosolids (assuming vector attraction has not been reduced by some other means) is that pathogens could regrow and Class A biosolids have no site restrictions to provide crop, grazing, and access protection.

Injection of biosolids beneath the soil places a barrier of earth between the biosolids and vectors. The soil removes water from the biosolids, which reduces the mobility and odor of the biosolids. Odor is usually present at the site during the injection process but quickly dissipates when injection is complete.

Option 10: Incorporation of Biosolids into the Soil

Under this option, biosolids must be incorporated into the soil within 6 hours of application to or placement on the land. Incorporation is accomplished by plowing or some other means of mixing the biosolids into the soil. If the biosolids are Class A with respect to pathogens, the time between processing and application or placement must not exceed 8 hours—the same as for injection under Option 9.

Option 11: Covering Biosolids

Under this option, biosolids placed on a surface disposal site must be covered with soil or other material at the end of each operating day. Daily covering reduces vector attraction by creating a physical barrier between the biosolids and vectors. Covering also helps meet pathogen requirements by allowing environmental conditions to reduce pathogens.

Option 12: Alkaline Treatment for Domestic Septage

This option pertains only to vector attraction reduction for domestic septage. Under this option, the pH of domestic septage must be raised to at least 12 and remain at pH 12 or above for a minimum of 30 minutes during which no additional alkaline material may be added.

Common Questions and Answers

Q: Are there any labs certified to perform the necessary pathogen tests?

A: Yes, and the correct analytical methods for pathogens are referenced in Part 503.

Q: For Class A pathogen Alternatives 1 and 2 (which use high temperatures to eliminate pathogens), is it necessary to verify the reduced level of viruses or helminth ova?

A: No.

Q: How often does a permittee have to show compliance with the vector attraction reduction requirements?

A: Compliance has to be shown at the same frequency as pollutant monitoring when vector attraction reduction Options 1 through 8 are met.

Q: Vector attraction reduction Options 2 and 3, which involve additional anaerobic or aerobic digestion, are tied to Option 1, which requires a specified reduction in volatile solids. Is it necessary to fail Option 1 before going on to Options 2 and 3?

A: Failure is not essential. The additional digestion approaches specified in Option 2 for biosolids treated anaerobically and Option 3 for biosolids treated aerobically can be followed without regard to the Option 1 volatile solids reduction requirements.

Q: Does the regulation address odor?

A: Not specifically. Volatile solids are a surrogate. No EPA standards address odor. Odor may be covered under State or local nuisance laws or under air regulations. Odor also may be covered as a special requirement under State or local public health and general welfare provisions.

Q: Are both Class A or B biosolids, in regard to pathogens, protective of public health and the environment, even though biosolids with Class B pathogen status may still contain pathogens and biosolids with Class A status do not?

A: Biosolids with either Class A or Class B pathogen status are protective of human health and the environment because of the added site restrictions and management practices that are required for biosolids with Class B pathogen status, which may contain pathogens. Stated as a generally correct rule of thumb:

Class A ≅ Class B + Site Restrictions + Management Practices.

Appendix D
Biosolids Management Plan

Biosolids Management Plan
City of Union
Union, Oregon

September 2005

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Biosolids Management Plan
City of Union
Union, Oregon

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1.0 INTRODUCTION

The City of Union (City) owns and operates a wastewater treatment plant for the treatment and management of municipal wastewater. The treatment system is operated under National Pollutant Discharge Elimination System (NPDES) Permit No. 101624 issued by the Oregon Department of Environmental Quality (DEQ) on November 24, 2004 and expiring on October 31, 2009. The biosolids resulting from the wastewater treatment processes are beneficially used in an agricultural setting through direct land application. Per Schedule C, Item 1, of the NPDES permit, the City is required to provide a revised Biosolids Management Plan in compliance with Oregon Administrative Rules (OAR) 340-50-031 (DEQ, 1995a), to outline the management techniques and monitoring procedures that will be completed for the safe operation of the City's land application program.

2.0 BRIEF DESCRIPTION OF TREATMENT FACILITY

The Union wastewater treatment plant, originally constructed in 1977 and upgraded in the early 2000s, has a design flow of 0.365 million gallons per day (mgd) and currently averages 0.150 mgd. The wastewater is composed primarily of domestic sewage from homes and businesses with no industrial or septage sources (i.e., about 90% domestic, 10% commercial, 0% industrial, and 0% septage). The influent receives primary treatment in the form of screening (i.e., mechanical screen followed by a 1" bar screen) to remove foreign materials, which are transported offsite for landfill disposal, prior to entering a 33,820-gallon concrete primary clarifier for solids settling. After primary clarification, the wastewater receives biological treatment utilizing a submerged biological contactor (SBR) followed by a series of rotating biological contactors (RBC) before undergoing secondary clarification in a 64,400-gal concrete clarifier. The treated wastewater is then chlorinated in a 15,600-gal contact chamber and then dechlorinated before discharge to Catherine Creek or to a storage pond used for providing supplemental irrigation water at the Buffalo Creek Golf Course. The solids generated from the clarification steps of the treatment train are directed to a primary and secondary aerobic digester for reduction and stabilization. The City maintains a series of paved drying beds at the site to dewater the biosolids removed from the secondary digester when needed or for general storage when land application events cannot be scheduled in conjunction with the removal of solids from the secondary digester. A process flow diagram of the wastewater and biosolids management system is provided in Figure 1.

3.0 SOLIDS TREATMENT PROCESSES

The biosolids are treated via primary and secondary aerobic digestion. The solids remain in the 92,000-gal concrete primary aerobic digester for 60 to 120 days prior to entering the 69,000-gal concrete secondary digester. The biosolids in both digesters are tested and managed on a monthly basis for total solids, pH, and volatile solids reduction with temperatures and oxygen content monitored on a daily basis to maintain operational control. When the appropriate Class B biosolids pathogen and vector attraction reduction parameters are met in accordance with 40

CFR § 503.32 and § 503.33 (refer to Section 5.4), the biosolids are considered available for spreading at the DEQ approved land application sites (refer to Section 7.0).

4.0 SOLIDS STORAGE

The City maintains four 17,952-gal concrete drying beds that are accessible using front-end loaders. These beds serve as backup treatment processes for additional volatile solids reduction when needed and/or for the storage of biosolids discharged from the secondary digester when land application activities cannot be scheduled or have to be delayed due to adverse weather or field conditions.

5.0 BIOSOLIDS CHARACTERISTICS

5.1 General

Based on recent production data (Riomondo, 2005), approximately 200,000 to 300,000 gallons of biosolids are estimated to be generated from the treatment plant per year. Assuming an average solids concentration range of 1.5 to 2.5%, the total annual biosolids production rate is projected to be between 12 and 30 dry tons/yr (10.8 to 27.2 dry metric tons/yr). A summary of the general constituent concentrations is provided in Table 1.

5.2 Nutrients

The biosolids will be land-applied to provide nutrients to crops. The estimate of plant available nitrogen (PAN) was determined by multiplying the average nitrogen (N) concentration by an availability factor (Table 2). The availability factor accounts for ammonia-N lost to volatilization at application and for organic-N that is mineralized to plant available forms (ammonium and nitrate – EPA, 1981). An average total of approximately 48.3 lb PAN/dry ton (DT) will be available each year for application. Based on the available PAN, a maximum biosolids application rate of between 1.0 and 5.2 dry tons per acre can be applied depending on the crop being grown at the land application site. Calculations used for predicting the application rate are provided in Table 3.

5.3 Metals

The average concentration of metals in the Union biosolids was compared to the pollutant limits from 40 CFR § 503.13(b) Tables 1 and 3. Metals concentrations in the Union biosolids are lower than the required pollutant limits as shown in Table 4, with most an order of magnitude lower. Because the measured concentrations are lower than the listed pollutant limits, cumulative pollutant loading rates will not be tracked (OAR 340-050-035 [DEQ, 1995b]).

5.4 Pathogens and Vector Attraction

The Union biosolids meets the Class B pathogen reduction requirements outlined in 40 CFR § 503.32 per the Processes to Significantly Reduce Pathogens (PSRP) option of aerobic digestion. The vector attraction reduction requirements, as specified in 40 CFR § 503.33, are satisfied as the biosolids are undergoing a greater than 38% reduction in volatile solids content (Riomondo, 2005).

6.0 BIOSOLIDS UTILIZATION PROGRAM

6.1 Removal, Delivery and Application

The biosolids are usually pumped from the secondary digester and placed in a City-owned 3,800-gallon tender truck. This truck is equipped with a spreader plate that surface applies the biosolids in a 10-ft wide swath behind the truck. The biosolids are surface applied at the land application sites by making multiple passes at a specific speed to help ensure equal and consistent application over the entire site. The application rate is determined based on the area covered and volume applied. Although not required, the biosolids can be incorporated into the soil by the landowner after application.

6.2 Site Selection Criteria

The criteria used to select the land application sites included: distance from the Union treatment facility, appropriate soil conditions, and favorable cropping patterns. New sites for biosolids application are not anticipated as being needed in the near future.

6.3 Contingency Options

In the event that biosolids are accidentally spilled during hauling to the land application sites, immediate action will be taken to cease further spillage and to remediate the spill. If the spill threatens to contaminate surface water or migrate off-site, the spill will be contained using dikes, sandbags, or straw bales. A vacuum truck will be required to remove the spilled biosolids from pooled areas and reloaded onto the truck. Biosolid spill response procedures are provided in Appendix A.

If the designated treatment processes fail to meet the minimum requirements for pathogen and/or vector attraction reduction, the suspect biosolids shall be stored in the drying beds until reintroduced into the digesters for additional treatment or the moisture content of the biosolids can be reduced to below 75%.

7.0 LAND APPLICATION SITES

7.1 Site Locations/Descriptions

The land application site consists of a constiguous tract of land subdivided into 7 subsections. This land application site is owned and farmed by the Sheehy family. The site authorization from the DEQ for this site is included in Appendix B. The site is located about ½ mile east of the wastewater treatment facility along Union Junction Road in a rural area of Union County. All subsections are actively farmed or in pasture with a generally flat topography (Figure 2).

The average maximum acreage requirement for the City of Union is about 63 acres (i.e., 30 DT/yr from Section 5.1 divided by 2.1 DT/ac applied from Table 3). The total net acreage available is about 154 acres excluding all required 50-ft buffers maintained along property boundaries, along both sides of any surface water features or ditches, and along roadways. A site map showing the boundaries, subsection layout, and buffers is shown on Figure 3.

7.2 Soil Characteristics

Soils at the land application sites are mapped as Catherine silt loam, La Grande silt loam, and Umapine silt loam (USDA, 1985). Complete official series descriptions from the National Cooperative Soil Survey completed by the Natural Resources Conservation Service are provided in Appendix C.

In general, Catherine silt loams are somewhat poorly drained soils with moderate permeability and a seasonally high water table between 18 and 48 inches from December to June. Rare to occasional flooding occurs for brief periods. Roots are present to 48 inches.

The La Grande silt loams are deep, moderately well drained soils with moderate permeability and a seasonal water table at a depth of 24 to 48 inches. Roots are present to 44 inches.

Umapine silt loams are very deep, somewhat poorly drained with moderate permeability and an apparent water table from 24 to 60 inches below ground surface from November through June. Umapine soils experience rare to common flooding from January to April. Roots are present to 24 inches.

7.3 Cropping Patterns

Crops planned for the land application sites may include wheat, wheat/fallow, alfalfa, and/or grass pasture. A wheat/fallow system is one in which a wheat crop alternates on an annual basis with a fallow period. Recommended nitrogen fertilizer rates from Oregon State University and Washington State University Cooperative Extension Fertilizer Guides for these crops are given in Table 3. All crops will be planted, grown and harvested using normal farming practices following the application of the biosolids.

Irrigated wheat, wheat/fallow, and grass pasture benefit from fall and spring applications of nitrogen fertilizer. Although alfalfa does not usually need to be fertilized with nitrogen as nitrogen is produced through the symbiotic relationship with nitrogen-fixing bacteria, numerous studies have shown that alfalfa will consume nitrogen if soil nitrogen is present.

Aside from the mechanical harvest of the proposed crops, some of the fields will undergo grazing from time to time. The grazing of animals will not occur until after the 30-day limit stipulated in OAR 340-50-0065 is reached (DEQ, 1995c). The agreements with the landowners stipulate that additional restrictions apply if food crops are to be grown. These restrictions range from 14 months for crops whose harvested parts may touch the biosolids/soil mixture (such as edible peas) to 38 months for root crops (such as carrots).

8.0 MONITORING AND REPORTING REQUIREMENTS

8.1 Site Application Logs

Part of the reporting requirements will be met by maintaining a site application log. The site application log shall be filed daily and shall include the quantity (cubic yards), quality (percent solids content), and location (field) of biosolids applied. An example daily site application log sheet is provided in Appendix D, although alternative log sheets may be used as approved by the City. All log sheets shall be maintained by the City as part of the permanent record.

8.2 Biosolids Sampling and Analysis

Biosolids samples shall be collected once per year as required by 40 CFR § 503.16, Table 1. This sample will be analyzed to demonstrate compliance with 40 CFR § 503.13 [metals], and 40 CFR § 503.14(d) [nutrient management] for the following:

1. **Metals:** arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), and zinc (Zn)

2. **Nutrients:** total Kjeldahl nitrogen (TKN), nitrate-nitrogen (NO_3-N), ammonium-nitrogen (NH_4-N), total phosphorous, and potassium (K)

3. **Physical Characteristics:** pH, total solids, and volatile solids.

Discrete samples shall also be collected from the biosolids to demonstrate compliance with the vector attraction reduction (40 CFR § 503.33(b) for Class B sewage sludge. At least one discrete sample shall be collected from the inflow and outflow of the aerobic digesters on a monthly basis when land application activities are occurring and analyzed for volatile solids. A summary of the biosolids sampling and analysis requirements is provided in Table 5.

8.3 Annual Reporting

An annual report will be submitted to the DEQ by February 19 of the year following land application of biosolids. A sample report form is shown in Appendix D. Information required in the annual report will include the biosolids quality test data; vector attraction reduction monitoring and records; and, the following:

Land Application Site Information
Crop(s)
Acres applied
Nitrogen applied (lb/ac)
Application rate (DT/ac)

Monitoring records will be maintained for a minimum of five years following the last date of land application.

REFERENCES

DEQ, 1995a. "Biosolids and Domestic Septage Management Plans." OAR 340-50-031. Chapter 40, Division 50, "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage." *Oregon Administrative Rules*. Department of Environmental Quality. Salem, Oregon.

DEQ, 1995b. "Monitoring and Reporting." OAR 340-50-035. Chapter 40, Division 50, "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage." *Oregon Administrative Rules*. Department of Environmental Quality. Salem, Oregon.

DEQ, 1995c. "Use Limitations." OAR 340-50-065. Chapter 40, Division 50, "Land Application of Domestic Wastewater Treatment Facility Biosolids, Biosolids Derived Products, and Domestic Septage." *Oregon Administrative Rules*. Department of Environmental Quality. Salem, Oregon.

Riomondo, Ralph, 2005. Personal communication. City of Union Wastewater Treatment Facility. Union, Oregon.

USDA, 1985. *Soil Survey of Union County Area, Oregon*. U.S. Department of Agriculture, Soil Conservation Service. Washington, D.C. and http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi.

EPA, 1981. *Process Design Manual: Land Treatment of Municipal Wastewater*. Doc: EPA 625/1-81-013. United States Environmental Protection Agency: Washington, D.C.

40 CFR §503. "Standards for the Use or Disposal of Sewage Sludge" *Code of Federal Regulations*. As amended. Part 503, Sections 14, 16, 32, and 33.

TABLES

Table 1. Biosolids Characteristics[1]
City of Union Biosolids Program - Union, Oregon

Parameter	Units	Concentration		Pounds per 1,000-gal	Pounds per Dry Ton
		Wet Basis	Dry Basis		
General Chemistry:					
Total Solids	%	2.0	100	167	2,000
Volatile Solids	%	62.7	3,140	5,229	62,800
Total Phosphate	mg/kg	631	31,600	5.3	63
Total Kjeldahl Nitrogen	mg/kg	1,220	61,000	10.2	122
Ammonia-Nitrogen	mg/kg	84	4,200	0.7	8.4
Nitrate-Nitrogen	mg/kg	100	5,000	0.8	10.0
Total Nitrogen	mg/kg	1,320	66,000	11.0	132
Total Metals:					
Arsenic	mg/kg	<1.0	<50	<0.008	<0.100
Cadmium	mg/kg	<0.05	<2.5	<0.0004	<0.0050
Copper	mg/kg	3.5	175	0.03	0.35
Lead	mg/kg	<0.5	<25	<0.004	<0.050
Mercury	mg/kg	0.04	2.0	0.0003	0.0040
Molybdenum	mg/kg	<0.5	<25	<0.004	<0.050
Nickel	mg/kg	<0.2	<10	<0.002	<0.020
Selenium	mg/kg	<1.0	<50	<0.008	<0.100
Zinc	mg/kg	12.4	620	0.10	1.24

NOTES:
[1]Biosolids samples collected December 27, 2004.
mg/kg = milligrams per kilogram.
% dry wt = percent dry weight.

Table 2. Estimation of Plant Available Nitrogen[1]
City of Union Biosolids Program - Union, Oregon

Parameter	Average Concentration (lb/DT)	Availability[2] Factor	PAN[3] (lb/DT)
Total Kjeldahl nitrogen	122	--	--
Ammonia-nitrogen	8.4	0.5	4.2
Nitrate-nitrogen	10.0	1	10.0
Organic nitrogen	113.6	0.3	34.1
		Total:	48.3

NOTES:

[1]Plant-available nitrogen (PAN) are the forms of nitrogen, ammonium and nitrate, that are readily taken up by plants.

[2]The Availability Factor accounts for ammonia-N lost to volatilization at application and for organic-N that is mineralized to plant available forms (ammonium and nitrate). Availability Factors are from EPA (1981).

[3] To assess the plant available nitrogen for each form of nitrogen, the average concentration is multiplied by the availability factor, 2.5 $^{lb}/_{DT}$ x 0.5 = 1.25 $^{lb}/_{DT}$ PAN.

lb/DT = pounds per dry ton.

Table 3. Agronomic Rate Determinations
City of Union Biosolids Program - Union, Oregon

Crop	Fertilizer Guide[1]	Nitrogen Requirement (lb N/ac)			Application Rate (DT/ac/yr)[2]
		Fall	Spring	Total	
Irrigated Wheat	FG 40	50-100	150-200	250	5.2
Wheat/Fallow	EB 1390	30-70	20-40	30-70	1.0
Alfalfa	FG 20	--	--	--	--
Grass Pasture	FG 21	40-100	80-200	125-300	4.4
Proposed Average		50	50	100	2.1

NOTES:

[1]References:

FG 40. 1983. Oregon State University Fertilizer Guide for Irrigated Wheat (Eastern Oregon - East of Cascades).

EB 1390. 1986. Washington State University Cooperative Extension Fertilizer Guide - Winter Wheat (Eastern Washington, Dryland Area).

FG 20. 1983. Oregon State University Fertilizer Guide for Alfalfa (Eastern Oregon - East of Cascades).

FG 21. 1983. Oregon State University Fertilizer Guide for Irrigated Clover - Grass Pastures (Eastern Oregon - East of Cascades).

FG 31. 1985. Oregon State University Fertilizer Guide for Bluegrass Seed (Northeast Oregon).

[2]Proposed application rate = Total Nitrogen Requirements ÷ lb-PAN/DT from Table 2.

DT/ac = dry tons per acre.

lb N/ac = pounds of nitrogen per acre.

Table 4. Comparison of Biosolids Metals Content and Pollutant Limits
City of Union Biosolids Program - Union, Oregon

Metal	Typical Concentration[1]	Ceiling Concentration[2]	Pollutant Concentration[3]
	mg/kg		
Arsenic	<1.0	75	41
Cadmium	<0.05	85	39
Copper	3.5	4300	1500
Lead	<0.5	840	300
Mercury	0.04	57	17
Molybdenum	<0.5	75	--
Nickel	<0.2	420	420
Selenium	<1.0	100	100
Zinc	12.4	7500	2800

NOTES:

[1]Average concentration from Table 1.

[2]Pollutant ceiling concentration limits for land application of municipal sewage sludge (40 CFR 503 revised July 1996).

[3]Pollutant concentration limits for land application of municipal sewage sludge (40 CFR 503.13(b) 1 revised July 1996).

mg/kg = milligrams per Kilogram.

Table 5. Monitoring Requirements for Biosolids Land Application
City of Union Biosolids Program - Union, Oregon

Item	Monitoring Frequency	Monitoring Point	Type of Monitoring	Parameter[1]
1. Biosolids Quality (General)	Annually	Secondary Aerobic Digester	Grab Sample	As, Cd, Cu, Pb, Hg, Mo, Ni, Se, Zn, TKN, NO_3-N, NH_4-N, Total P, K, pH, Total Solids, Volatile Solids
	Monthly	Before Primary Aerobic Dig.	Grab Sample	Volatile Solids
	Monthly	After Secondary Aerobic Dig.	Grab Sample	Volatile Solids
2. Biosolids Quantity	Daily	Loads taken to fields	Volume	Gallons delivered to application site
	Daily	Land Application Site	Calculated	Pounds PAN per acre per field
4. Reporting	Daily Field Log	Application Documentation	Calculated	Quantity (tons) Quality (nutrients applied) Location (field applied to)
	Annual Report	Application Documentation	Observed/Calculated	Crops, acres applied, Nitrogen applied (lb/ac), Application rate (Dry tons/ac), Biosolids quality test data, and Vector attraction reduction monitoring/management records

NOTES:
[1]Abbreviations are defined as follows: As = Arsenic, Cd = cadmium, Cu = copper, Pb = lead, Hg = mercury, Mo = molybdenum, Ni = nickel, Se = Selenium, Zn = Zinc, Al = aluminum
TKN = total Kjeldahl nitrogen, NH_4-N = ammonium-nitrogen, NO_3-N = nitrate-nitrogen, P = phosphorus, K = potassium

FIGURES

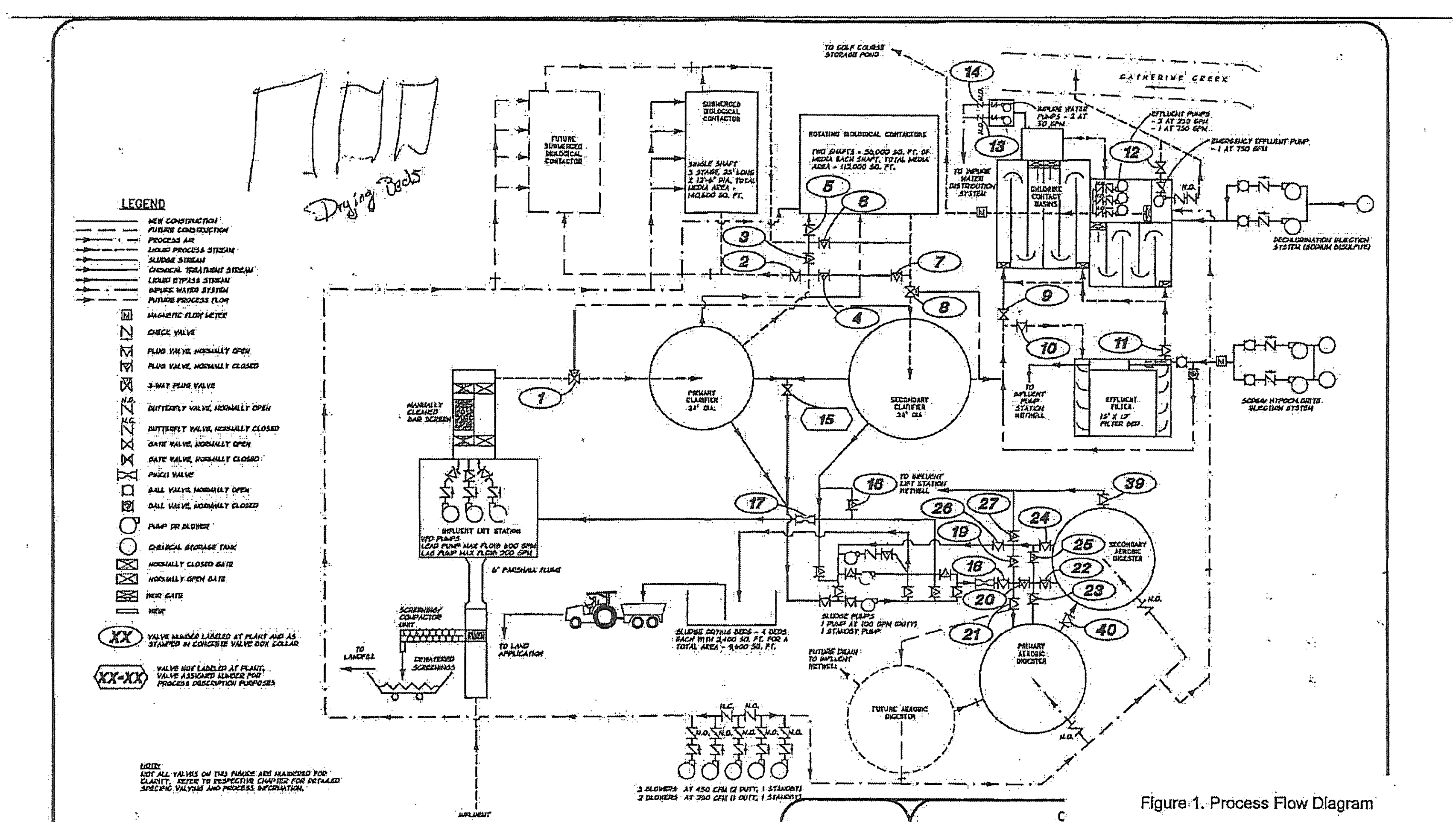
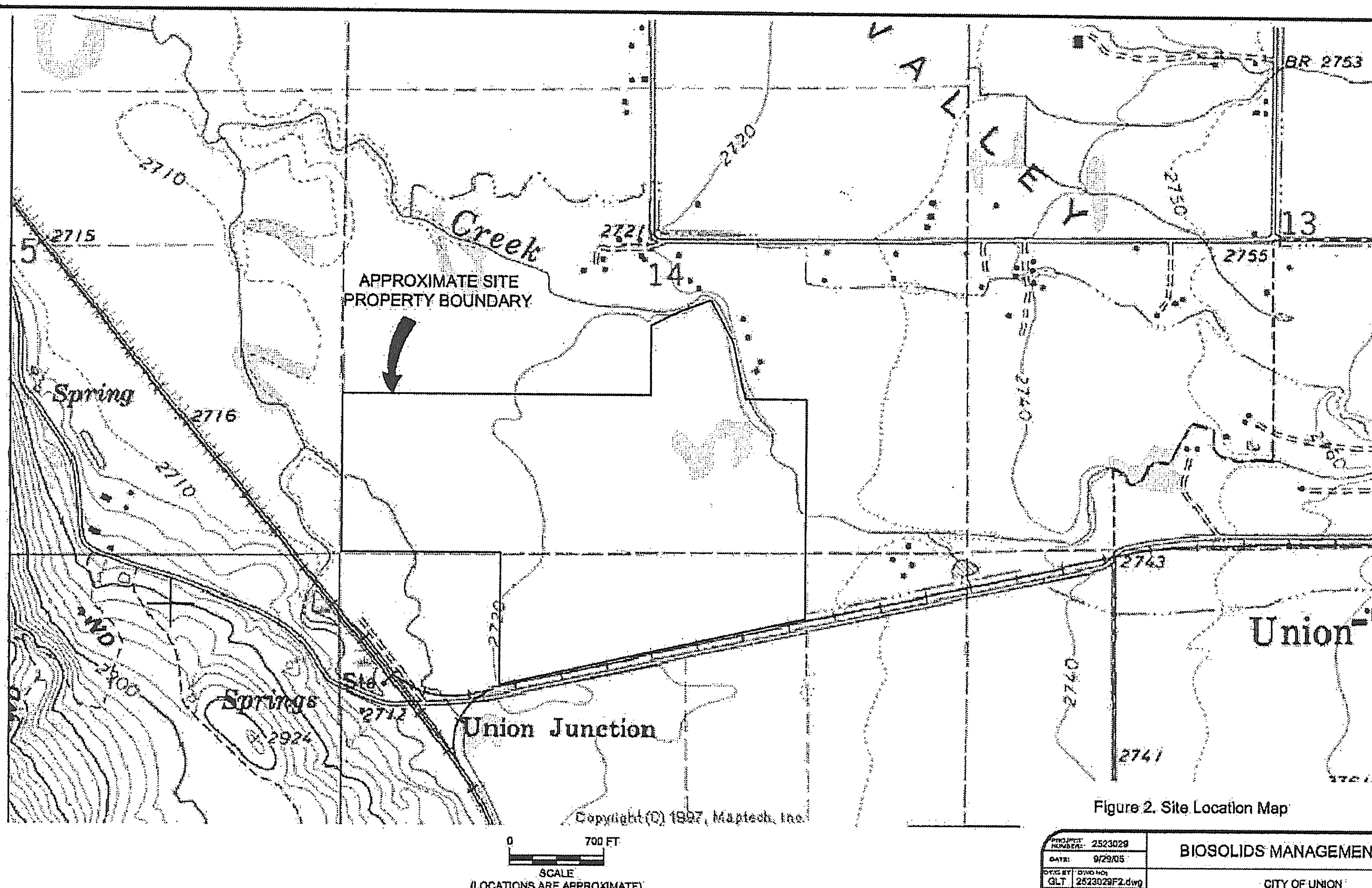


Figure 1. Process Flow Diagram

PROJECT NUMBER: 2523029		BIOSOLIDS MANAGEMENT PLAN
DATE: 9/20/05		
DWG BY: GLT	DWG NO.: 2523029F1.dwg	CITY OF UNION UNION, OREGON
PROJECT MANAGER: GLT		
REVISED:		CES CASCADE EARTH SCIENCES A Valmont Industries Company

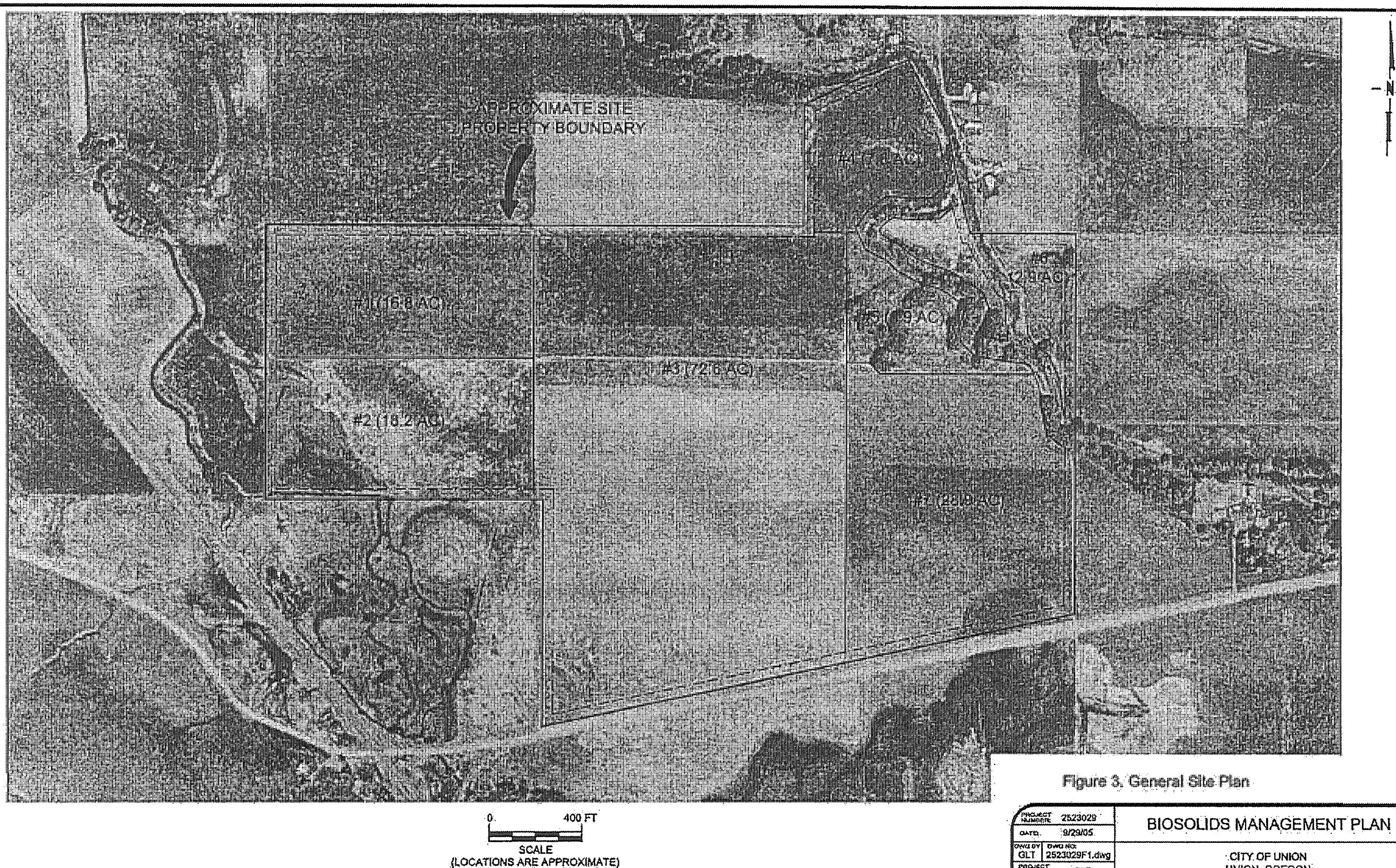
(SOURCE: Anderson-Perry Process Flow Diagram)



(SOURCE: USGS, 1964 - Union Quadrangle)

Figure 2. Site Location Map

PROJECT NUMBER: 2523029		BIOSOLIDS MANAGEMENT PLAN
DATE: 9/29/05		
DWG BY: GLT	DWG NO: 2523029F2.dwg	CITY OF UNION UNION, OREGON
PROJECT MANAGER: GLT		
REVISED:		CES CASCADE EARTH SCIENCES A Valmont Industries Company



(SOURCE: www.terraserver.com)

Figure 3. General Site Plan

PROJECT NUMBER: 2523029	BIOSOLIDS MANAGEMENT PLAN
DATE: 9/29/05	
DWG BY: GLT — DWG NO: 2523029F1.dwg	CITY OF UNION UNION, OREGON
PROJECT MANAGER: GLT	
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company

APPENDICES

Appendix A.

Biosolids Spill Response Plan

Biosolids Spill Response Procedure

A. General

1) Biosolids are nonhazardous and nontoxic. If a spill occurs, there is no need for special equipment or emergency protocol beyond that outlined in this procedure. Biosolids are primarily processed solids produced by sewage treatment plants.

2) Biosolids spilled onto pavement pose a potential road hazard because they can create wet, slick surfaces for motor vehicles, and/or can obstruct traffic flow. If biosolids remain on the surface for a sufficient time, they could be a source of potential contamination of nearby storm drains, waterways, or groundwater. Biosolids should be thoroughly removed so that no significant residues remain to be washed into any storm drain or waterway by surface water. All spilled biosolids must be returned to the trailer from which they spilled, or be loaded into another appropriate transport vehicle.

B. Personal Hygiene Procedures

1) Biosolids are processed organic residual solids from domestic sewage treatment, containing nitrogen, phosphorus, trace metals, and some pathogenic (disease-causing) organisms.

2) Personnel cleaning up a spill of biosolids should:

- Wear gloves for shoveling, sweeping or handling biosolids
- Not eat, drink, smoke or chew while working directly with biosolids
- Wash hands (and all other exposed parts of the body) with waterless hand cleaner, or soap and water, following spill clean-up and prior to eating, drinking, smoking or chewing.

C. Over-the-Road Spill Response Procedures

1) If a spill occurs on a paved road surface, place traffic cones, reflectors and/or flares to divert traffic around the spill. Remain with the spilled materials, unless it is necessary to leave temporarily to contact emergency services.

2) Appliers shall notify their Supervisor as soon as possible by radio or by phone. Give the location and amount of biosolids spilled. Also notify the Union County Sheriff's Office by telephone [911], if the spill has occurred on a public right of way.

3) If the spill occurs on a public right of way, inform the authorities that you are handling biosolids, which are nonhazardous and nontoxic. Cooperate with the authorities and assist with traffic control and cleanup.

4) Do not leave the scene of any spill, even a small one, until it is cleaned up. You may clean up small spills first and then report the spill.

D. Spill Response Procedures

1) Spilled biosolids must be prevented from migrating off the incident site, into storm drains, or into surface waters. This is especially important if an incident occurs in rainy conditions. Biosolids spills may be diked or controlled with sand, sand bags, straw, absorbents, or other blocking material.

2) Call in a vacuum truck to removed pooled biosolids from pooled areas. Dry material can be loaded with shovels or a front-end loader can load the spill. A large spill must be loaded into a vehicle by an appropriate rubber tired loader. The scene coordinator is best suited to choose the appropriate loading option to deal with the spill, based on equipment availability and spill size.

3) After the spill has been loaded, the incident site must be cleaned. Spills should be cleaned by sweeping the site free of remaining debris. Do not wash off tools or trucks at the spill location. Return tools and trucks to the wastewater treatment plant for cleaning.

4) Cleaned up spills should be taken to the original destination or back to the sewage treatment plant.

5) Spill response drills should be conducted periodically.

Appendix B.

DEQ Site Authorization

File: Huntington Sewer File

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

EASTERN REGION

October 30, 1992

Leonard Almquist, City Administrator
City of Union
P.O. Box 529
Union, OR 97883

Re: WQ-MW; City of Union;
Sludge Land Application
Authorization; Sheehy Site;

Dear Mr. Almquist:

On May 10, 1991, regional staff evaluated the Sheehy site with Doug Osburn to determine if the site would be suitable for the land application of aerobic digested sludge and drying bed sludge from the City of Union's wastewater treatment facility.

Based on our evaluation of site conditions and native soils I am pleased to inform you the Sheehy property described above is approved for the application of aerobic digested sludge and drying bed sludge subject to the following conditions:

1. Sludge processing and handling will comply with Oregon Administrative Rules for Land Application and Disposal of Sewage Treatment Plant Sludge and Sludge Derived Products Including Septage (OAR 340-50-005 to OAR 340-50-080 a copy is attached) and all other applicable statutes, rules and federal regulations;

2. Sludge volatile solids shall be reduced by 38% or more via aerobic digestion prior to land spreading;

3. The approved agronomic loading rate and site life based on the most recent sludge analysis for the Sheehy site is provided in attachment A.

RECEIVED
NOV - 2 1992
WATER QUALITY DIVISION
DEPT. ENVIRONMENTAL QUALITY

700 SE Emigrant
Suite 330
Pendleton, OR 97801
(503) 276-4063
DEQ/ER-101

4. If other sources of nitrogen will be applied to the field, the sludge application rate must be reduced so that the combined commercial, animal manure or green chop nitrogen plus sludge nitrogen does not exceed the agronomic loading rate of any field within the site;

5. A minimum setback of 200 feet shall be maintained between all wells and other water sources and points of sludge application;

6. Sludge shall be applied in a manner that will prevent ponding and runoff;

7. No food chain crops for direct human consumption shall be grown on any sludge amended area for at least 18 months following the date of last application;

8. A 30 day fallow period shall follow the application of sludge prior to grazing livestock on any field, or feeding harvested crops from sludged areas to animals;

9. Public access to the site shall be restricted for at least 12 months after sludge land spreading has ceased;

10. In the event an odor problem is reported to the Department after sludge application at the Sheehy Site, corrective action must be taken to counteract that condition;

11. The City shall maintain detailed records which describe sludge handling activities at DEQ authorized land spreading site. Records shall indicate on a field map where, when, and how much sludge was land applied to a particular site vicinity.

12. Site records shall indicate the date, location and amount of sludge applied, segments of each field that received sludge, pounds of nutrients, cadmium, copper, lead, nickel, and zinc applied to each area receiving sludge, and the type of crop grown. These records must remain available for DEQ evaluation for at least five years after sludge land application on any Department approved authorized site has been discontinued;

13. The City shall provide DEQ a monthly summary of sludge removed from the aerobic digester and the sludge drying beds that is beneficially land applied. This information is required under the wastewater treatment facility's National Pollutant Discharge Elimination System permit and needs to be included on the Discharge Monitoring Report;

14. All sludge spills shall be cleaned up by the City. The Eastern Region office shall be notified within one hour of any spills or other threats to the environment that may occur. Spills that occur after normal working hours shall

be reported to the Emergency Management Office (EMD) within one hour. The telephone number of EMD is 1-800-452-0311;

15. The Department shall have the right to enter at reasonable times City of Union's wastewater treatment facility place of record keeping to review sludge management operations and records; obtain copies of any records required under the terms of this authorization and the facility's sludge management plan; inspect any monitoring equipment required under this authorization; inspect any collection, transport, or land application vehicles and obtain any photographic documentation or evidence deemed appropriate;

16. Any changes in the current cropping practices for the Sheehy site will require Department approval. The City needs to provide the Department with a copy of the Digested Sewage Sludge Fact Sheet signed by both the City and the property owner.

17. The Department may impose any additional restrictions or conditions deemed necessary to assure adequate sludge management. Any variations from the City's approved sludge management plan and this authorization letter must receive prior written approval from the Eastern Region Office; and

18. This authorization is subject to revocation should health hazards, environmental degradation, or nuisance conditions develop as a result of inadequate sludge treatment or site management. This authorization is considered to be part of your approved sludge management plan. Therefore, if operations are not conducted in accordance with terms specified under this authorization, the Department will initiate an enforcement action which may lead to the assessment of a civil penalty.

If you have any questions regarding this site authorization, please contact me at 276-4063.

Sincerely,

Don Caldwell

Don Caldwell,
Environmental Specialist

Enc: Attachment A, City of Union Annual Solids Production Summary
OAR 340-50-005 to OAR 340-50-080

cc: Doug Osburn, Supt.
Mark Ronayne, Water Quality

Appendix C.

Soil Descriptions

LOCATION CATHERINE OR+ID WA

Established Series
Rev. WEL/WEL/RWL
01/2001

CATHERINE SERIES

The Catherine series consists of very deep, somewhat poorly drained soils that formed in mixed alluvium. Catherine soils are on flood plains and have slopes of 0 to 3 percent. The mean annual precipitation is about 17 inches, and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls

TYPICAL PEDON: Catherine silt loam - cultivated, on a 1/2 percent slope at an elevation of 2705 feet. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 8 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and irregular pores; slightly acid (pH 6.4); abrupt smooth boundary.

A1--8 to 18 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and irregular pores; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; neutral (pH 6.6); clear smooth boundary.

A2--18 to 30 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many fine and very fine tubular pores; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; neutral (pH 7.0); clear smooth boundary. (Combined thickness of the A horizon is 21 to 41 inches)

AC--30 to 40 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many fine and very fine tubular pores; many fine distinct yellowish brown (10YR 5/4) redox concentrations; neutral (pH 7.3); clear smooth boundary. (6 to 16 inches)

C1--40 to 48 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; many fine distinct yellowish brown (10YR 5/4) redox concentrations; slightly alkaline (pH 7.5); abrupt smooth boundary. (8 to 18 inches thick)

2C2--48 to 60 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam; massive; hard, firm, slightly sticky and slightly plastic; 50 percent gravel; slightly alkaline (pH 7.5).

TYPE LOCATION: Union County, Oregon; about 1.5 miles east of Island City, 1,400 feet north and 100 feet east of the Pierce Lane Bridge across the Grande Ronde River in the NW1/4SW1/4 sec. 36, T. 2 S., R. 38 E. (Latitude 45 degrees, 20 minutes, 49 seconds N, Longitude 118 degrees, 00 minutes, 46 seconds W)

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 47 to 52 degrees F, and the mean summer soil temperature is 66 to 69 degrees F. The soil is saturated with water at some period of the year but has a short dry period during the summer. The soil is noncalcareous and ranges from slightly acid to slightly alkaline. Depth to bedrock is 60 inches or more. The particle-size control section is 18 to 35 percent clay and has less than 15 percent material coarser than very fine sand. The upper 7 inches of the A horizon contain 4 to 10 percent organic matter. Depth to the 2C horizon is 40 to 60 inches.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3 moist, 3 to 5 dry and chroma of 2 or less moist and dry. It is silt loam or silty clay loam.

The lower part of the A horizon and the AC horizon have distinct or prominent redox concentrations.

The C horizon has hue of 10YR or 2.5Y, value of 3 or 4 moist, 4 to 6 dry and chroma of 2 or less. It is silt loam or silty clay loam. Lenses of volcanic ash are in some pedons below a depth of 40 inches.

The 2C horizon is stratified loamy sand, sandy loam, silt loam or light silty clay loam. It has 0 to 50 percent gravel and 0 to 15 percent cobbles.

COMPETING SERIES: These are the Afton, Clementine, Colo, Otter, Pastolla, Sawmill and Whitewood series. Afton, Clubcaf, Colo, Otter, Sawmill and Whitewood soils lack a dry summer period and have mean annual precipitation of more than 25 inches. Afton, Otter, Sawmill and Whitewood soils have a mollic epipedon less than 36 inches thick. Clementine soils have lime within depths of 20 to 40 inches. Pastolla soils are poorly drained and have calcareous horizons. Sawmill and Whitewood soils have moderate structure in the Bg horizon.

GEOGRAPHIC SETTING: Catherine soils are on flood plains and have slopes of 0 to 3 percent. Some areas are channeled; many have swales or depressions. Elevations are 600 to 4,000 feet. The soils formed in mixed alluvium. The climate is characterized by cool wet winters and hot dry summers. The mean annual precipitation is 11 to 23 inches. The mean annual temperature is 45 to 54 degrees F. The frost-free period is 100 to 195 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Baldock, Black Canyon, Conley, Hooly, Hot Lake, La Grande and Wingville soils. Baldock and Hooly soils lack a mollic epipedon. Black Canyon soils are clayey over loamy. Conley soils have a fine textured argillic horizon. Hot Lake soils are coarse-silty and have a thinner mollic epipedon. La Grande soils are moderately well drained. Wingville soils are calcareous and moderately alkaline.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; moderate permeability; a water table is at a depth of 1.5 to 4 feet during the winter and spring and has rare to occasional flooding for brief periods.

USE AND VEGETATION: These soils are used mainly for the production of wheat, alfalfa, barley and hay and pasture. Potential native vegetation is mainly sedges, rushes, tufted hairgrass, and bluegrasses.

DISTRIBUTION AND EXTENT: Valleys and basins of eastern Oregon, southeastern Washington and southwestern Idaho, MLRA 8, 9, 10, 43. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Grande Ronde Valley Area, Union County, Oregon; 1926.

REMARKS: This draft reflects a change in classification from Haplaquolls to Endoaquolls based on revisions to Soil Taxonomy.

Diagnostic horizons and features recognized in this pedon are:

mollic (cumulic) epipedon - from 0 to 40 inches (Ap, A1, A2, and AC horizons) with more than 0.6 percent organic carbon than the C1 horizon.

aquic feature - from 8 to 40 inches (A1, A2, and AC horizons) distinct redox concentrations in the lower part of the mollic epipedon.

particle-size control section - from 10 to 40 inches (part of the A1, A2 , and AC horizons)

National Cooperative Soil Survey
U.S.A.

LOCATION LA GRANDE OR

Established Series
Rev. CTH/AON
10/2002

LA GRANDE SERIES

The La Grande series consists of deep, moderately well drained soils that formed in mixed alluvium on alluvial fans and low stream terraces. Slopes range from 0 to 3 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 49 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Pachic Haploxerolls

TYPICAL PEDON: La Grande silt loam, cultivated. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 7 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and irregular pores; moderately alkaline (pH 8.0); abrupt smooth boundary. (6 to 11 inches thick)

A--7 to 14 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak medium prismatic and moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; mildly alkaline (pH 7.8); clear smooth boundary. (5 to 12 inches thick)

AB--14 to 21 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common medium tubular pores; few basalt pebbles 1/2 to 1 inch in diameter; 25 percent krotovinas of material from above about 3 to 6 inches in diameter; mildly alkaline (pH 7.8); clear wavy boundary. (7 to 14 inches thick)

Bw1--21 to 34 inches; dark yellowish brown (10YR 3/4) silty clay loam, brown (10YR 5/3) dry; many fine distinct dark grayish brown (10YR 4/2) and strong brown (7.5YR 4/6, 4/8) mottles; moderate and weak fine subangular blocky structure; slightly hard, friable, sticky and plastic;

common very fine roots; many very fine and common medium tubular pores; slightly acid (pH 6.2); gradual smooth boundary. (9 to 15 inches thick)

Bw2--34 to 44 inches; dark yellowish brown (10YR 3/4) silty clay loam, brown (10YR 5/3) dry; common fine distinct dark grayish brown (10YR 4/2) and strong brown (7.5YR 4/8) mottles; moderate and weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic;
common very fine roots; many very fine and few medium tubular pores; neutral (pH 6.6); clear wavy boundary. (8 to 12 inches thick)

2C--44 to 60 inches; multicolored extremely gravelly loam; massive; hard, firm, slightly sticky and slightly plastic; many very fine to medium tubular pores; neutral (pH 6.6).

TYPE LOCATION: Union County, Oregon; 575 feet south of the southeast corner of shop building and 47 feet west of north, south field road on Union Experiment Station; NW1/4NE1/4 sec. 24, T. 4 S., R. 39 E.

RANGE IN CHARACTERISTICS: The soils are usually moist, but are dry between depths of 4 and 12 inches for 60 to 80 consecutive days following the summer solstice. The mean annual soil temperature is 47 to 53 degrees F, and the mean summer soil temperature is 66 to 70 degrees F. The soil is saturated with water within 40 inches of the surface for 90 days during the year where not drained. The soil is noncalcareous and is slightly acid to moderately alkaline. The particle-size control section is silt loam to silty clay loam and averages 22 to 35 percent clay and less than 15 percent coarser than fine sand fragments. The mollic epipedon is 20 to 40 inches thick.

The A horizon has hue of 10YR or 2.5Y, value of 1 or 2 moist, 3 through 5 dry, and chroma of 1.5 or less.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 or 5 dry, 3 or 4 moist, chroma of 2 or 3 moist and dry to a depth of 20 inches or more and 3 or 4 below this depth. Mottles are prominent or distinct and have chroma of 2 through 8.

The 2C horizon is stratified and ranges from sand to loam with rock fragments ranging from 0 to 70 percent. Some pedons lack rock fragments to a depth of 60 inches or more.

COMPETING SERIES: These are the Athena, Tucannon and Wingville series. Athena soils are well drained. Tucannon soils are well drained and are 20 to 40 inches deep to bedrock. Wingville soils are somewhat poorly drained, lack a cambic horizon and are calcareous in the surface.

GEOGRAPHIC SETTING: The La Grande are on alluvial fans and low stream terraces. Slopes are 0 to 3 percent. Elevations are 2,200 to 4,000 feet. The soils formed in recent mixed alluvium weathered mainly from basaltic, granitic, and argillitic bedrock. The frost-free period is 110 to 160 days. The mean annual precipitation is 11 to 20 inches. The mean annual temperature is 45 to 51 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Catherine, Conley, Hoopal, Hot Lake, Phys, and the competing Wingville soils. Catherine soils are mottled in the mollic epipedon and are somewhat poorly drained. Conley soils have an E horizon and a clay argillic horizon. Hoopal soils have a duripan and are coarse-loamy. Hot Lake soils are coarse-silty, calcareous, and moderately alkaline or strongly alkaline. Phys soils are well drained and loamy-skeletal.

DRAINAGE AND PERMEABILITY: Moderately well drained; slow runoff; moderate permeability. A seasonal water table occurs at a depth of 2 to 4 feet.

USE AND VEGETATION: Mostly cultivated for wheat, alfalfa, green peas, grass seed, and pasture. Few areas are used for urban development. The natural vegetation is dominantly giant wildrye, Nebraska sedge and Baltic rush.

DISTRIBUTION AND EXTENT: Valley basins of eastern Oregon. The series is of small extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Grande Ronde Valley Area, Union County, Oregon; 1926.

ADDITIONAL DATA: Partial characterization (chemical) for 2 pedons (S64-OR-31-1) done by Oregon State University (not published).

NATIONAL COOPERATIVE SOIL SURVEY
U.S.A.

LOCATION UMAPINE WA+OR

Established Series
Rev. JJR/RJE/RWL
05/2003

UMAPINE SERIES

The Umapine series consists of very deep, somewhat poorly drained soils formed in alluvium in basins and on low terraces. Slopes are 0 to 5 percent. The mean annual precipitation is about 9 inches and the mean annual temperature is about 52 degrees F.

TAXONOMIC CLASS: Coarse-silty, mixed, superactive, calcareous, mesic Typic Halaquepts

TYPICAL PEDON: Umapine silt loam - grassland. (Colors are for dry soil unless otherwise stated)

Akn--0 to 9 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak thick platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; vesicular pores; violently effervescent; very strongly alkaline (pH 9.2); abrupt smooth boundary. (5 to 12 inches thick)

Bknl--9 to 19 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; violently effervescent; very strongly alkaline (pH 9.6); gradual wavy boundary. (0 to 15 inches thick)

Bkn2--19 to 28 inches; gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) moist; few faint redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular pores; violently effervescent; strongly alkaline (pH 9.0); gradual wavy boundary. (6 to 15 inches thick)

Bkn3--28 to 41 inches; light gray (10YR 7/1) silt loam, gray (10YR 5/1) moist; few faint redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few roots; many fine tubular pores; lime both disseminated and segregated in fine, soft masses and thread; violently effervescent; strongly alkaline (pH 8.8); clear wavy boundary.(10 to 16 inches thick)

C--41 to 60 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; few faint redox concentrations; massive; slightly hard, friable, nonsticky and nonplastic; few roots; violently effervescent; strongly alkaline (pH 8.6).

TYPE LOCATION: Adams County, Washington; 600 feet north, 540 feet east of west quarter corner section 6, T. 15 N., R. 28 E., W.M.

RANGE IN CHARACTERISTICS: These soils are saturated within 40 inches of the surface at some time of the year in most years. The mean annual soil temperature is 48 to 55 degrees F. The upper 40 inches of soil is strongly alkaline or very strongly alkaline. The exchangeable sodium percentage exceeds 15 percent in the upper 20 inches and decreases with increasing depth.

The Akn horizon has hue of 10YR or 2.5Y, value of 3 to5 moist, 5 or 6 dry and chroma of 1 to 3 moist and dry.

The Bkn horizon has hue of 10YR or 2.5Y, value of 3 to 5 moist, 5 to 7 dry and chroma of 1 or 2 moist and dry. It has redox concentrations within a depth of 20 inches in some pedons. Texture is silt loam or very fine sandy loam. Reaction is strongly alkaline or very strongly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 3 or 4 moist and 5 or 6 dry. Reaction is slightly alkaline to very strongly alkaline.

COMPETING SERIES: These are the Janise, Sinloc, and Stanflow series. Janise soils have a thin E horizon and thin Bt horizon. Sinloc soils are stratified silt loam, very fine sandy loam and fine sandy loam in the lower part of the particle-size control section. Stanflow soils are moderately well drained and have a weakly cemented layer at a depth of 20 to 40 inches.

GEOGRAPHIC SETTING: Umapine soils are in basins and on low terraces at elevations of 250 to 3,500 feet. Slopes are 0 to 5 percent. These soils formed in alluvium from loess The mean annual precipitation is 6 to 12 inches. Umapine soils are in an arid or semiarid climate.with warm, dry summers and cool, moist winters. The average January temperature is 28 degrees F. and the average July temperature is 70 degrees F. The mean annual temperature is 45 to 54 degrees F. The frost-free season is 110 to 195 decays.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burke, Powder, Shano, and Stanfield soils. Burke and Stanfield soils have a duripan. Powder soils have a mollic epipedon, have low exchangeable sodium and are on alluvial fans and bottomlands. Shano soils have low sodium content, an aridic moisture regime and are on terraces, hills and plateaus. Stanfield soils are on terraces. Burke soils are on uplands.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; slow runoff; moderate permeability. It has common to rare flooding during January to April.

USE AND VEGETATION: These soils are used mainly for native livestock grazing. Some areas are drained and reclaimed and used for irrigated cropland. Native vegetation is greasewood, big sagebrush, inland saltgrass, Basin wildrye inland, and other halophytic plants.

DISTRIBUTION AND EXTENT: Central and southeastern Washington and eastern Oregon. MLRA 7, 8. Series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Baker Area, Oregon, 1941.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
Ochric epipedon - the zone from 0 to 9 inches
Exchangeable sodium - more than 15 percent in the upper 20 inches of the soil and becomes less with increasing depth
Particle-size control section - the zone from 10 to 40 inches

---

National Cooperative Soil Survey
U.S.A.

Appendix D.

Example Forms/Reports

Daily Biosolids Application Log

Project Name: ______________________________ **Date:** ____________

Load #	Weight/Volume[1]	% Solids[2]	Dry Ton Volume[3]	Site Delivered[4]

NOTES:

[1]Load volume in gallons.

[2]Percent solids from most recent laboratory analysis.

[3]Column 1 x Column 2 corrected for units.

[4]Refer to Biosolids Management Plan for site number (i.e., Plots 1 through 7)

Page ________ of ________

Biosolids Annual Report Form

Facility Information

DEQ File Number:______________ **Permit Number:**

Name ______________________________ Permit Type: NPDES ___________

Location Address ______________________________ WPCF ___________

Mailing Address ______________________________

Contact name ______________________ Telephone: ______________________

E-mail ______________________ Fax: ______________________

Biosolids Process Descriptions

Generation

Wastewater Sources & Volumes:

	Gallons/yr
Municipal	
Industrial	
Septage	
Total Gallons	

Solids Produced:

	Dry Tons (DT)/yr
primary	
secondary	
other	
Total DT	

Preparation

Mark applicable processes and on separate sheet describe the processes and equipment used for:

screening
grit removal
settling
thickening
digestion
dewatering

Storage

For each container type, list numbers, sizes, materials (i.e. steel, etc.) and volume.

Containers	X number of units	X volumes of each storage container	(material)	= total volume
tanks				
clarifiers				
lagoons				
drying beds				
other				
other				
TOTAL CAPACITY:				

Application

List transport equipment used from facility to sites (e.g. 3,000 gal. tanker truck).

→

List application method and equipment used to apply at sites

Biosolids Annual Report Form

(e.g. truck splash plate, spray gun, manure spreader, etc.).

→

Biosolids Quality

EQ		Class A		Class B	

Testing frequency (times/yr)	1	4	6	12
[in Metric Tons]	[<290]	[290>1,500]	[1,500>15,000]	[≥ 15,000]
[in U.S. Tons]	[<319]	[319>1,650]	[1,650>16,500]	[≥ 16,500]

[Choose one, based on dry weight of biosolids produced and land applied annually.]

Test data

Use Tables below to record quarterly or annual testing results; use average column for annual test data. If testing more frequently (monthly), supply data on separate sheet.

Nutrient Monitoring

Item	1st quarter	2nd quarter	3rd quarter	4th quarter	Average
TKN					
NO_3-N					
NH_4-N					
P					
K					
pH					
Total Solids					
Vol. Solids					

Test data is expressed in % dry weight (dw), except pH which is standard units.

Pollutant Monitoring

Metals	1st quarter	2nd quarter	3rd quarter	4th quarter	Average
As					
Cd					
Cr					
Cu					
Pb					
Hg					
Mo					
Ni					
Se					
Zn					

Biosolids Annual Report Form

Pathogen Reduction Monitoring & Records

Circle selected pathogen reduction alternative below and on a separate sheet:

- Describe process used to reduce pathogens
- State operational parameters met (e.g. time & temperature)
- Attach monitoring data and certification statement

Part 503.32 Pathogen Reduction Alternatives

Class A Alternatives

[requires tests for fecal coliform &/or *Salmonella* sp.]

1. time & temperature
2. pH >12, 72 hr;@52°C,12hr, >50%TS
3. pre- & post-testing for enteric virus & helminth ova
4. post-testing for enteric virus & helminth ova
5. PFRP: 1 composting
   2 heat drying
   3 heat treatment
   4 thermophilic aerobic
   5 beta ray irradiation
   6 gamma ray irradiation
   7 pasteurization
6. PFRP equivalent

Class B Alternatives

1. 7 samples, geometric mean < 2,000,000 MPN or CFU/g TS
2. PSRP: 1 aerobic digestion
   2 air drying
   3 anaerobic digestion
   4 composting
   5 lime stabilization
3. PSRP equivalent

Vector Attraction Reduction (VAR) Monitoring & Records

Circle selected alternative and on separate sheet:

- Describe VAR process used
- Describe operational parameters met (e.g. pH & time)
- Attach monitoring data and certification statement

Part 503.33 Vector Reduction Alternatives

In-plant alternatives

1. 38% min. reduction of volatile solids
2. anaerobic bench scale digestion
3. aerobic bench scale digestion
4. SOUR aerobic 1.5mg O^2/hr/g TS (dw)
5. aerobic 14 days>45°C average temp.
6. pH ≥ 12 for 2 hr, + 22 hr ≥ 11.5 pH
7. secondary solids ≥ 75% solids
8. primary solids ≥ 90% solids

Site management alternatives

9. subsoil injection within 8 hr
10. soil incorporation within 6-8 hr

Other alternatives

11. (for disposal units only)
12. septage only
    pH ≥ 12 for at least 30 min.

Biosolids Annual Report Form

Land Application Site Information

For all sites used during the reporting year period, provide the following information:
(This information can be provided on a separate spreadsheet if available.)

Site Name (resident)	Site ID No.	Location (Sec,Twn,Rge)	Crop(s)	Acres applied	N lb/ac applied	Application rate DT/ac	Total DT/site	Seasonal restrictions

NOTE: Attach the following items if applicable.

Soil test data if site is proposed for application for third consecutive year.
This will apply to all sites used in 1998 that were applied to in 1996 & 1997.
See **OAR 340-50-080(5)**

Cumulative loadings & site life information for sites receiving biosolids with any trace pollutants exceeding Table 3 values.
See **OAR 340-50-035(6)(b)**

Appendix E
Collection System Monitor Items

Collection System Monitor Items

Work Item No.	Wastewater Collection System Sheet No.[1]	Reach or Manhole No.	Distance from Manhole (feet)	Notes
1	3	D19-D20	262	Shifted joint at tap.
2	3	D19-D20	152	Shifted joint at tap.
3	3	D29-D28	169	Rolled gasket on service tap.
4	2	B3C-B3D	156 to 205	Belly.
5	2	B3C-B3D	205	Partially submerged lateral.
6	5	B36-B37	263	Slightly offset joint at 263 feet.
7	5	B28-B28a	11	Repaired main in poor condition with possible I/I.
8	1	C29-C30	230 to 400	Belly in line.
9	3	D12-D11	52	Patched pipe in poor condition.
10	3	D17-D18	0 to 10	Belly.
11	3	D17-D18	452 to 462	Belly.
12	2	E4-E3	285	Gravel accumulation.
13	2	E3-E2	280 to E2	Belly and offset joints.
14	3	D36-D35	151	Protruding lateral.
15	3	C39-C42	48	Existing pipe repair.
16	3	D36-D35	282	Replaced pipe vertically misaligned.
17	2	E2	N/A	Raised manhole.
18	4	A29-A8	150	Protruding lateral (right) leaking 0.25 gpm.
19	2	D30-D31	23	Concrete obstacle.
20	6	A53-A54	N/A	Belly.
21	3	D13-D12	4	Spider Cracks.
22	4	A3-A4	N/A	Belly.

[1]See Figure 4-1.

Appendix F
Collection System Maintenance Items

Collection System Maintenance

Work Item No.	Wastewater Collection System Sheet No.[1]	From Manhole to Manhole	Description of Work
H1	2	1-Influent	Jet Line
H2	4	6-B1	Jet Line
H3	5	A25-A16	Jet Line
H4	5	A27-A28b	Jet Line
H5	6	A48-A49	Jet Line
H6	5	B40-B39	Jet Line
H7	4	B25-B26	Jet Line
H8	5	B34a-B34b	Jet Line
H9	2	C15-C14	Jet Line
H10	2	C15-D1	Jet Line
H11	2	C7a-C7	Jet Line
H12	3	C37-C45	Jet Line
H13	3	C53-C54	Jet Line
H14	3	C59-C58	Jet Line
H15	3	D18-D20	Jet Line
H16	3	D47-D50	Jet Line
H17	3	D38-D35	Jet Line
H18	3	D42-D44	Jet Line
H19	5	D63-D62	Jet Line
H20	5	D56b-D56a	Jet Line
H21	5	D57-D58	Jet Line
M1	1	C32-C31	Jet Line
M2	2	C9-C8	Jet Line
M3	2	C12-C11	Jet Line
M4	3	C38-C37	Jet Line
M5	3	C40-C39	Jet Line
M6	3	C47-C49	Jet Line
M7	3	C52-C51	Jet Line
M8	4	A12-A11	Jet Line
M9	5	A31-A30	Jet Line
M10	5	A16-A17	Jet Line
M11	6	A37-A36	Jet Line
M12	4	A36-A8	Jet Line
M13	6	A46-A45	Jet Line
M14	6	A55-A56	Jet Line
M15	4	B9-B8	Jet Line
M16	4	B18-B15	Jet Line
M17	2	B7-B6	Jet Line
M18	5	B33-B32	Jet Line
M19	5	B28-B28a	Jet Line
M20	2	D21-D22	Jet Line
M21	2	D6-D5	Jet Line

[1]See Wastewater Collection System Maintenance Map
H = High Priority
M = Medium Priority
L = Low Priority

anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM MAINTENANCE ITEMS

TABLE
F

Collection System Maintenance

Work Item No.	Wastewater Collection System Sheet No.[1]	From Manhole to Manhole	Description of Work
M22	2	D8-D6	Jet Line
M23	2	D33-D32	Jet Line
M24	3	D8-D9	Jet Line
M25	3	D12-D11	Jet Line
M26	3	D28-D27	Jet Line
M27	3	D51-D53	Jet Line
M28	5	D61-D61a	Jet Line
L1	5	B36-B35	Jet Line
L2	4	A14-A9	Jet Line
L3	6	A7a-A7	Jet Line
L4	5	A15a-A15	Jet Line
L5	5	A20-A19	Jet Line
L6	5	A18-A17	Jet Line
L7	5	A22-A23	Jet Line
L8	5	A30-A8	Jet Line
L9	5	A34-A33	Jet Line
L10	6	A43-A44	Jet Line
L11	6	A43-A41	Jet Line
L12	5	A38-A39	Jet Line
L13	6	A54-A50	Jet Line
L14	6	A59-A58	Jet Line
L15	6	A60-A61	Jet Line
L16	6	A62-A61a	Jet Line
L17	5	B12-B10	Jet Line
L18	5	B10-B11	Jet Line
L19	4	B15-B8	Jet Line
L20	5	B19-B18	Jet Line
L21	5	B16-B15	Jet Line
L22	5	B41-B29	Jet Line
L23	5	B28-B27	Jet Line
L24	3	C17-C18	Jet Line
L25	2	C8-C7	Jet Line
L26	3	C42-C43	Jet Line
L27	3	C56-C57	Jet Line
L28	2	D4-D3	Jet Line
L29	2	D30 -D21	Jet Line
L30	3	D23-D24	Jet Line
L31	3	D25-D23	Jet Line
L32	5	D59-D57	Jet Line
L33	2	E8-E7	Jet Line

[1]See Wastewater Collection System Maintenance Map
H = High Priority
M = Medium Priority
L = Low Priority

anderson perry & associates, inc.

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN

COLLECTION SYSTEM MAINTENANCE ITEMS

TABLE
F
CONT'D.

Appendix G
Resolution Adopting Wastewater Facilities Plan

CITY OF UNION
RESOLUTION NO. 2014-14

A RESOLUTION APPROVING THE CITY OF UNION WASTEWATER TREATMENT PLANT FACILITIES PLAN AS PART OF THE CITY'S WASTEWATER TREATEMENT PLANT COMPRESHENSIVE PLAN.

WHEREAS, the consulting firm of Anderson Perry & Associates has prepared a draft copy of the Wastewater Treatment Plant Facilities Plan; and

WHEREAS, Anderson and Perry & Associates have presented said plan to Union City council and staff; and

WHEREAS, the Union Council has held public meetings concerning the Facility Plan; and

WHEREAS, the City Council finds that the approval of the plan is necessary to help protect the public health, safety and welfare of the municipality; and

WHEREAS, Council hereby approves the facts and findings contained in the City of Union Wastewater Facility Plan.

BE IT RESOLVED BY THE COMMON COUNCIL OF THE CITY OF UNION:

PASSED AND ADOPTED by 5 members of the City Council voting therefore, and approved by the Mayor of the City of Union, Oregon, this 13th day of October, 2014.

William C. Lindsley
William C. Lindsley, Mayor

ATTEST: Sandra Patterson
Sandra Patterson, City Administrator/Recorder

Appendix H
Sewer Rate Ordinance, Rate Structure, and Sewer Use Regulations

TITLE V: PUBLIC WORKS

Chapter

§ 50.068 METERS.

(A) *Ownership.* The Water Department will own and maintain all water meters. The Water Department will not pay rent or any other charge for a meter or other water facilities, including housing and connections on a customer' s premises.

(B) *Installation.* Installation of water meters shall be performed only by authorized employees of the Water Department. All meters shall be sealed by the Water Department at the time of installation, and no seal shall be altered or broken except by one of its authorized employees.

(C) *The size and type of meter.* Applicant may request and receive any size meter regularly stocked or furnished by the Water Department, provided the request is reasonable and further provided that the meter is not greatly oversized or undersized, as determined by the Water Superintendent. The Water Department reserves the right to determine the type of meter to be installed.

(D) *Location of meters.* Meters shall normally be placed at the curb or property lines. The meter will be installed wherever the applicant desires within reason, but the location must be approved by the Water Department. The meters will not be located in driveways or other locations where damage to the meter or its related parts may occur unless protective measures are undertaken.

(E) *Joint use of meters.* The joining of several customers to take advantage of the single minimum charges and large quantity rates shall be prohibited, except under special contract, in writing, with the City Council.

(F) *Charges.*

(1) *Funds in excess of utility expenses.* If revenues received from the imposition of water and sewer rates exceed expenses of the current operation, capital improvement costs and debt service for the water and sewer systems, the excess water and sewer revenues shall be held, respectively in the Water Reserve Fund and Sewer Reserve Fund, and the use of those funds shall be limited to the future maintenance, improvement and debt payment for the water and sewer systems, respectively.

(2) *Water; residential equivalent unit.*

(a) Except as provided following the chart below, the number of residential equivalent units (REUs) shall be determined by meter size, as follows:

Water Meter Size	*Number of REUs*	*Allowable Consumption Included in Base Rate (Cubic Feet)*	*Base Rate Month*
3/4-inch	1	1,000	$18
1-inch	2	2,000	$36
1 1/2-inch	4	4,000	$72

Water Meter Size	*Number of REUs*	*Allowable Consumption Included in Base Rate (Cubic Feet)*	*Base Rate Month*
2-inch	8	8,000	$144
3-inch	16	16,000	$288

(b) The number of residential equivalent units (REUs) for duplexes, triplexes, manufactured dwelling parks, multi-family dwelling and businesses with apartment where two or more dwelling units are served by a single meter, shall be the sum of the dwelling units served by that meter, irrespective of meter size. Individuals will have 180 days after passage to establish service to all residential equivalent units on nonconforming units in existence at the time of passage. After the 180 days, those units found in noncompliance will pay system development charges (SDCs).

(3) *Water rates.*

(a) All dwellings (REUs) using water from the City of Union will be required to have a three-fourths inch meter (or larger if required by special circumstances e.g., fire suppression system). The base rate water for residential service shall be $18 per month per residential equivalent unit (REU) as defined in this section, which shall include 1,000 cubic feet of water.

(b) The small business rate of $12 per month with an allowance of 200 cubic feet of water shall be allowed. This would apply to businesses not using water as part of the business and no more than two employees.

(c) For each cubic feet of water used in excess of the base allowance in divisions (F)(3)(a) and (b) above, the charge shall be $ 0.0085.

(4) *Sewer rates.*

(a) The residential equivalent unit (REU) for sewer is 725 cubic feet of effluent. Each additional REU used, such as by heavy industrial or commercial laundry use, for example, will be multiples of the REU rate similar to the water chart (division (F)(2)(a) above).

(b) The base rate for sewer service from the City of Union shall be $35 per month per residential equivalent unit (REU).

(c) Hotels, motels and RV parks will be charged one base rate for the business and pro-rated one-thirtieth per use day of rooms or hookups.

(5) *Disconnection of water service for a period of time rates (snow birds and others).* When water is disconnected a flat charge of $30.00 per month shall be charged to apply to the continuing water and sewer debt, Fire Department service, meter and line maintenance even though one is temporarily not using the residential system. (This is distributed $18.75 for sewer debt and $11.25 to a combination of water bonds and water line maintenance.)

(6) *Rates: use of water no sewer or sewer no water.*

(a) Those people on city water service but no sewer service will pay full water service ($18.00) and the amount of $18.75 for sewer debt service. No system development charges will be levied to the two customers in this situation as of the date of passage of this section.

(b) Those people on city sewer service will pay full rates for sewer and $11.25 for a combination of water bonds and water line maintenance. No system development charges will be levied to the ten customers in this situation as of the date of passage of this section.

(7) *Adjustments.* For the purposes of this section, a 2.5% adjustment of the above rates in divisions (F)(3), (4), (5) and (6) above will be made yearly to keep the water and sewer rates current with increased cost of living. (This percentage reflects an average of consumer price indexes over the past ten years.)

(a) The adjustment will automatically go into effect the first of the month 30 days following passage of this section in 2007 and thereafter on April 1 annually.

(b) The City Council shall be required to review the adjustment annually in January (but no later than March).

(c) The City Council is authorized to increase the water or sewer rates above the 2.5% adjustment prior to April 1, or at any time, in the event of an emergency defined as a major loss to the water or sewer system, the need to respond to an unfunded mandate of the State of Oregon or the U.S. Federal government, an act of God, terrorism or vandalism.

(d) The City Council is also authorized at any time to decrease water or sewer rates.

(8) *Special circumstances and requirements.* For any utility rates not expressly provided for in this section, including but not limited to utility hookup charges, standby fire rates and contract rates, the City Council retains the authority to set rates by resolution.

(G) *Effective date of metered rates.* The rates herein provided to be paid and collected shall be effective for all collection periods beginning on and after the date on which the City Council, by resolution, established the beginning of metered charges.
(Ord. 421, passed 5-30-1990; Ord. 508, passed 6-28-2007)

- Home »
- News & Updates
- Community Events Calendar
- Links and Resources »
- Visitor Information

Utility Billing Department

The mission of the Utility Department is to provide billing and inquiry services of the highest quality to the residents of Union in an efficient and progressive manner.

We are committed to providing these services with integrity, honesty, fairness, and a dedication to excellence while complying with all Utility Billing laws and standards.

Meter readings are conducted monthly by Public Works employees; the reads are then inputted into our database where they are calculated. A file is then created and bills are printed and mailed. Winter reads consist only of the downtown businesses and a few residents, with more residents being added each year due to the meter replacement program. Winter reads is approximately November through April.

The department also serves as a point of contact for customers who have inquiries regarding their bills and for residents who wish to establish a new account or close-out an account from a property which they have vacated. Inquiries can be made by calling City Hall 541-562-5197.

Rates

Base Water/Sewer/User Fee as of 07/01/2013
$77.77 per month

Water Rate:
$27.16 for single-family residence, (1-REU) the base water is for 1000 cubic feet.

For each cubic feet of water used in EXCESS of the base allowance the charge will be .00986.

7.48 gallons equals 1 cubic foot.
7,480 gallons equals 1000 cubic feet.

Sewer Rate:
$40.61 for a single-family residence.

Disconnect Rate: (Disconnection of service for a period of time)
Water: $20.22 and Sewer: $21.78

EMS User Fee:
$10.00 per REU

New Customer Set Up Fee:
A non refundable set up fee is required for all new applicants:
Water: $25.00
Sewer: $25.00
Total $50.00

REU = Residential Equivalent Unit
Ordinance No. 508 and Ordinance No. 515

- **Delinquent accounts**
- **Check for leaks**
- **Water adjustment**

"It has been a pleasant experience starting a small business and residence in this quaint, self-contained, small community of Union. Thank you to all of Union for their friendliness and support, We are very happy and content being a part of this beautiful historic City."

~Charma D. Vaage, Sights & Sounds Video/Consignment Shop.

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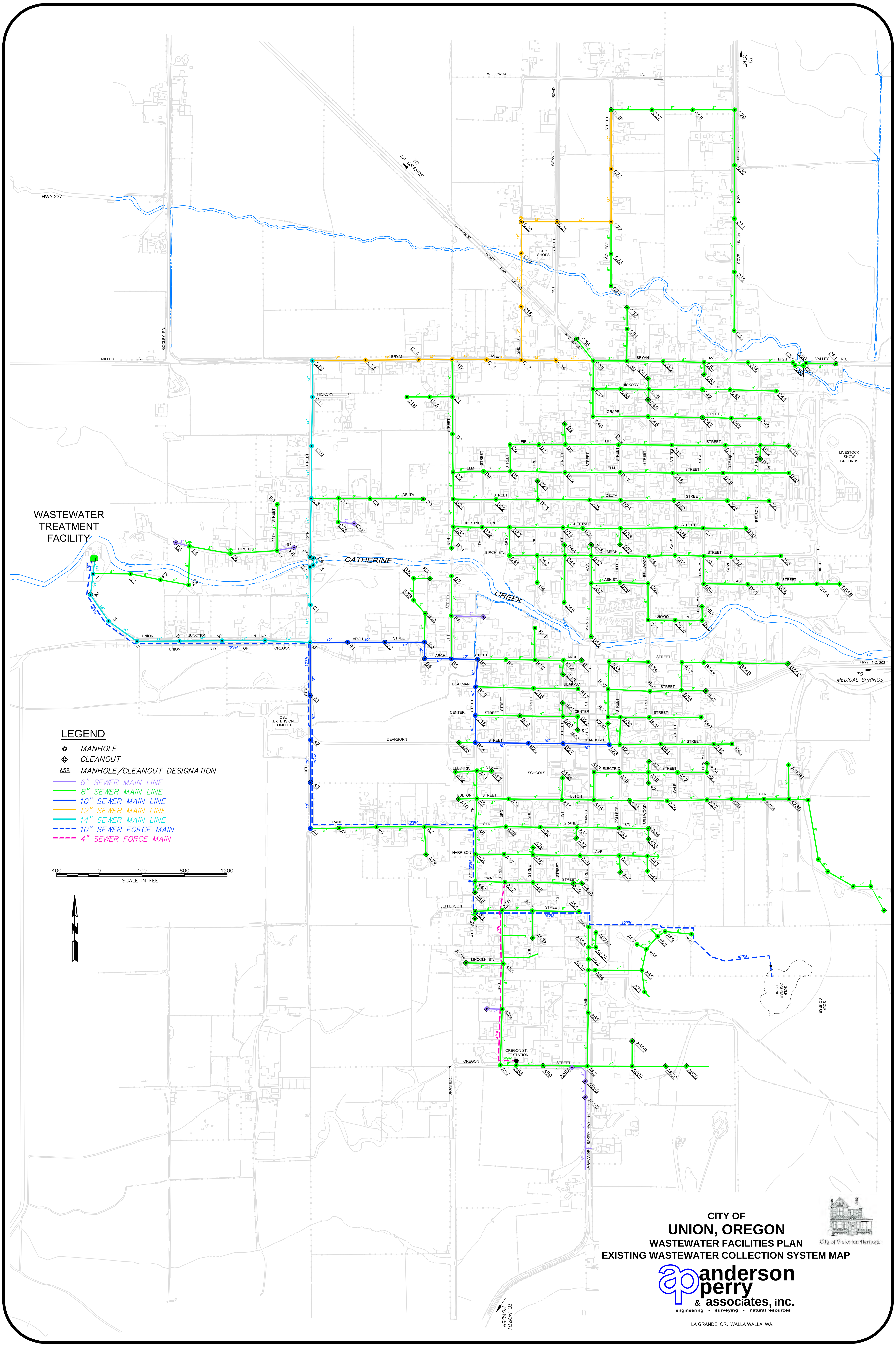

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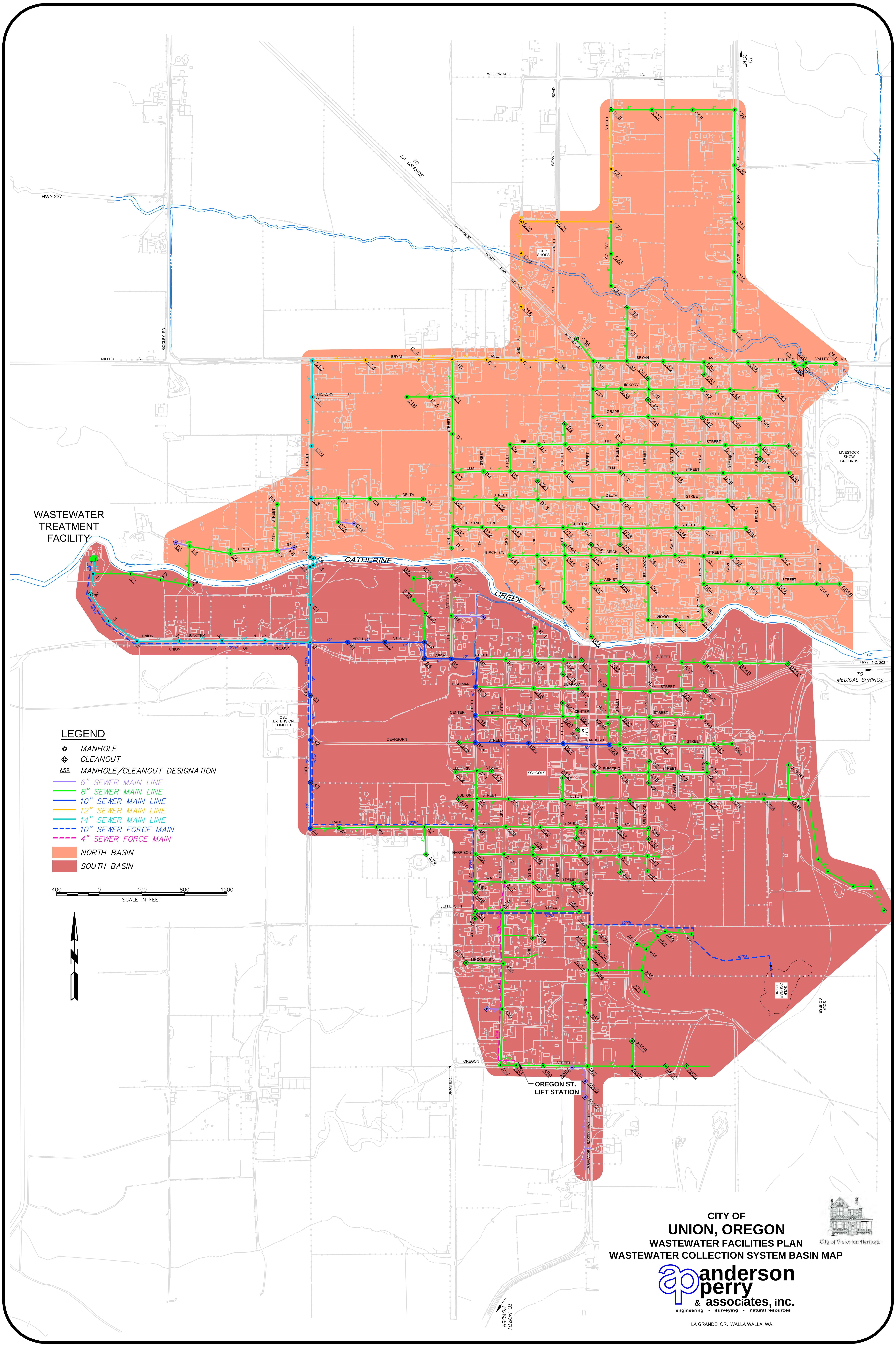

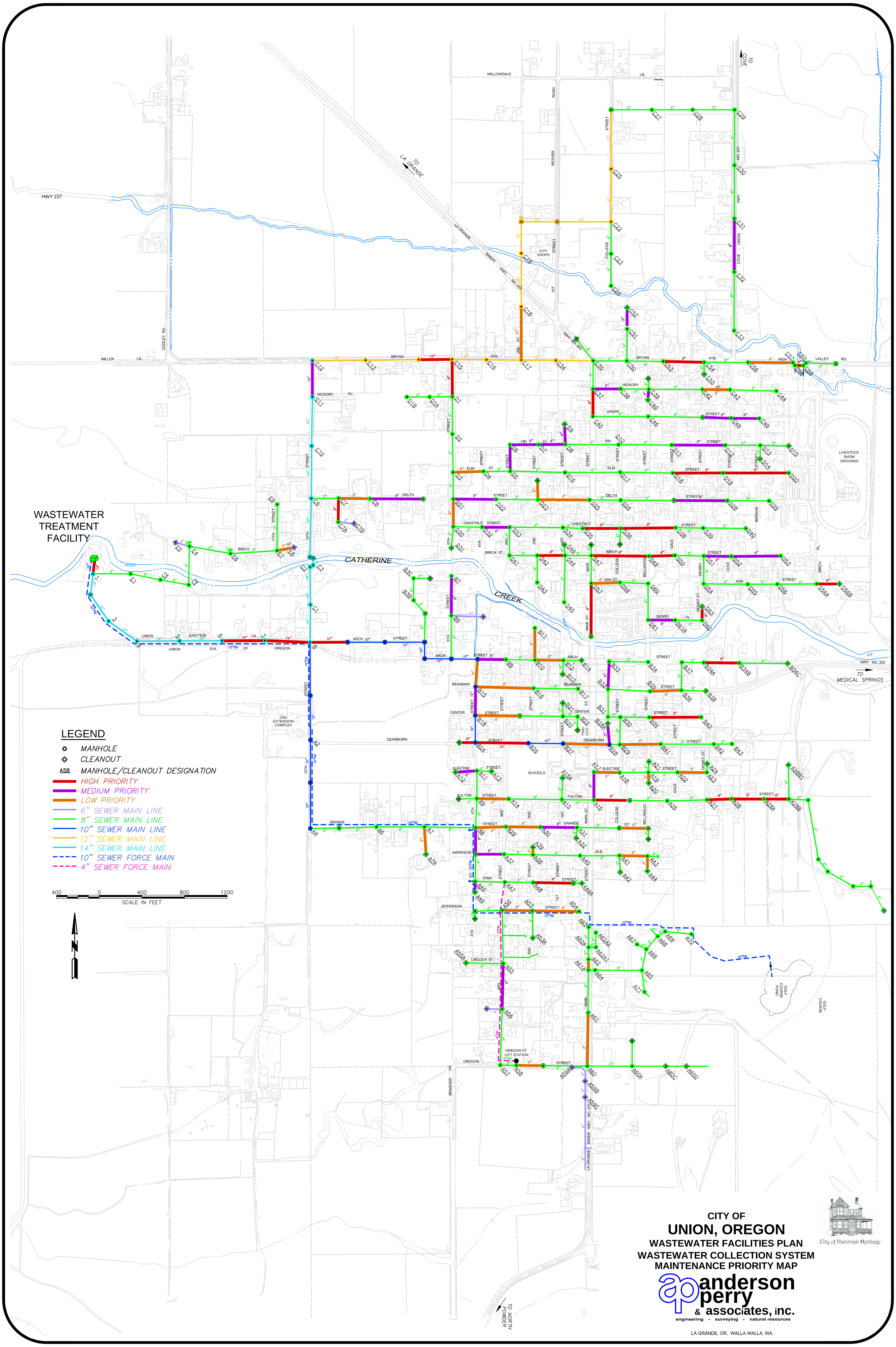

CITY OF
UNION, OREGON
WASTEWATER FACILITIES PLAN
WASTEWATER COLLECTION SYSTEM
MAINTENANCE PRIORITY MAP
anderson perry & associates, inc.
engineering · surveying · natural resources
LA GRANDE, OR. WALLA WALLA, WA.
City of Victorian Heritage
LEGEND
MANHOLE
CLEANOUT
A58 MANHOLE/CLEANOUT DESIGNATION
HIGH PRIORITY
MEDIUM PRIORITY
LOW PRIORITY
6" SEWER MAIN LINE
8" SEWER MAIN LINE
10" SEWER MAIN LINE
12" SEWER MAIN LINE
14" SEWER MAIN LINE
10" SEWER FORCE MAIN
4" SEWER FORCE MAIN
400 0 400 800 1200
SCALE IN FEET
WASTEWATER TREATMENT FACILITY
CATHERINE CREEK
TO COVE
TO LA GRANDE
TO MEDICAL SPRINGS
TO NORTH POWDER
HWY 237
LIVESTOCK SHOW GROUNDS
GOLF COURSE
GOLF COURSE POND
OSU EXTENSION COMPLEX
CITY SHOPS
SCHOOLS
OREGON ST. LIFT STATION

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