Public Notice

Planning Commission Agenda
January 5, 2016, 7:00 pm City Hall Council Chambers
898 Elk Drive, Brookings, OR 97415

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1. Call To Order

2. Pledge Of Allegiance

3. Roll Call

4. Planning Commission Chairperson Announcements

5. Public Hearings

   5.I. In The Matter Of File No. CP-2-15,
   approval of the Wastewater Facilities Plan, 2015, as well as revisions to the Public Facilities Plan (PFP) and Goal 11 of the Brookings Comprehensive Plan to reflect the Wastewater Facilities Plan. City initiated. The criteria used to decide this matter are found in Chapter 17.140 Amendments, of the Brookings Municipal Code (BMC). This is a legislative hearing and the Planning Commission will make a recommendation to City Council on this matter.

   Documents: STAFF REPORT.PDF, ATT A - WWFP VOL 1.PDF, ATT A - WWFP VOL 2.PDF, ATT B - PFP.PDF, ATT C - GOAL 11.PDF

6. Minutes For Approval

   6.I. Minutes Of Regular Planning Commission Meeting Of November 17, 2015.

   Documents: 11-17-15 PC MINUTES.PDF

7. Unscheduled Public Appearances

8. Report From The Planning Staff

   8.I. Citizen Involvement Report

   Documents: CCI REPORT 2015.PDF

9. Planning Commission Business

   9.I. Election: Chair And Vice-Chair

10. Adjournment

All public meetings are held in accessible locations. Auxiliary aids will be provided upon request with 10 days advance notification. Please contact 469-1137 if you have any questions regarding this agenda.

CITY OF BROOKINGS PLANNING COMMISSION
STAFF REPORT

SUBJECT: Comprehensive Plan Amendment
FILE NO: CP-2-15
HEARING DATE: January 5, 2016

REPORT DATE: December 23, 2015
ITEM NO: 5.1

GENERAL INFORMATION

APPLICANT: City Initiated.
REPRESENTATIVE: City Staff.
REQUEST: Approval of the Wastewater Facilities Plan (WWFP), 2015, as well as text revisions to the Public Facilities Plan (PFP) and Goal 11 Public Facilities and Services to reflect the information from the master plan. City initiated.

PUBLIC NOTICE: Published in local newspaper.

BACKGROUND INFORMATION

Although Master Plans are developed to assess needs over a 20 year time period, it is prudent to review them on a 5 year schedule to determine that the assumptions used in their development continue to be viable. The last update to the WWFP was done in 2008 by former City Engineer, HGE.

The purpose of the WWFP is to provide guidance for the following:

- Identifying potential improvements and management options
- Prioritize the repair of aging infrastructure
- Address current sizing needs
- Serves as a planning document to meet long term growth needs within the City
- Addresses regulatory requirements for health, sanitation and security
- Identifying funding options for financing

Minor inconsistencies, unnecessary background information and scriveners errors have been identified by Planning Commission members and have been brought to the attention of the Dyer Partnership. These items will be corrected prior to final adoption.

Revisions have been made to the Public Facilities Plan and Goal 11, Public Facilities and Services of the Brookings Comprehensive Plan to reflect the information from the WWTP. All documents will be presented to Council for adoption after recommendation of the Planning Commission.

RECOMMENDATION

After careful consideration, and any input the public may provide, Staff supports a Planning Commission recommendation of approval of file CP-2-15, Wastewater Facilities Plan, and revisions to the Public Facilities Plan and Goal 11, to the City Council.

Volume 1

CITY OF BROOKINGS

WASTEWATER FACILITIES PLAN

Prepared By:

The Dyer Partnership

Engineers & Planners, Inc.

Engineers, Planners, Surveyors,

Water, Wastewater, Transportation

Project 145.49 November 2015

City of Brookings

Curry County, Oregon

WASTEWATER FACILITIES PLAN

November 2015

Project No. 145.49

The Dyer Partnership
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Table of Contents

VOLUME 1

SECTION 1: PROJECT PLANNING

1.1 Introduction and Location 1-1
Figure 1.1.1 Planning Area 1-3
Figure 1.1.2 Terrain Map 1-4

1.2 Environmental Resources 1-5
Figure 1.2.1 Monthly Temperature Data 1-5
Figure 1.2.2 Monthly Precipitation Data 1-6
Figure 1.2.3 Wetlands Inventory 1-8
Figure 1.2.4 100-Year Flood Plain 1-9
Figure 1.2.5 Seismic Map 1-10
Figure 1.2.6 Earthquake Hazard Map 1-10
Figure 1.2.7 Tsunami Risk Area 1-11
Figure 1.2.8 Landslide Risk Area 1-12

1.3 Population Trends 1-13
Figure 1.3.1 Population Forecast 1-14
Table 1.3.1 Population Forecast Table 1-14

1.4 Community Engagement 1-15

SECTION 2: EXISTING FACILITIES

2.1 Location Map 2-1

2.2 History 2-1

2.2.1 General 2-1
2.2.2 Wastewater Pump Stations and Harbor Sanitary District Contribution 2-1
2.2.3 Wastewater Treatment Plant Liquid Stream 2-1
2.2.4 Wastewater Treatment Plant Solids Handling 2-2

2.3 Condition of Existing Facilities 2-2

2.3.1 Existing Collection System 2-2

2.3.1.1 Inventory of Collection System 2-2
Table 2.3.1.1.1 Wastewater Collection System Inventory 2-11
Figure 2.1.1 Existing Collection System 2-3
Figure 2.1.2 Existing Collection System 2-4
Figure 2.1.3 Existing Collection System 2-5
Figure 2.1.4 Existing Collection System 2-6
Figure 2.1.5 Existing Collection System 2-7
Figure 2.1.6 Existing WWTP Site 2-8
Figure 2.1.7 Flow Schematic – Liquid Stream 2-9
Figure 2.1.8 Flow Schematic – Solid Stream 2-10

2.3.1.2 Infiltration and Inflow 2-11
2.3.1.3 Smoke Testing 2-11
Table 2.3.1.3.1 Smoke Testing Number and Type of Deficiencies 2-12
Figure 2.3.1.3.5 Smoke Testing Results Summary, Number of Violations by Type 2-12
Table 2.3.1.3.2 Report Numbers According to Deficiency Type 2-13
2.3.1.4 Flow Mapping 2-14
2.3.1.5 Collection Sewer Summary 2-14
2.3.1.6 Pump Stations 2-14
2.3.1.7 Miscellaneous Pump Station Items 2-16

2.3.2 Existing Treatment Facilities 2-17
2.3.2.1 Headworks 2-17
Table 2.3.2.1.1 Bar Screens and Grit Removal Chamber Capacities 2-17
2.3.2.2 Primary Sedimentation 2-17
Table 2.3.2.2.1 Primary Sludge Clarifiers Capacity 2-18
2.3.2.3 Primary Sludge and Scum Pumping 2-18
Table 2.3.2.3.1 Primary Sludge and Scum Pump Capacities 2-19
2.3.2.4 Trickling Filter 2-19
Table 2.3.2.4.1 Trickling Filter Capacities 2-19
2.3.2.5 Snail Removal 2-19
Table 2.3.2.5.1 Snail Removal and Pump Capacities 2-20
2.3.2.6 Solids Contact/Sludge Re-aeration Basins 2-20
Table 2.3.2.6.1 Basin and Aeration Blower Capacities 2-20
2.3.2.7 Secondary Clarifiers 2-21
Table 2.3.2.7.1 Secondary Clarifier Capacities 2-21
2.3.2.8 Return Activated Sludge (RAS) and Clarifier Drain Pumps 2-21
Table 2.3.2.8.1 RAS and Clarifier Drain Pump Capacities 2-21
2.3.2.9 Disinfection 2-21
Table 2.3.2.9.1 2-22
2.3.2.10 Sludge Thickener 2-22
Table 2.3.2.10.1 Sludge Thickener Capacities 2-22
2.3.2.11 Digester 2-22
Table 2.3.2.11.1 Digester Capacities 2-23
2.3.2.12 Sludge Storage 2-23
Table 2.3.2.12.1 Sludge Capacities 2-24
2.3.2.13 Sludge (Biosolids) Dewatering 2-24
Table 2.3.2.13.1 Sludge Dewatering System Capacity 2-24
2.3.2.14 SCADA System 2-24
2.3.2.15 Electrical System Including Generator 2-24
2.3.2.16 Plant Water Pumps 2-25
Table 2.3.2.16.1 Plant Water Pressure 2-25

2.4 Financial Status 2-25

2.4.1 Financial Statement 2-25
Table 2.4.1.1 Wastewater Revenue and Resources 2-25
Table 2.4.1.2 Wastewater Expenditures 2-26
Table 2.4.1.3 SRF Revenue and Resources 2-26
Table 2.4.1.4 SRF Expenses 2-26
Table 2.4.1.5 SDC Revenue and Resources 2-27
Table 2.4.1.6 SDC Expenses 2-27
2.4.2 Current Rate Schedule 2-27
Table 2.4.2.1 Monthly Sewer Rates 2-27
2.4.3 Annual O&M Costs 2-28
Table 2.4.3.1 Wastewater Collection System O&M 2-28
Table 2.4.3.2 Wastewater Treatment O&M 2-29
2.4.4 Capital Improvement Program 2-29

Table 2.4.4.1 Wastewater Collection System Capital Improvements 2-29
Table 2.4.4.2 Wastewater Treatment Capital Improvements 2-30
2.4.5 Debts and Reserve Accounts 2-30
Table 2.4.5.1 Wastewater Loan Fund Revenue and Resources 2-30
Table 2.4.5.2 Wastewater Loan Fund Expenses 2-30
2.4.6 Tabulation of Users by Category 2-30
Table 2.4.6.1 User Types and Equivalent Dwelling Units (EDUs) 2-31

2.5 Water/Energy/Waste Audits 2-31

2.5.1 General WWTP 2-31

SECTION 3: NEED FOR PROJECT

3.1 Health, Sanitation and Security 3-1
3.1.1 Current NPDES Permit Requirements 3-1
3.1.2 Potential Future Regulatory Issues 3-3

3.2 Design Criteria and Considerations 3-3
3.2.1 Design Period 3-3
3.2.2 Collection System 3-3
3.2.3 Wastewater Treatment Facility 3-4

3.3 Aging Infrastructure 3-7
3.3.1 Infiltration and Inflow 3-7
Figure 3.3.1.1 WWTP Plant Flow Trends 2010-2013 3-8
Table 3.3.1.1 I/I Analysis Summary 3-9

3.4 Reasonable Growth 3-9
Table 3.4.1 City of Brookings Storm Events 3-10
3.4.1 Dry Weather Flow 3-11
Figure 3.4.1.1 Average Plant Flow vs. Winter Rainfall 3-11
3.4.2 Wet Weather Flow 3-12
Figure 3.4.2.1 Rainfall Storm Event vs. Plant Inflow 3-13
Figure 3.4.2.2 Brookings WWTP (2013) Existing Inflow Rates 3-14
Table 3.4.2.1 Brookings WWTP (2013) Existing Influent Flow Rates 3-14

3.5 Wastewater Composition 3-15
Table 3.5.1 WWTP Influent Concentrations and Loads 3-15
Table 3.5.2 Wastewater Design Compostion Values 3-16

3.6 Projected Wastewater Characteristics 3-16
Figure 3.6.1 Future Peak Flows and Existing Flows 3-17
Table 3.6.1 Wastewater Flows 3-17
Table 3.6.2 Wastewater Treatment Design Values 3-18

SECTION 4: ALTERNATIVES CONSIDERED

4.1 Gravity Collection System 4-1
4.1.1 Inflow/Infiltration Reduction 4-1
Table 4.1.1.1 Priority 1 I/I Projects 4-4
Table 4.1.1.2 Priority 2 I/I Projects 4-4
Figure 4.1.1.1 I/I Reduction Projects 4-5
Figure 4.1.1.2 I/I Reduction Projects 4-6
Figure 4.1.1.3 I/I Reduction Projects 4-7
Figure 4.1.1.4 I/I Reduction Projects 4-8

Figure 4.1.1.5 I/I Reduction Projects 4-9
4.1.2 Priority 1-New Sewer Improvements to Service Lone Ranch Vicinity & Harbor Sanitary District 4-10
Figure 4.1.2.1 New Sewer Replacement/Rehabilitation 4-13
Figure 4.1.2.2 New Sewer Replacement/Rehabilitation 4-14
Figure 4.1.2.3 New Sewer Replacement/Rehabilitation 4-15
Figure 4.1.2.4 New Sewer Replacement/Rehabilitation 4-16
Figure 4.1.2.5 New Sewer Replacement/Rehabilitation 4-17
Table 4.1.2.1 Priority 1-Project Costs to Serve Lone Ranch & Vicinity 4-18
4.1.3 Priority 2-Sewer Main Replacements/Rehabilitation 4-18
Table 4.1.3.1 Priority 2-Costs for Sewer Main Replacement/Rehabilitation 4-21

4.2 Pump Stations 4-22
4.2.1 Priority 1-Pump Station Improvements 4-22
Table 4.2.1.1 Pump Station Improvements Priority 1 4-24
4.2.2 Priority 2-Pump Station Improvements 4-24
Table 4.2.2.1 Pump Station Improvements Priority 2 – Immediate 4-26
Table 4.2.2.2 Pump Station Improvements Priority 2 – Future 4-26
4.2.3 Priority 3-Pump Station Improvement Items 4-26
Table 4.2.3.1 Pump Station Improvements Priority 3 4-28
Table 4.2.3.2 Pump Station Improvements Priority 3 – Future 4-29

4.3 WWTP Upgrades 4-29
4.3.1 Alternatives Considered But Found Non-Viable 4-29
4.3.1.1 High Pressure Gas Storage Tank 4-29
4.3.1.2 Low Pressure Gas Storage Tank 4-30
4.3.1.3 Gas Dome Addition for Gas Storage 4-30
4.3.1.4 Outside pipe Insulation to Conserve Heat 4-31
4.3.1.5 Digester Roof Insulation to Conserve Heat 4-31
4.3.1.6 Replace Existing Boiler with New Co-Burn Boiler 4-32
4.3.1.7 Improved Digester Mixing 4-32
4.3.1.8 Feeding of F.O.G. to Digester 4-32
4.3.1.9 Electrical Generation from Excess Methane 4-33

4.4 Viable WWTP Upgrades 4-33
4.4.1 Coatings and Corrosion Protection 4-34
Table 4.4.1.1 Corrosion Protection 4-35
4.4.2 Headworks 4-35
Table 4.4.2.1 Replace Mechanical Bar Screen - Immediate 4-35
Table 4.4.2.2 Replace Mechanical Bar Screen, Degritter and Classifier Rehabilitation - 10-year Future 4-36
4.4.3 Primary Clarifiers 4-36
Table 4.4.3.1 Primary Clarifier Rehabilitation – 10 Year Future 4-36
4.4.4 Trickling Filter 4-37
Table 4.4.4.1 Cost Estimate – Trickling Filter Rehabilitation 4-37
4.4.5 Re-eration/Solids Contact Process 4-37
Table 4.4.5.1 Cost Estimate Re-aeration System Rehabilitation-Immediate 4-38
Table 4.4.5.2 Cost Estimate Re-aeration System Rehabilitation-10-Year 4-38
4.4.6 Secondary Clarifiers, Scum, RAS and WAS Pumping 4-38
Table 4.4.6.1 Cost Estimate Secondary Clarifier, WAS, RAS and Scum Pumps - 5-year 4-39
Table 4.4.6.2 Cost Estimate Secondary Clarifier, WAS, RAS and Scum Pumps - 10-year 4-39
4.4.7 UV Disinfection System 4-39
Table 4.4.7.1 Cost Estimate - UV System Replacement - Immediate 4-40
4.4.8 Replace Digester Gas Pressure 4-40

Table 4.4.8.1 Cost Estimate Replace Digester Burner 4-41
4.4.9 Modify Digester Liquid Operation Level 4-41
Table 4.4.9.1 Methane Loss and Diesel Use 4-42
Table 4.4.9.2 Cost Estimate Modify Operating Level of Digester 4-43
Table 4.4.9.3 Cost Estimate Temporary Sludge Treatment St 1 and 2 4-43
4.4.10 Improved Mixing for Sludge Storage Tank 3 4-44
Table 4.4.10.1 Cost Estimate: Install Mixer Sludge Tank 3 4-44
Table 4.4.10.2 Cost Estimate: Install Replacement Blower Sludge Tank 3 4-44

4.5 Cost Estimates 4-44
Table 4.5.1 ENR Index - 2005 to 2015 4-45

SECTION 5: SELECTION OF ALTERNATIVE 5-1
5.1 Cost-effectiveness and Benefit Analysis 5-1
5.1.1 Life Cycle Cost 5-1
5.1.2 Present Worth Analysis 5-2
5.1.3 Matrix Evaluation 5-2
5.2 Alternatives Selection 5-3
5.2.1 Collection System I/I Repair Projects 5-4
5.2.1.1 Priority One I/I Projects 5-4
5.2.1.2 Priority TwoI/I Projects 5-4
5.2.1.3 Collection System I/I Repair Costs 5-4
Table 5.2.1.3.1 Present Worth Analysis for Priority One I/I Repairs 5-4
Table 5.2.1.3.2 Present Worth Analysis for Priority Two I/I Repairs 5-5
5.2.1.4 Matrix Evaluation of Collection System I/I Repair Projects 5-5
Table 5.2.1.4.1 I/I Repairs 5-5
5.2.2 Collection System Expansion and Sewer Replacement 5-5
5.2.2.1 Priority One-New Improvements to Serve Lone Ranch Vicinity And Harbor Sanitary District 5-5
5.2.2.2 Priority Two - Sewer Main Replacements 5-6
5.2.2.3 Collection System Expansion and Sewer Replacement Costs 5-6
Table 5.2.2.3.1 Present Worth Analysis Harbor/Lone Ranch Priority One Improvements 5-6
Table 5.2.2.3.2 Present Worth Analysis Sewer Main Replacements Priority Two 5-6
5.2.2.4 Matrix Evaluation of Collection System Expansion and Sewer Replacement 5-7
Table 5.2.2.4.1 Evaluation of Collection System Expansion and Sewer Replacement 5-7
5.2.3 Pump Station Improvements 5-7
5.2.3.1 Priority One Pump Station Improvements 5-7
5.2.3.2 Priority Two Pump Station Improvements 5-7
5.2.3.3 Priority Three Pump Station Improvements 5-8
5.2.3.4 Pump Station Improvements Cost 5-8
Table 5.2.3.4.1 Present Worth Analysis Pump Station Improvements 5-8
5.2.3.5 Matrix Evaluation of Pump Station Improvements 5-8
Table 5.2.3.5.1 Evaluation of Pump Station Improvements 5-8
5.2.4 WWTP Upgrades 5-9
5.2.4.1 Project 1-Coatings and Corrosion Protection 5-9
5.2.4.2 Project 2-Headworks, Replace Mechanical Bar Screen, Immediate 5-9
5.2.4.3 Project 3-Headworks, Replace Mechanical Bar Screen, Classifier and Degritter, 10 Years 5-9
5.2.4.4 Project 4-Primary Clarifier Rehabilitation, 10 Years 5-9
5.2.4.5 Project 5-Trickling Filter Rehabilitation, Immediate 5-9
5.2.4.6 Project 6-Re-aeration System Rehabilitation, Immedate 5-10
5.2.4.7 Project 7-Re-aeration System Rehabilitation, 10 years 5-10
5.2.4.8 Project 8-Secondary Clarifier, WAS, RAS, and Scum Pumps, 5 Years 5-10
5.2.4.9 Project 9-Secondary Clarifier, WAS, RAS, and Scum Pumps,

10 years 5-10
5.2.4.10 Project 10-UV System Replacement, Immediate 5-10
5.2.4.11 Project 11-Replace Digester Gas Burner 5-10
5.2.4.12 Project 12-Modification of Digest Operation Level, Immediate 5-11
5.2.4.13 Project 13-Sludge Storage Tanks 2 and 3 Temporary Conversion To Digester, Immediate 5-11
5.2.4.14 Project 14-Sludge Storage Tank 3 Improved, Immediate 5-11
Table 5.2.4.14.1 Present Worth Analysis – SST #3 Alternative Projects 14.A & 14B 5-11
5.2.4.15 Project 15-WWTP Upgrades Costs 5-12
Table 5.2.4.15.1 Present Worth Analysis for WWTP Rehabilitation and Replacement Projects 5-12
5.2.4.16 Matrix Evaluation of WWTP Upgrades 5-12
Table 5.2.5.16.1 Evaluation of WWTP Projects 5-12

SECTION 6: RECOMMENDED PLAN

6.1 Collection System 6-1
6.1.1 Priority 1 - I/I Repairs 6-1
6.1.2 Priority 2 - City I/I Repairs 6-1
6.1.3 Priority 1 - Lone Ranch and Harbor Sanitary District Improvements 6-2
6.1.4 Priority 2 - Sewer Main Replacements or Rehabilitation 6-2

6.2 Pump Station Recommendations 6-2
6.2.1 Priority 1 - Pump Station Repairs 6-2
6.2.2 Priority 2 - Pump Station Repairs 6-2
6.2.3 Priority 3 - Pump Station Repairs 6-3

6.3 WWTP Recommendations 6-3
6.3.1 Project 1 - Coating and Corrosion Control Project 6-3
6.3.2 Project 2 - Headworks - Replace Mechanical Bar Screen, Immediate 6-3
6.3.3 Project 3 - Headworks - Replace Mechanical Bar Screen, Classifier and Degritter, 10 Years 6-3
6.3.4 Project 4 - Primary Clarifier Rehabilitation, 10 Years 6-3
6.3.5 Project 5 - Trickling Filter Rehabilitation, Immediate 6-4
6.3.6 Project 6 - Re-aeration System Rehabilitation, Immediate 6-4
6.3.7 Project 7 - Re-aeration System Rehabilitation, 10 Years 6-4
6.3.8 Project 8 - Secondary Clarifier, WAS, RAS, and Scum Pumps, 5 Years 6-4
6.3.9 Project 9 - Secondary Clarifier, WAS, RAS, and Scum Pumps, 10 Years 6-4
6.3.10 Project 10 - UV System Replacement, Immediate 6-4
6.3.11 Project 11 – Replace Digester Burner 6-4
6.3.12 Project 12 - Modify Digest Operation Level, Immediate 6-5
6.3.13 Project 13 - Sludge Storage Tanks 2 and 3 Temporary Conversion to Digesters, Immediate 6-5
6.3.14 Project 14 - Sludge Storage Tank 3 Improvements, Immediate 6-5

6.4 Project Cost Summary 6-5
Table 6.4.1 Summary of Recommended Projects 6-6

6.5 Permits 6-7

6.6 Project Schedule 6-7

6.7 Annual Operating Budget 6-8

SECTION 7: FINANCING

7.1 Grant and Loan Programs 7-1
Table 7.1.1 Maximum Rural Development Grant Funds Based on Median Household Income 7-3
Table 7.1.2 CWSRF Interest Rates 7-8

7.2 Local Funding Sources 7-9

7.3 Financing Strategy 7-12
Table 7.3.1 Potential Funding Scenarios 7-14
Table 7.3.2 WWTP Expansion Funding Source User Rates 7-14

VOLUME 2

APPENDICES

Appendix A DEQ Documents
Appendix B Figures and Mapping
Appendix C Cost Estimates and Funding
Appendix D Miscellaneous Reports and Studies
Appendix E Photos

SECTION 1: **PROJECT PLANNING**

1.1 Introduction and Location

Purpose
The purpose of this wastewater facilities plan is to provide the City of Brookings with a comprehensive wastewater utility planning document. This Wastewater Facility Plan (WWFP) provides guidance for the following:

- Identifying potential improvements and management options.
- Repairing aging infrastructure.
- Addressing current sizing needs.
- Serving as a planning document to meet reasonable long-term growth within the City.
- Addressing regulatory requirements for health, sanitation and security.
- Assisting the City in acquiring available funding for financing such improvements.

The plan provides an evaluation and/or improvement recommendations for the wastewater collection, pumping, and treatment facilities.

Objectives
In order to protect the public health and welfare within the planning area and to improve water quality, the overall objectives of this WWFP are to:

- Evaluate the condition of the existing collection system and assess its capacity, identifying current system deficiencies.
- Estimate current and projected wastewater flows and loads from within the current city limits.
- Develop potential wastewater collection system improvements to correct existing problems and to serve existing and future development within the city limits consistent with DEQ regulations and requirements.
- Fulfill the engineering planning document requirements of the DEQ Clean Water State Revolving Fund, Oregon Business Development Department's Infrastructure Finance Authority, and U.S.D.A. Rural Development.
- Provide cost estimates and phasing recommendations for the recommended improvements.

- Provide recommendations for improvements to the wastewater treatment facility that will (once in operation) Meet the conditions of the effluent discharge permit, comply with total maximum daily load (TMDL) restrictions if any, and provide treatment capacity for future growth. The planning period for this study will be through the year 2035 for these objectives. Municipal treatment and pumping equipment is typically designed for a 20-year life. A longer planning period allows additional time for planning, securing funding, design, and construction, before to the facilities becoming operational. Many improvements last well beyond the 20-year design life.

Location and Limits

The City of Brookings is located on the southwest coast of Curry County in the state of Oregon. Brookings is approximately six miles north of the California border and is bordered on the south and west by the Pacific Ocean, on the east by the Chetco River, and on the north by the foothills of the Coastal Range. The area included within the city limits is approximately 2,400 acres. The planning area for this WWFP is located within the city limits, as shown on Figure 1.1.1. A general terrain map is shown in Figure 1.1.2.

There has been steady urbanization in areas outside the urban growth boundary. Most of this urbanization has occurred in the Harbor Bench area, which extends from the Harbor Sanitary District to the California border. Even though these areas are outside the urban growth boundary, the City could be required to treat wastewater from the areas if a health hazard is declared by the Oregon Health Authority.

Brookings owns and operates its own municipal wastewater collection and treatment system. The system consists of a gravity flow collection system with 12 pump stations and a wastewater treatment plant with an ocean outfall. Flows from the Harbor Sanitary District are conveyed to the Brookings system for treatment and disposal.

The City has longstanding problems with inflow and infiltration (extraneous water entering the sewer system through structural defects or physical connections with ground and surface water sources). Inflow and infiltration (I/I) removal studies were prepared in 1979 and 1997 that included recommended improvement programs. The City has implemented numerous repairs, rehabilitation projects and line replacement projects over the years. Since approximately 1996, the City has cleaned and televised most of the City's sewer mains.

In general, reduction of I/I in the collection system has been viewed as a way of accommodating area growth and maintaining treatment facility capacity. Significant area growth is anticipated; and the most immediate growth pressure is associated with development in the Lone Ranch area and other surrounding areas in the northwest part of the City.

FIGURE 1.1.1
PLANNING AREA

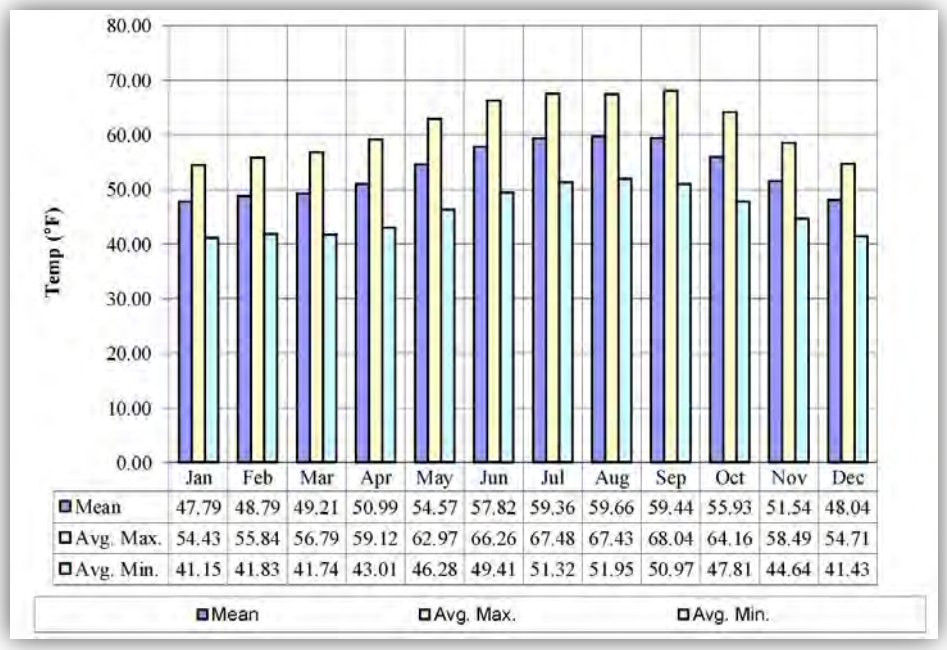
FIGURE 1.1.2
TERRAIN MAP

1.2 Environmental Resources

The following provides information about the environmental resources in and around the City of Brookings.

Climate

Brookings is located in a coastal zone that is characterized by wet winters, relatively dry summers, and mild temperature changes throughout the year. Temperatures will rarely drop below 30°F or exceed 75°F. Figure 1.2.1 summarizes the average maximum and minimum temperatures in the City.

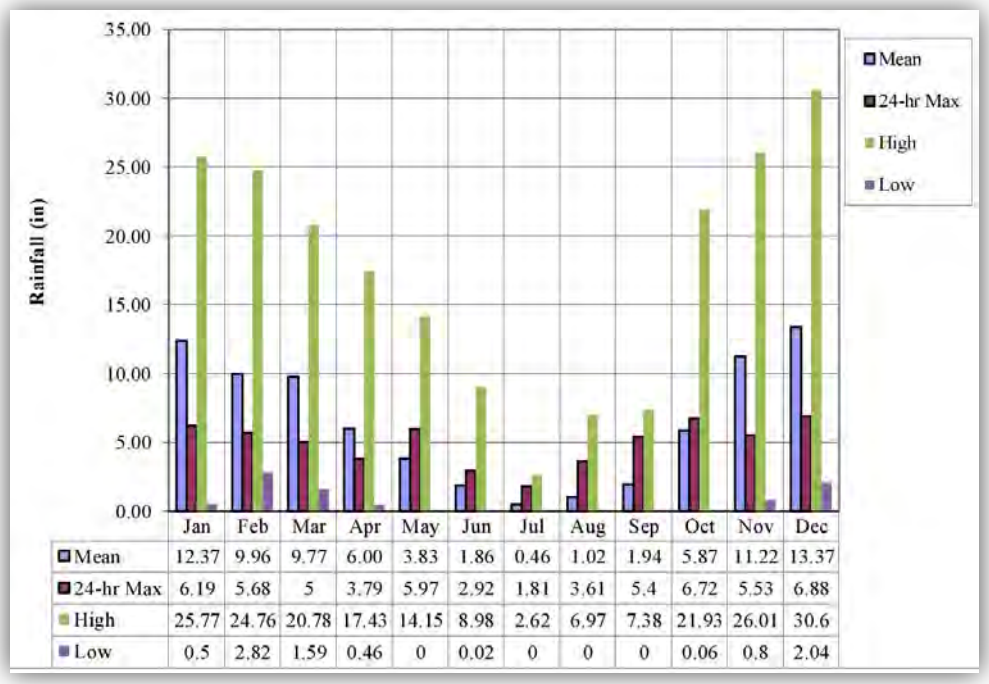


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	47.79	48.79	49.21	50.99	54.57	57.82	59.36	59.66	59.44	55.93	51.54	48.04
Avg. Max.	54.43	55.84	56.79	59.12	62.97	66.26	67.48	67.43	68.04	64.16	58.49	54.71
Avg. Min.	41.15	41.83	41.74	43.01	46.28	49.41	51.32	51.95	50.97	47.81	44.64	41.43

FIGURE 1.2.1
MONTHLY TEMPERATURE DATA

Precipitation data indicates that Brookings receives an average of 43 to 124 inches of precipitation per year. Nearly all precipitation occurs as rainfall, with the majority (approximately 73 percent) falling between the months of November and March. Moist air masses moving off the Pacific Ocean onto land, especially during the winter months, produce a significant amount of rainfall (approximately 74.64 inches per year). Rainfall averages for November, December and January are approximately 12.32 inches per month. The wettest month is December with a historic average of approximately 13.37 inches of rainfall. The driest month is July with a historic average of approximately 0.46 inches of rainfall.

Records show that the average maximum 24-hour rainfall is 4.95 inches. The largest average amount of rainfall experienced in a 24-hour period is the maximum mean 24-hour rainfall. A maximum mean 24-hour rainfall of 6.88 inches has been recorded for the month of December. Precipitation data is available from NOAA at *http://www.ncdc.noaa.gov/cdo-web/* and is also in Appendix D. Figure 1.2.2 summarizes the average monthly precipitation for the Brookings area.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	12.37	9.96	9.77	6.00	3.83	1.86	0.46	1.02	1.94	5.87	11.22	13.37
24-hr Max	6.19	5.68	5	3.79	5.97	2.92	1.81	3.61	5.4	6.72	5.53	6.88
High	25.77	24.76	20.78	17.43	14.15	8.98	2.62	6.97	7.38	21.93	26.01	30.6
Low	0.5	2.82	1.59	0.46	0	0.02	0	0	0	0.06	0.8	2.04

FIGURE 1.2.2
MONTHLY PRECIPITATION DATA

Historical Resources

In 1853 a small group of white men settled along the Chetco River Valley. Native Americans who originally inhabited the land were known as the "Cheti". The "Cheti" would peacefully harvest roots berries, and acorns from the land. They also harvested clams, mussels, sea lions and salmon from the ocean and river.

Once the white men drove the Native Americans away, they renamed the "Cheti" the Chetco. As a result the river nearby became the Chetco River. In 1856, the settlers went to work turning Chetco Harbor into a major port of call along the Pacific Coast.

In the 1870s and 1880s, travelers and merchandise would go between Chetco and Grants Pass in a wagon along a dirt road. As two wagons would meet each other one, would have to move aside to allow the other to pass. Consequently, the pioneers did not form an actual town until 1891 when The Chetco Land and Townsite Company founded the town of Harbor. A ferry crossing the Chetco was established in 1904. Once a bridge spanning the river was built in 1915, the ferry was discontinued. In the early 1900s timber had emerged as one of the region's primary economic staples. In 1921 construction began on a long railroad bridge over the mouth of the Chetco River so redwood logs could be hauled from the logging camps in California to the mill in Brookings. In 1925 the operation quit, and the bridge burned in the 1930s. Only one pier is left standing.

In September 1942, a Japanese plane dropped a bomb just north of the Brookings area. The pilot was launched from an offshore submarine. This event is notorious for representing the only foreign power to have dropped a bomb on the continental United States during World War II.

Biological Resources

The U.S. & Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are responsible for identifying and establishing programs to protect and conserve species listed as threatened or endangered by the federal Endangered Species Act of 1967. The Oregon Department of Fish and Wildlife (ODFW) is responsible for species listed as threatened or endangered by the Oregon Endangered Species Act. Threatened or endangered species (TES) known to exist in the vicinity of the City are summarized in Appendix D from the Oregon Natural Heritage Information Center.

Topography

The topography of the Brookings area is dominated by the low coastal terraces, typically having gentle relief and "The Head", which form steep to vertical slopes and high relief. An uplifted coastal marine terrace underlies most of the western portions of the coast and ranges in elevation from sea level to about 80 feet above mean sea level (MSL). The surface of the terrace slopes toward the west. Along the coast line, fore dunes and sea cliffs have low reliefs (from a few feet high to approximately 60 feet high) are present.

Soils

There are many general classification of surficial geologic formation found in the local Brookings area. A map showing these formations (Nation Resources Conservation Service) is included in Appendix D. The formations of each soil in the Brookings area typically consist of very deep and well-drained soils.

Groundwater

Groundwater elevations in the Study Area are influenced by recharge from the coastal drainage ways and by tidal influences from the Pacific Ocean. Throughout the Bookings area a water table exists, which is typically a muted expression of the land surface, with slight mounds beneath major upland terraces, and depressions beneath existing drainage ways. Groundwater reaches the ocean via indirect discharge to streams or direct subsurface flow to the ocean surf zone. In general, soils are typically well-drained, have a ground water table at a depth of more than 80 inches, and have a moderate infiltration rate. Groundwater will be found at increasing depths as elevation is gained.

Wetlands

Wetlands are one of the most biologically productive components of the environment. Their functions and values include water quality improvement, fish and wildlife habitat, flood control, point of entry for groundwater discharge, shoreline anchoring, and erosion control. Wetlands are abundant in the area surrounding the Chetco River. Wetlands have also been identified in the vicinity of Harris Beach State Park. Figure 1.2.3 shows the wetlands identified on the U.S. Fish & Wildlife Services National Wetlands Inventory Map (also included in Appendix B).

FIGURE 1.2.3
WETLANDS INVENTORY

Flooding

The Study Area flooding characteristics and limits are summarized from the most recent *Flood Insurance Study for Curry County, Oregon and Incorporated Areas* (dated Sept. 25, 2009). U.S. Highway 101 is the only major highway serving the City. The sources of flooding for the City are the Pacific Ocean and the Chetco River. The Chetco River has been known to flood in the past; one of the largest, most recent floods occurred in December 1964 along the Chetco River. A 150-year return interval was estimated for the event. FEMA reports the event was accompanied by high tides and the damage was relatively minor along the undeveloped floodplain adjacent to the river. Log debris accumulated against the Highway 101 bridge. The bridge was declared unsafe and replaced by a new bridge at a higher elevation. Other notable floods occurred in 1996, 1971, 1955, 1890, and 1861. In November 2012, as much as 10 inches of rain fell in a 24-hour period. This caused minor flooding, especially along the Chetco River. There is neither a 500-year nor a 100-year flood plain within the vicinity of the WWTP. See Appendix B for the FIRM maps.

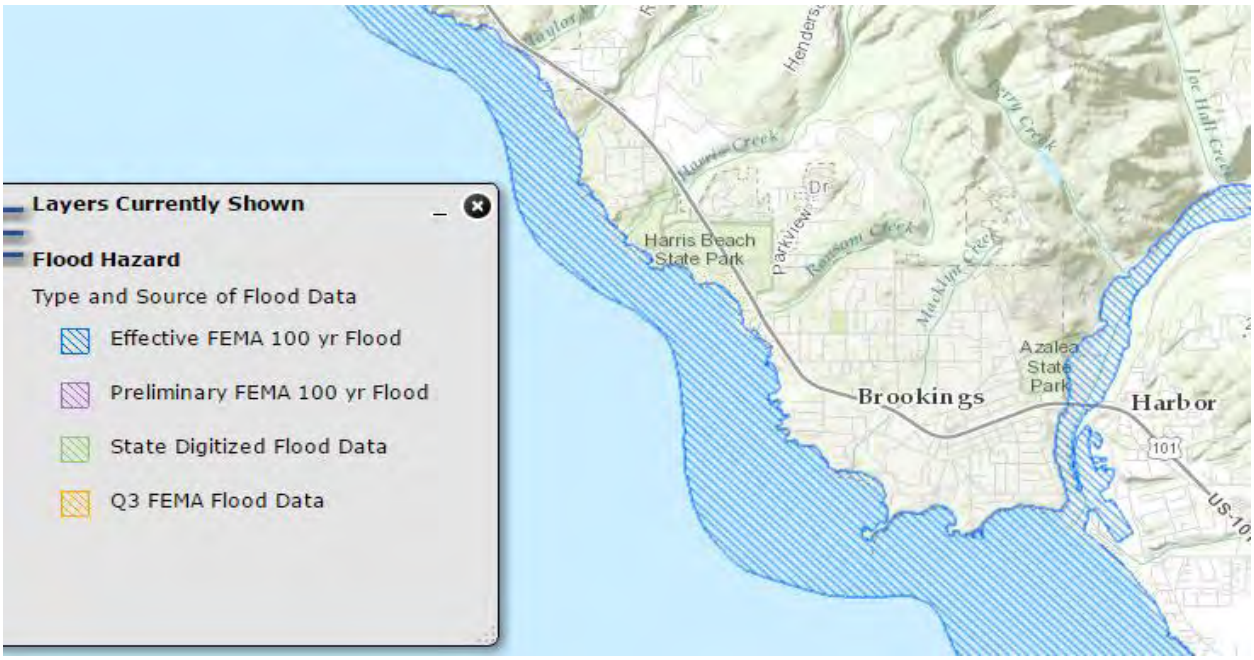


FIGURE 1.2.4
100-YEAR FLOOD PLAIN

Geologic Hazards

Several areas within the City are susceptible to geologic hazards. These hazards include earthquakes, landslides and erosion. A discussion of each hazard and its expected locations are discussed below.

- **Earthquakes** are the products of deep-seated geologic faulting and the subsequent release of large amounts of energy. The relative earthquake hazards include factors such as earthquake-induced landslides, liquefaction and shaking amplification. The U.S. Geological Survey has developed National Seismic Hazard Maps which are the basis for seismic design provisions of building codes, insurance rate structures, earthquake loss studies, retrofit priorities, and land-use planning. Incorporating these hazard maps into designs of buildings, bridges, highways, and critical infrastructure allows these structures to withstand earthquake shaking without collapse. Properly engineered designs not only save lives, but also reduce disruption to critical activities following a damaging event. By estimating the likely shaking for a given area, the maps also help engineers avoid costs from over-design for unlikely levels of ground motion.

  Brookings is affected by the Cascadia Subduction Zone which lies to the west (offshore) of northern California, Oregon and Washington. As a result, the Brookings seismic rating is moderate (60+) to high (80+). Seismic levels are functions of horizontal shaking that have a 2-in-100 chance of being exceeded in a 50-year period. Shaking is expressed as a percentage of **g** (**g** is the acceleration of a falling object due to gravity). Figure 1.2.5 and Figure 1.2.6 (prepared by USGS from an extensive information-gathering and review process) represent seismic conditions and earthquake hazards in the Brookings area.

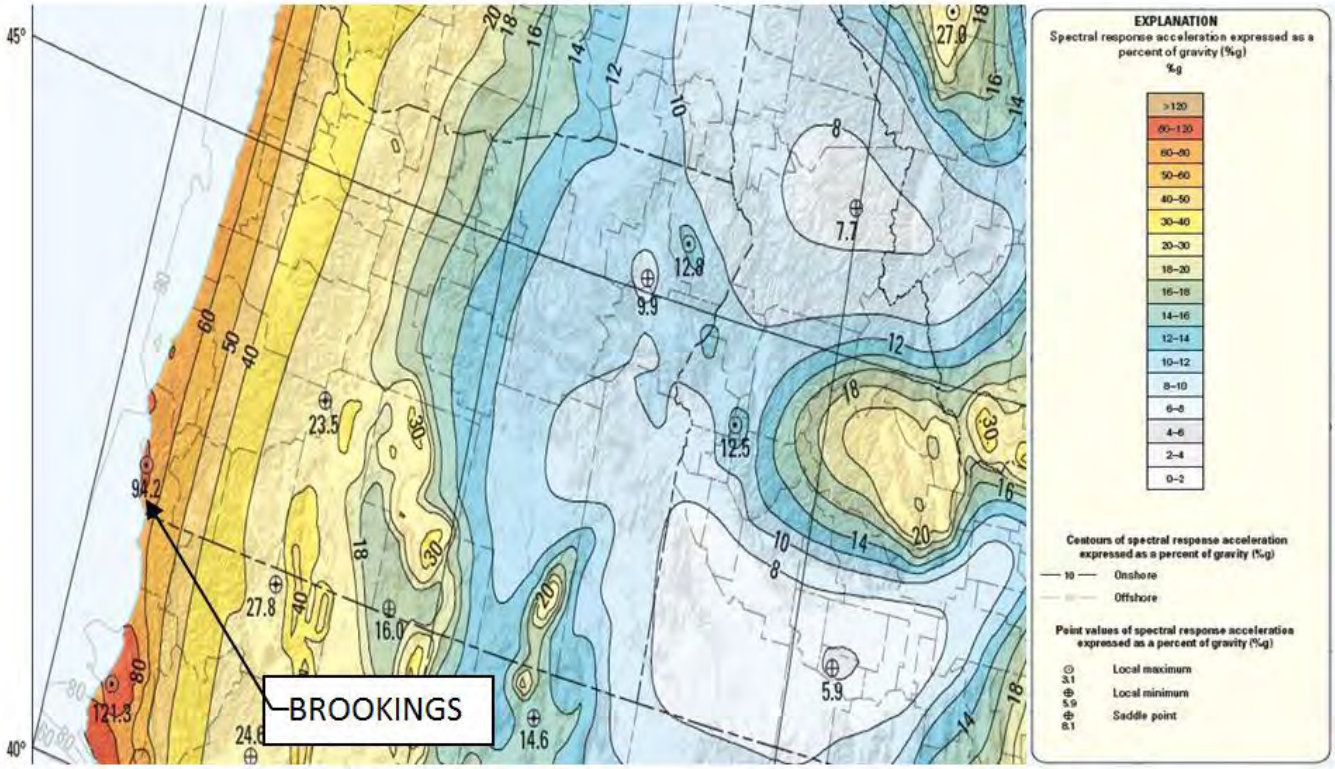


FIGURE 1.2.5
SEISMIC MAP

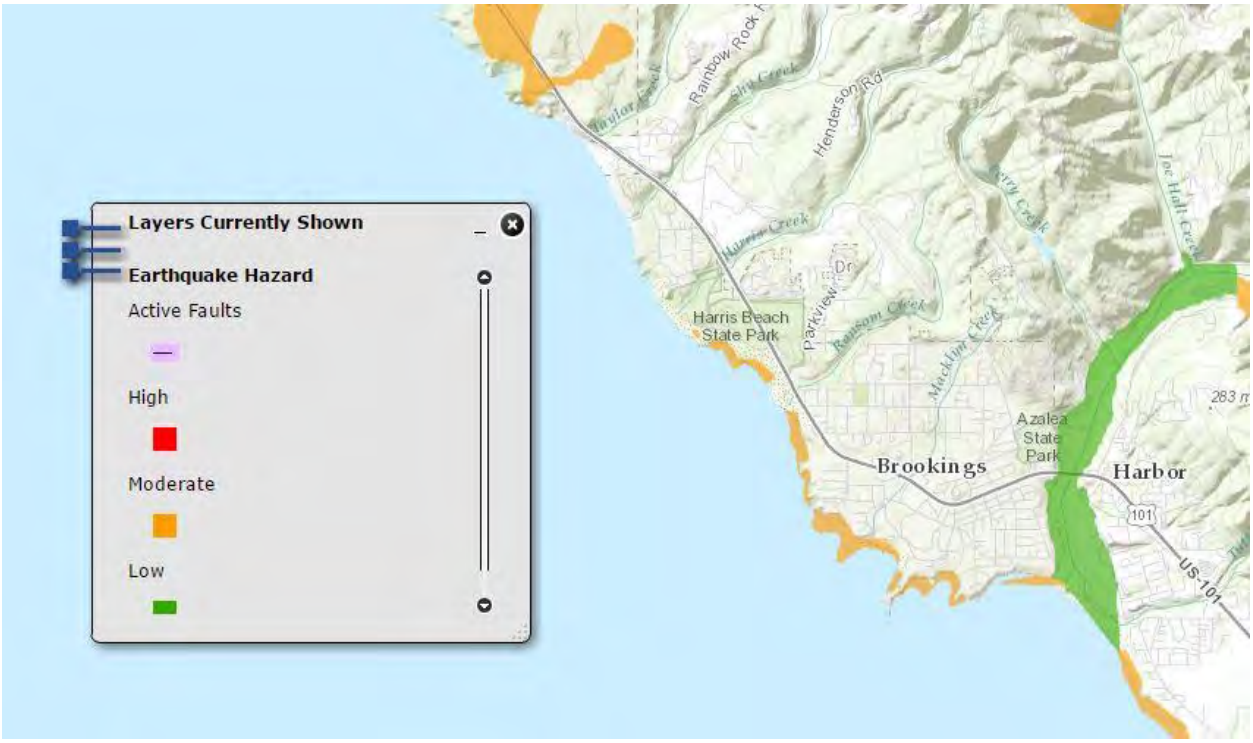


FIGURE 1.2.6
EARTHQUAKE HAZARD MAP

- **Tsunami**, or long-period seas waves are created by seismic events (typically subduction zone events) or submarine landsides and have occurred historically along the Oregon Coast. Future tsunamis will undoubtedly strike the Oregon Coast and the City of Brookings. When they will occur and at what magnitude is unknown and unpredictable. Estimate for future tsunamis have been made for the entire Oregon Coast. An extreme (rare) tsunami run-up may extend to an elevation 30 feet above sea level (MSL). A tsunami risk area map is shown in Figure 1.2.7.

  On March 11, 2011 a tsunami caused by a 9.0 M_w earthquake off the Pacific Coast of Tohoku, Japan hit the City of Brookings. An estimated $25 million in damage was done, especially at the Port of Brookings Harbor. Many boats and docks were damaged, sunk, and/or swept out to sea.

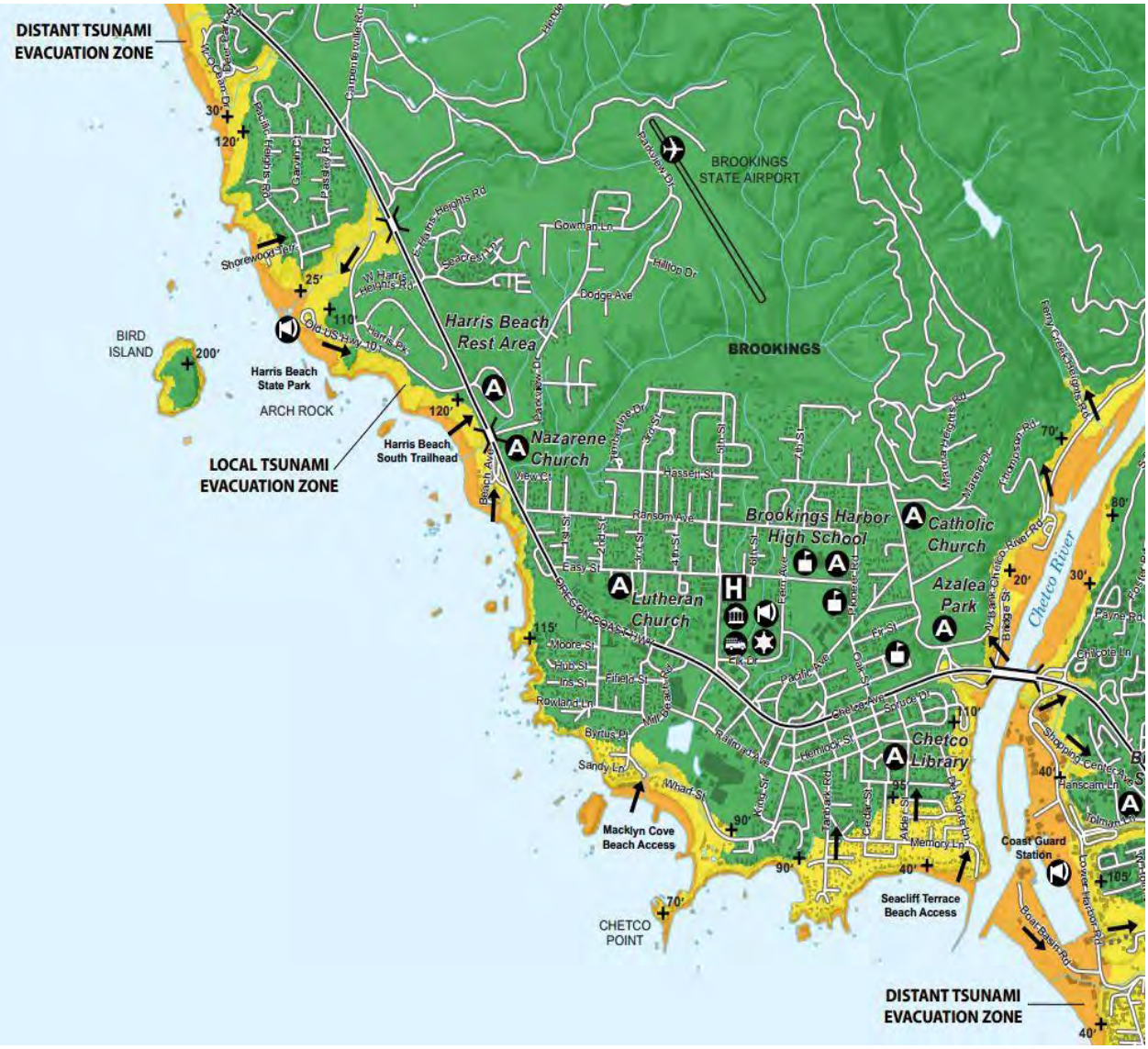


FIGURE 1.2.7
TSUNAMI RISK AREA

- **Landslides** do not pose an adverse threat to the City. Potential landslide areas are near the east of the City and to the south in Harbor. A landslide risk area map is shown in Figure 1.2.8.

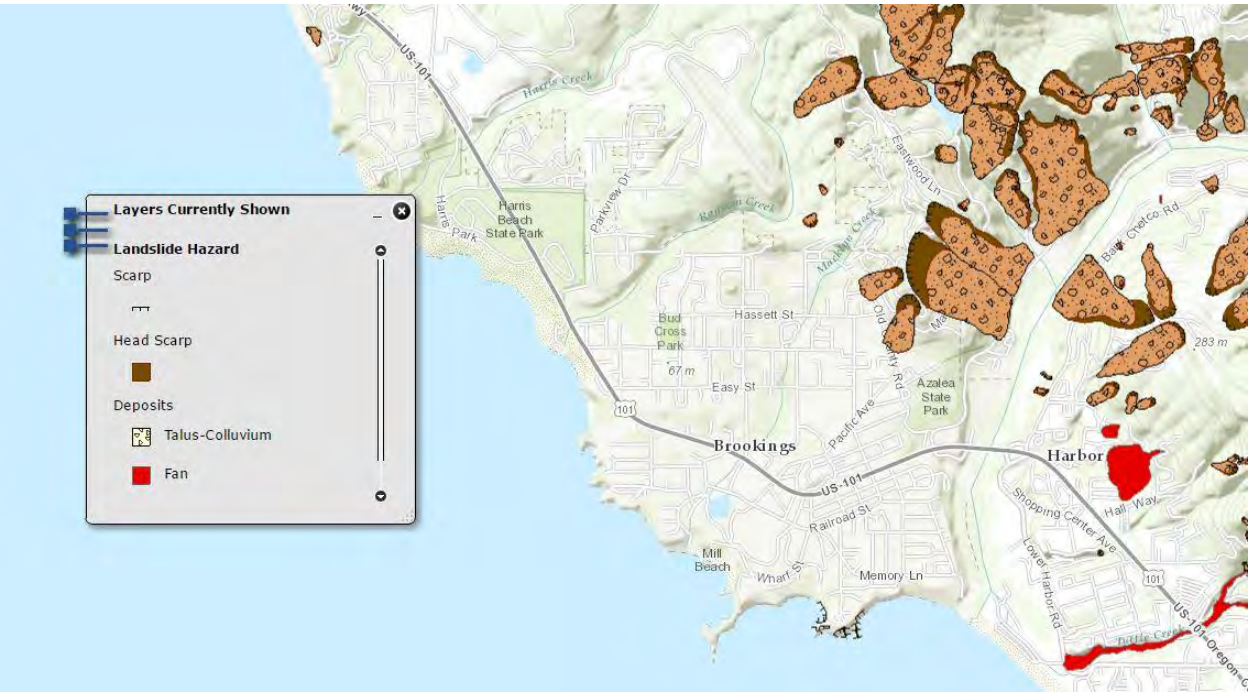


FIGURE 1.2.8
LANDSLIDE RISK AREA

- **Erosion and Scouring** of the shoreline areas results in the eastward (landward) retreat of those areas over time. Typically shoreline retreat does not occur systematically at an annual rate but occurs as episodic surges associated with significant storm events. The magnitude of landward retreat of the shoreline at each specific storm event is dependent on the severity of the storm, the geologic characteristics of the shoreline, orientation of the shoreline relative to the storm, wave system, and the armoring of the shoreline by barrier beaches, rip rap and rocks. Even though retreat occurs episodically, the rate of shoreline retreat is often estimated over a broad period of time and expressed as an average annual rate. A typical average annual rate is 12 inches per year.

Economic Conditions

The City of Brookings currently has a high percentage of elderly residing in Brookings and a high unemployment rate. Only about 15% of the Brookings population has more than a high school education. Brookings at this time is not a high-skill, high-wage community. Recreational vehicle parks support a seasonal population that, combined with the influx of tourists during the summer, increases the water/ flows demand. Numerous community events are planned each summer, which can cause the City's population to swell. During the winter the community settles to a more gradual pace.

Water Resources

Brooking's primary water source is the Chetco River. Historical sources of municipal water also include Ferry Creek, Joe Hall Creek and Ransom Creek. Two permits and one certificate represent the City's most important water rights. Permits 27610 and 31293 and Certificate 64614 have a total quantity of 20 cfs. Certificate 64614 is currently not used since several attempts to relocate the point of diversion upstream to the City's well have been denied to date.

Seasonal permitted withdrawals from March 1st - June 30th are utilized to avoid impacting the low stream flows during the summer months. These permits are Numbers 51383, R11535 and 51595 and were obtained in the early 1990s to provide irrigation water for the golf course along lower Jack Creek.

Certificate 4953 was developed to provide additional flow to the Ferry Creek Reservoir. Certificate 20734 is known as a historic source. Joe Hall Creek, Ferry Creek, and Ransom Creek sources are no longer utilized.

Energy Production and Consumption

No major energy resources have been identified in the Study Area. Energy consumption is expected to increase within the Study Area due to population growth during the planning period. Coos-Curry Electric Cooperative, Inc. provides electrical energy to the City of Brookings.

1.3 Population Trends

In the preparation of this Wastewater Facility Plan, an accurate population forecast is required to determine wastewater flow projections through the end of a 20-year study period. Population forecast can affect the demand for and sizing of infrastructure. If the 20-year population forecast is too low, infrastructure may be undersized. Alternatively, if the population forecast is too high, the result could be oversized systems that are over-priced, have higher operational costs, and, in the case of biological systems, may be more difficult to operate and maintain.

Regulatory agencies require a population forecast developed by or approved by the Oregon Department of Administrative Services' Office of Economic Analysis (OEA). The OEA develops forecasts in coordination with Oregon counties to plan and implement programs and activities. When an adopted, coordinated forecast is more than ten years old, a city may propose a new coordinated population projection in accordance with ORS 195.

The estimated annual growth rate for this WWFP has been provided by the Office of Economic Analysis, Department of Administrative Services, State of Oregon, Release Date April 15, 2014, as shown in Table 1.3.1. The Census 2010 population for Brookings is 6,336 and the Census 2000 population for Brookings is 5,447. In 2010, the City of Brookings population is 28% of Curry County's population. Figure 1.3.1 displays the population projection for the City of Brookings and the community of Harbor.

FIGURE 1.3.1
POPULATION FORECAST

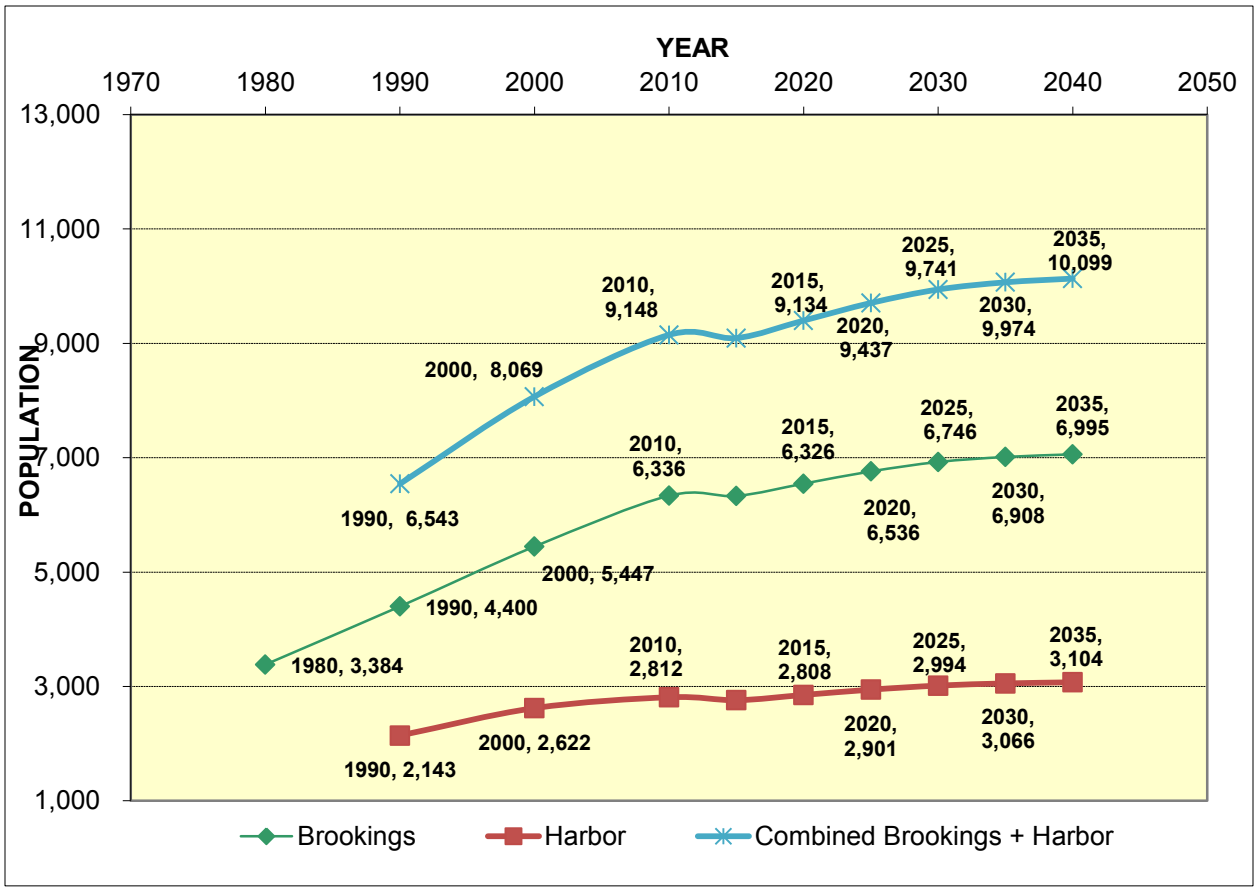


TABLE 1.3.1
POPULATION FORECAST TABLE

Year	Curry County	City of Brookings	City of Harbor	Combined Brookings/Harbor	Est. Annual Growth Rate
1980	17,078	3,384	-	-	-
1990	19,449	4,400	2,143	6,543	-
2000	21,168	5,447	2,622	8,069	-
2010	22,355	6,336	2,812	9,148	-
2015	22,321	6,332	2,760	9,092	-0.37%
2020	23,087	6,546	2,852	9,399	0.66%
2025	23,854	6,761	2,945	9,706	0.64%
2030	24,440	6,926	3,016	9,941	0.48%
2035	24,751	7,013	3,054	10,067	0.25%
2040	24,912	7,059	3,073	10,132	0.13%

Notes:

1. Curry County 1980 thru 2050 population is taken from the Office of Economic Analysis, Department of Administrative Services, State of Oregon, Release Date April 15, 2014.
2. City of Brookings population from 1980 to 2010 was prepared by the Population Research Center, PSU April 2014.

This 2014 WWFP is based on a 20-year study period starting at project completion dates, and therefore utilizes a 2040 design year. City planning has indicated they have received inquiries on several land development projects that, if the projects come to fruition, may expand the city limits and increase the population. The Brookings population projection for the year 2040 is 7,040.

1.4 Community Engagement

Community engagement provides the opportunity for the system owners (local citizens) to meaningfully participate in development and to provide guidance on implementation and management of their wastewater system.

Goals of community engagement include: 1) develop an understanding of the environmental issues; 2) define regulatory requirements; 3) present design development information; 4) collaborate in developing solutions; and 4) review funding/revenue strategies for a recommended plan. Various community engagement opportunities occur during the planning process to inform and receive feedback about the project from the public, regulatory agencies and stakeholders. A couple of goals are to identify community issues of concern, and share information utilized to develop recommendations. Feasible feedbacks from the stakeholders are incorporated into the management of the wastewater system. The community engagement opportunities include:

- Local agency and jurisdictional briefings
- News releases in the local newspaper
- Project fliers distributed during a monthly utility billing cycle
- Articles posted on the City's web page
- Hosting a public stakeholders meeting
- Adoption of the WWFP through a public city council meeting

SECTION 2: **EXISTING FACILITIES**

2.1 Location Map

The locations of the wastewater collection system including wastewater pump stations and their relationship to the gravity sewer systems and force mains in Brookings are shown on Figures 2.1.1 through 2.1.5 on the following pages. There are a total of thirteen wastewater pump (or lift) stations in addition to the primary pump station at the wastewater treatment plant. The wastewater plant treatment units and buildings are included as Figure 2.1.6.

2.2 History

2.2.1 General

The community of Brookings developed around the saw mill and railroad on the north side of the Chetco River and was constructed in 1912 by John E. Brookings. The original sanitary sewers were laid in 1916. The City of Brookings was incorporated in 1951 and in 1957 a primary sewage treatment plant was constructed at Chetco Point. With the addition of a trickling filter for secondary treatment in 1973, the treatment plant was expanded to a treatment capacity of 1 MGD, and a hydraulic capacity of 2.25 MGD with the ability to handle 4.5 MGD peak flow. Another major plant upgrade occurred in 1988. The latest major plant upgrade was completed in 2001, providing for an average dry weather flow of 1.7 MDG, a peak day average flow of 10.9 MGD, and a peak wet weather hydraulic capacity of 15.5 MGD. The improvement constructed in 2010 was only for the sludge dewatering and did not affect the plant capacity.

2.2.2 Wastewater Pump Stations and Harbor Sanitary District Contribution

The Mill Beach Pump Station was constructed in 1958 and remodeled with a standby generator added in in 1972. It was remodeled again in 1989. It is located on Mill Beach Road and serves the west and southwest portions of Brookings. Memory Lane Pump Station (aka Buena Vista Loop) was constructed in 1968 on Buena Vista Loop to serve the southeastern portion of the City. It was remodeled in 2001. Sea View (aka Beach Avenue), Sea Cliff Terrace and Mill Beach Station No. 2 (aka Zwagg Island or Macklyn Cove or Cove) pump stations were all constructed in 1978. Sea Cliff Terrace was replaced in the early to mid-1990s. Dawson Tract Pump Stations 1 through 5 were constructed in 1992. The Constitution Way Pump Station was constructed in the mid-1990s. It anticipated serving a subdivision that never materialized and is currently not used. Cypress Cove Pump Station was constructed in 1997. The Harbor Sanitary District was formed in March of 1976 and since then the district sends all of their sewage via pump station to Brookings for treatment. Riverview Pump Station was constructed after 2008.

2.2.3 Wastewater Treatment Plant Liquid Stream

In 1988, the City's wastewater treatment plant was a relatively simple conventional return activated sludge plant which included preliminary treatment, primary treatment, aeration, trickling filtration, two stage anaerobic digestion and final clarification. It was then expanded by a project identified as "Phase 1 Expansion". The improvements included improved screening, grit removal, addition of primary

sedimentation, additional trickling filter, the conversion of aeration to solids contact and sludge reaeration, a new secondary clarifier and the conversion of the original secondary clarifier to a chlorination contact chamber.

In 2001, plant improvements were made by a project titled simply "Waste Treatment Plant Improvements" which was the earlier anticipated Phase 2 portion of the plant. These improvements included demolition of the chlorine contact basin (which had been converted to that use in 1988), demolition of the old rock trickling filter, and demolition of the old headworks. Improvements included construction of new headworks with a new primary clarifier cell, improvements to the existing circular primary clarifier, new cover and odor control for the trickling filter, new aeration blowers, construction of a new secondary clarifier, operations building, lab building and storage building. The improvements also included extensive piping, electrical and instrumentation improvements. The major upgrade of 2001 anticipated explosive growth (which was occurring at the time) in the Brookings area. After the housing bubble burst in 2008, growth dramatically decreased. Therefore, facilities that were constructed in 2001 generally have very adequate reserve capacity for the future.

2.2.4 Wastewater Treatment Plant Solids Handling

Sludge has been treated by the anaerobic process rather than by an aerobic process since before 1988. During the 2001 upgrade, the two staged anaerobic digesters were converted to digested sludge storage and their function was replaced by a new, large single stage anaerobic digester. It appears from construction plans that an additional digester of the same size was anticipated in the future and would have been constructed in the location of the storage building. In addition, in 2001, a new digester control and thickener building was constructed. At that time, a new 2-million-gallon digested sludge storage tank was also added to the facility. In 2010, a new sludge dewatering facility was added to the wastewater treatment plant which takes digested sludge from the 2-million-gallon storage tank at 1% solids concentration and dewaters it to 22% solids concentration. This improvement eliminated the original requirement to transport liquid sludge for distribution on farm fields. Later, due to public objection to land application, allowed disposal at a distant sludge disposal location. Prior to 2010, it was anticipated that a dewatering facility able to process the biosolids to a Class A product, rather than its current Class B state would be constructed. However, due to continued public objections to the distribution of biosolids, whatever the class, it was determined that simple dewatering of the Class B biosolids without the expensive additional steps necessary for production of Class A biosolids was prudent, since the sludge was to be landfilled. The dewatered Class B biosolids have a greatly reduced volume in comparison to liquid sludge and are transported by hopper to the Curry County transfer station for disposal as a solid waste.

2.3 Condition of Existing Facilities

2.3.1 Existing Collection System

2.3.1.1 Inventory of Collection System

The City's wastewater collection system consists of approximately 175,000 lineal feet of gravity collection pipes, 19,000 lineal feet of pressure sewer mains, 850 manholes and 13 pump stations. A summary of the existing piping inventory is given in Table 2.3.1.1.1, and existing collection system maps are shown in Figures 2.1.1 through 2.1.5 following.

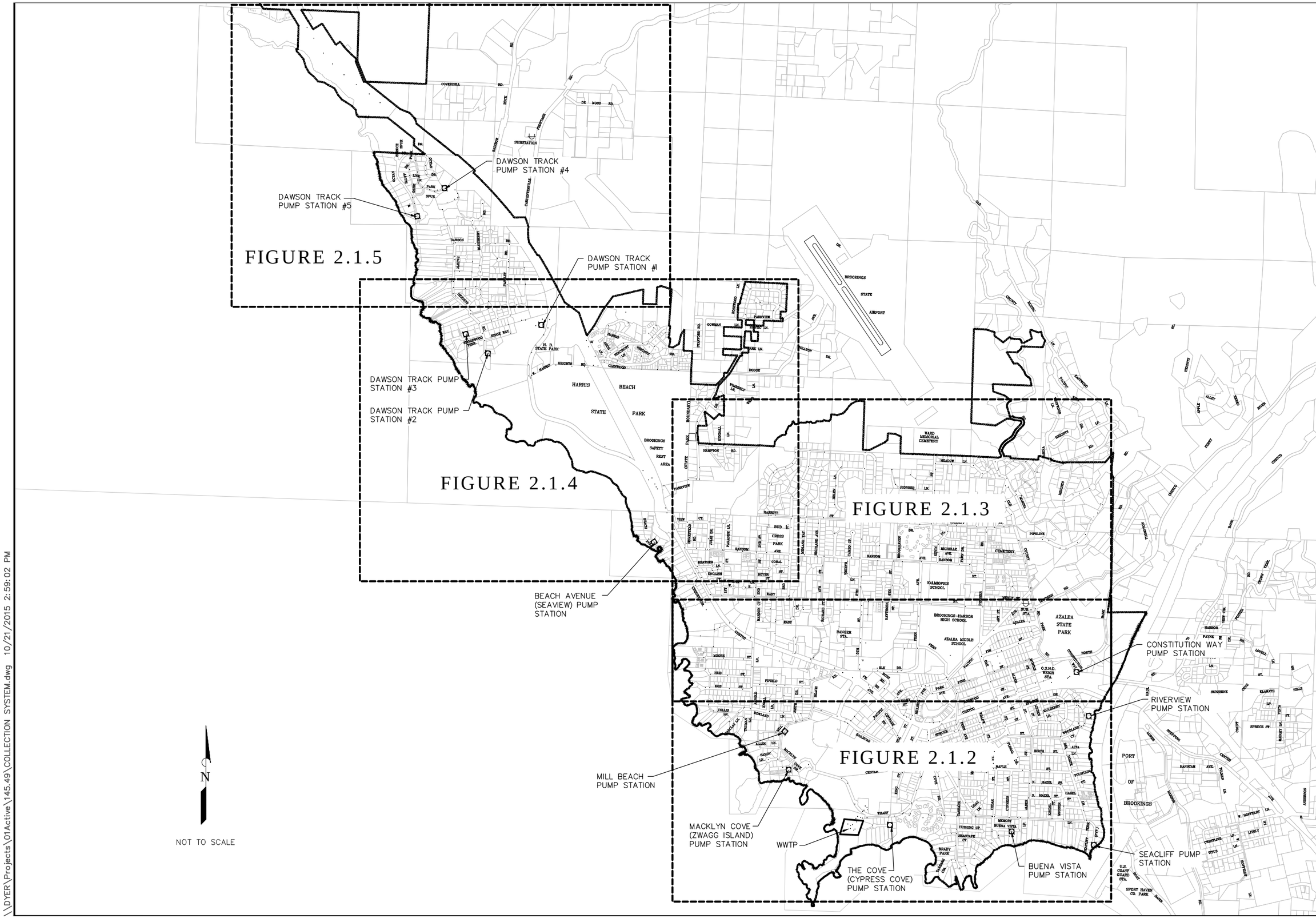


FIGURE NO.
2.1.1

CITY OF BROOKINGS
CURRY COUNTY, OREGON

EXISTING COLLECTION SYSTEM

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.49

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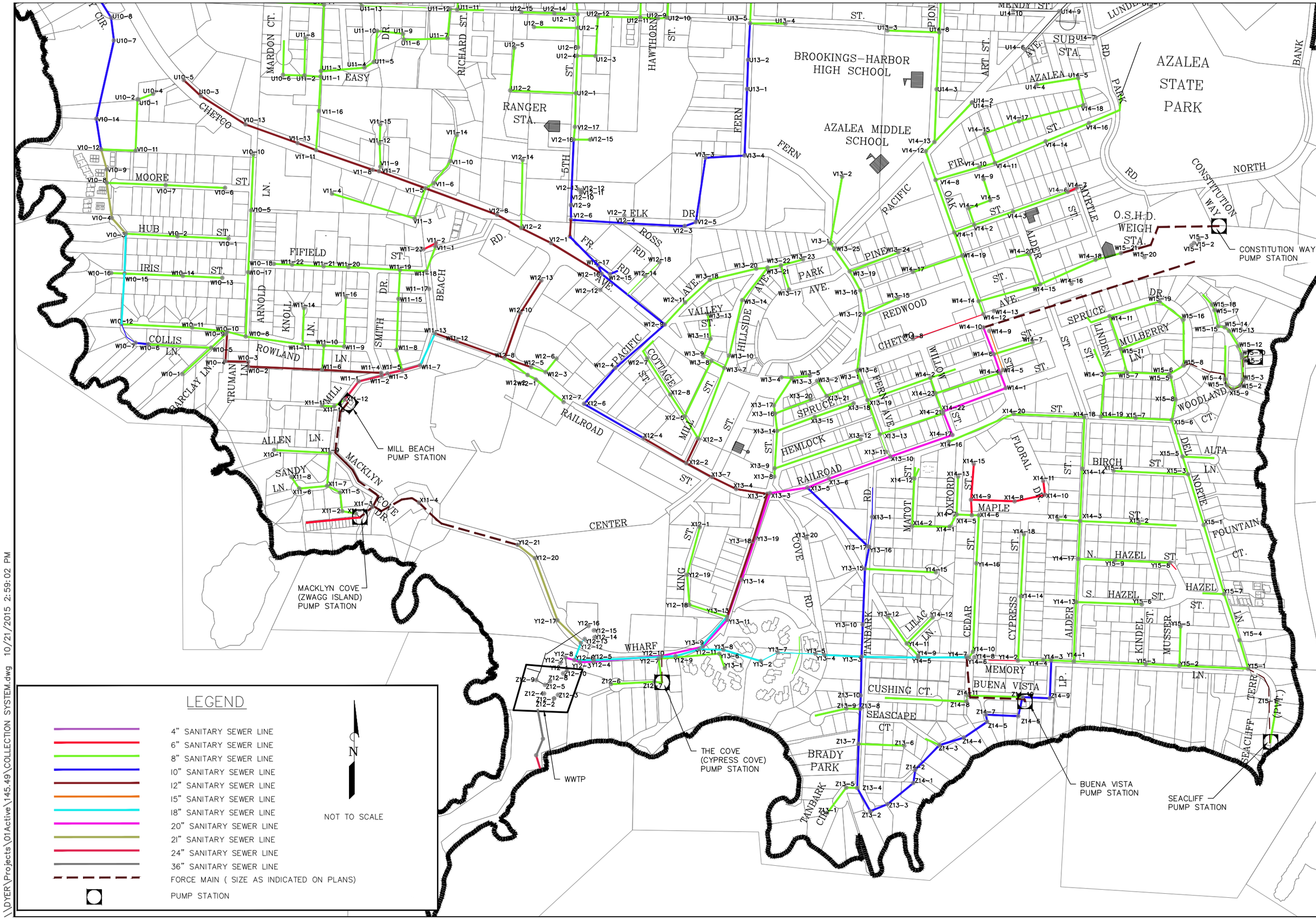

FIGURE NO. 2.1.2

CITY OF BROOKINGS
CURRY COUNTY, OREGON

EXISTING COLLECTION SYSTEM

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.49

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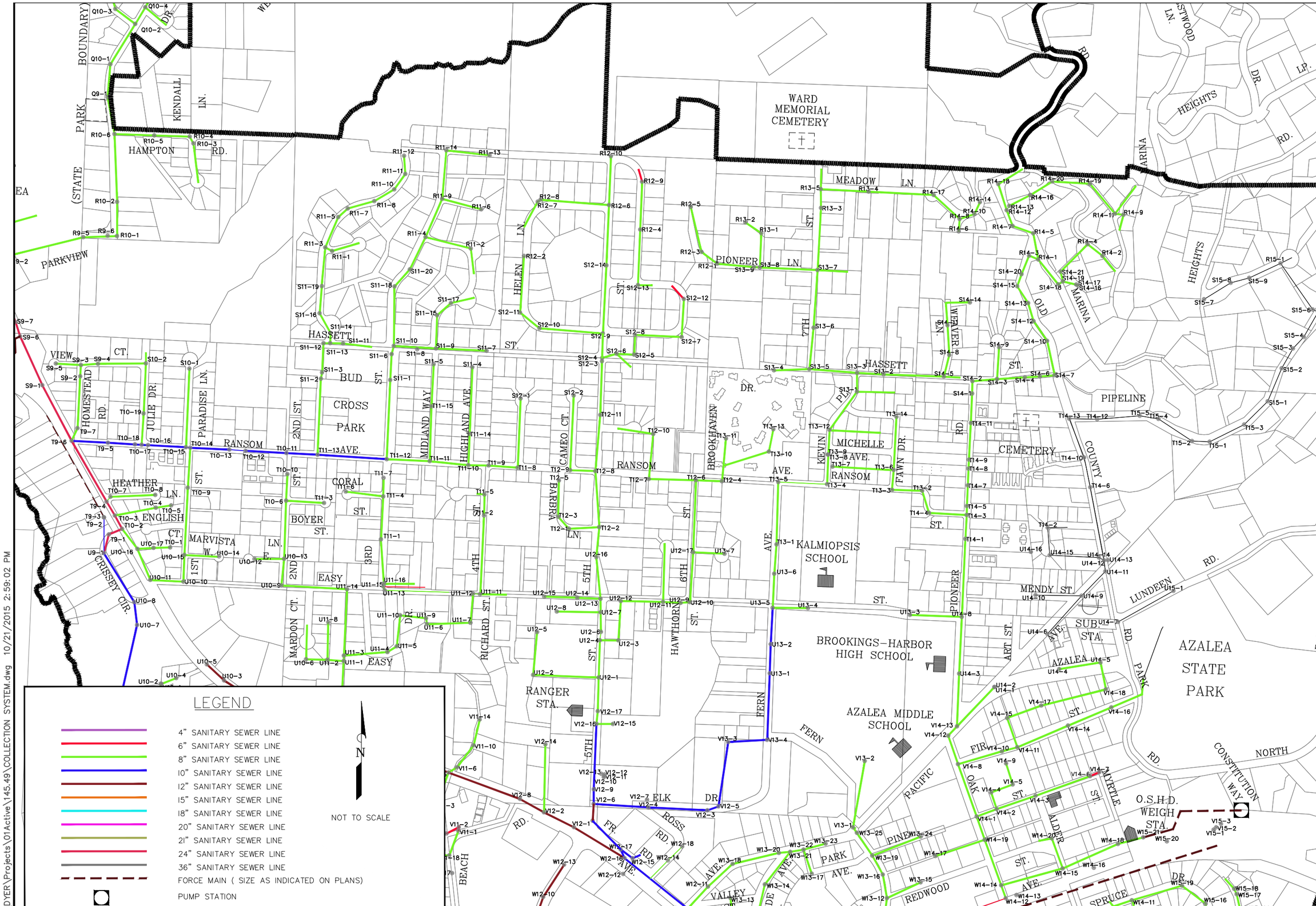

FIGURE NO.
2.1.3

CITY OF BROOKINGS
CURRY COUNTY, OREGON

EXISTING COLLECTION SYSTEM

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

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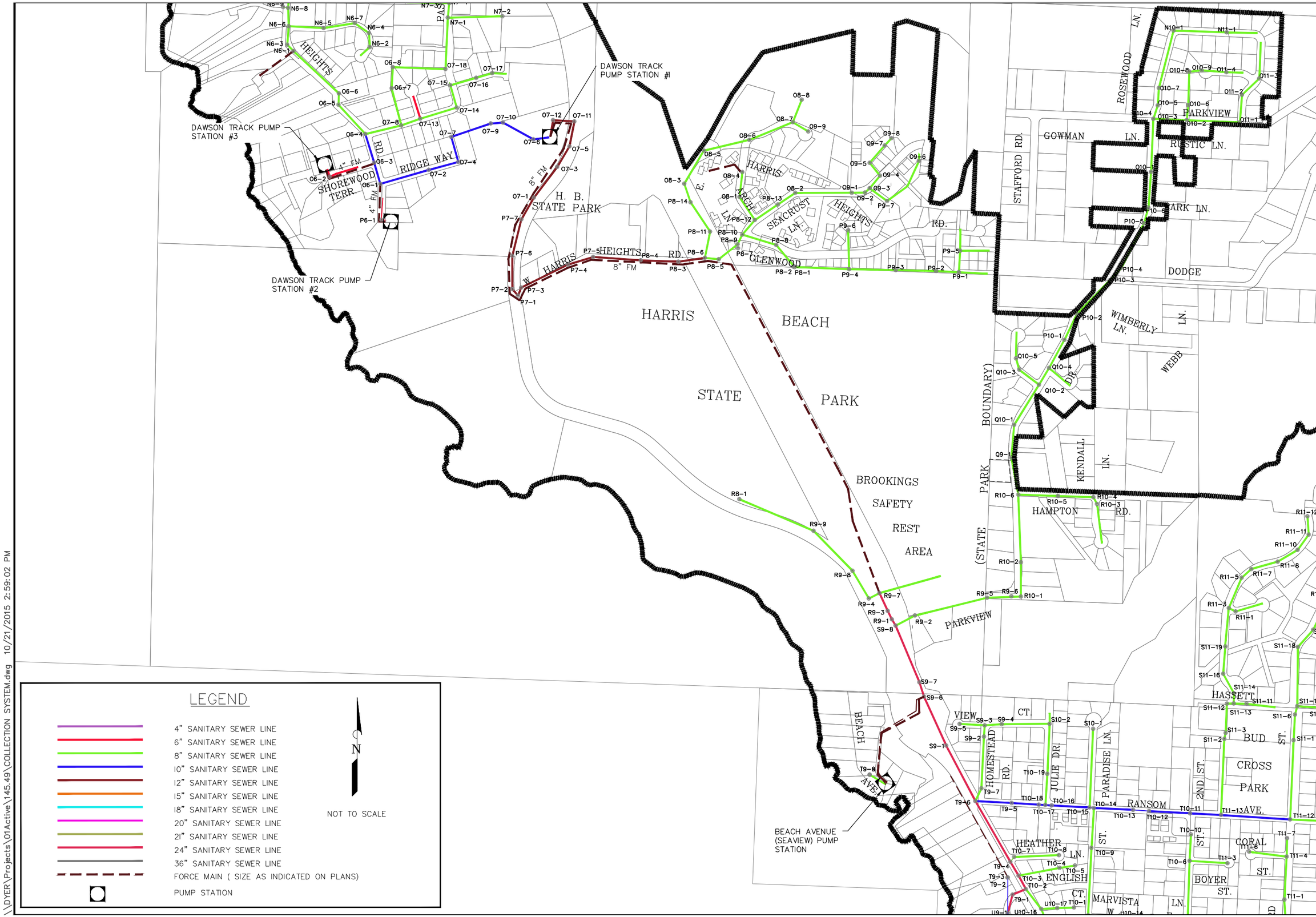

FIGURE NO. 2.1.4

CITY OF BROOKINGS
CURRY COUNTY, OREGON

EXISTING COLLECTION SYSTEM

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

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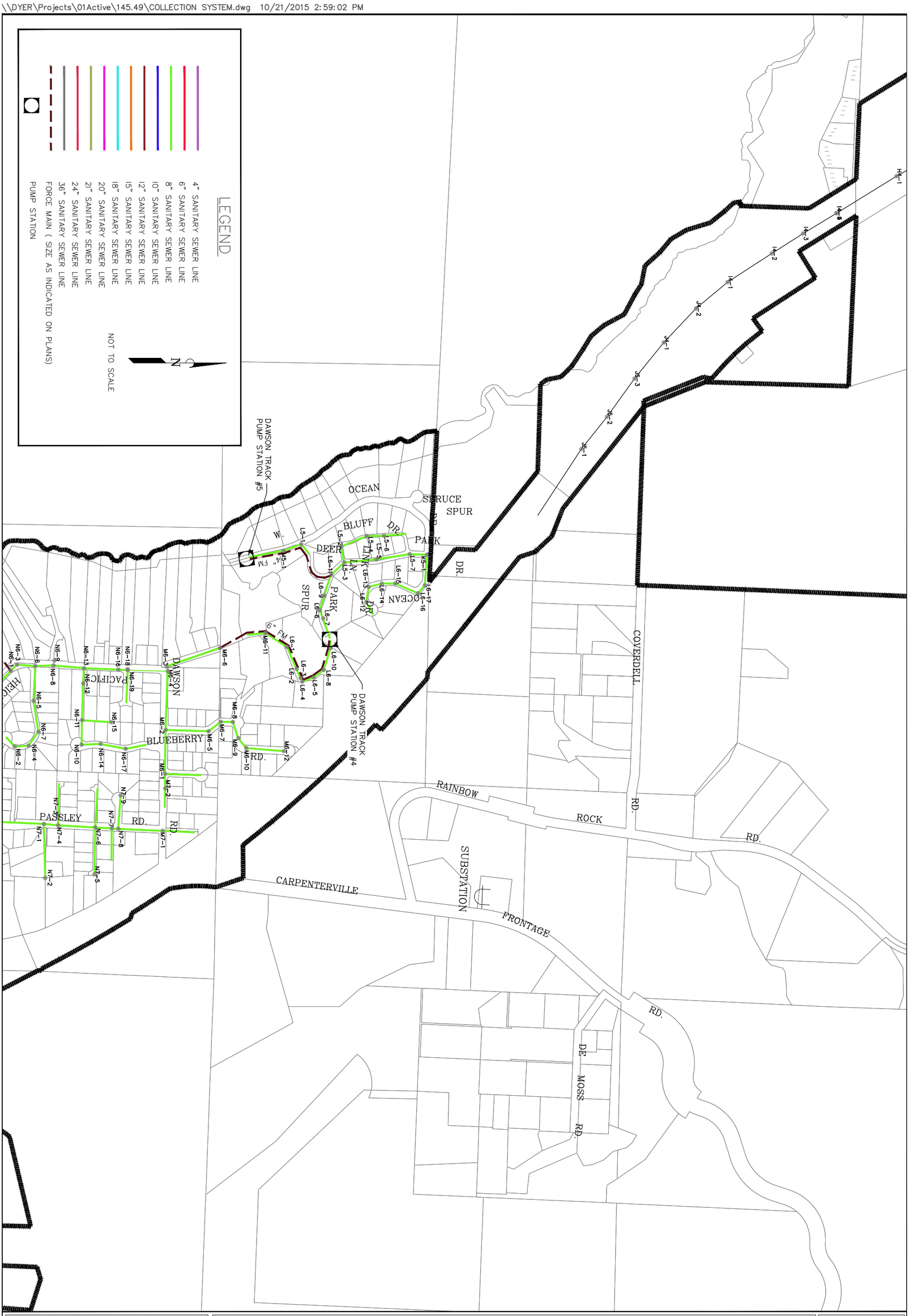
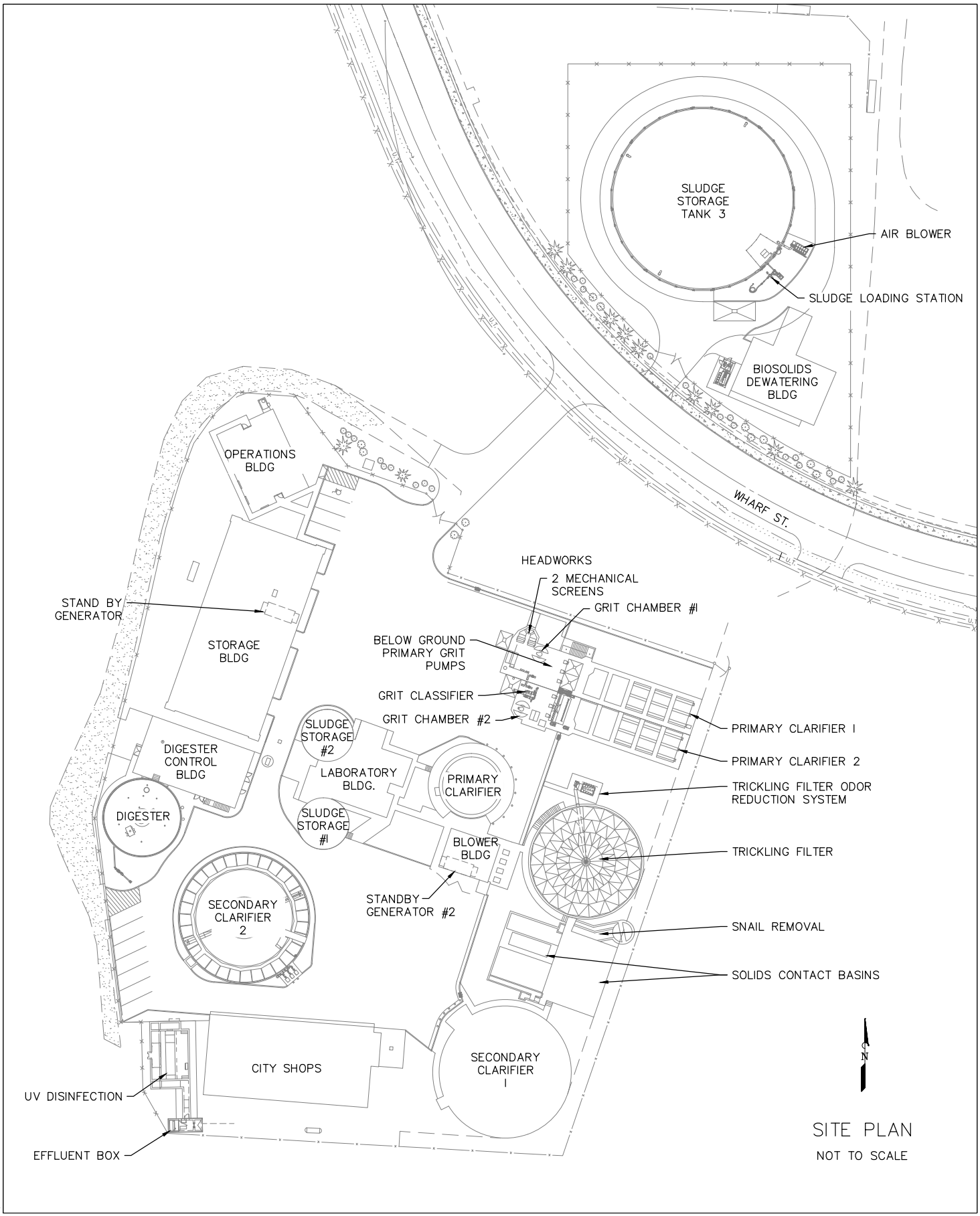


THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF BROOKINGS CURRY COUNTY, OREGON	FIGURE NO.
DATE: FEBRUARY 2014	EXISTING COLLECTION SYSTEM	2.1.5
PROJECT NO.: 145.00C		



SITE PLAN

NOT TO SCALE

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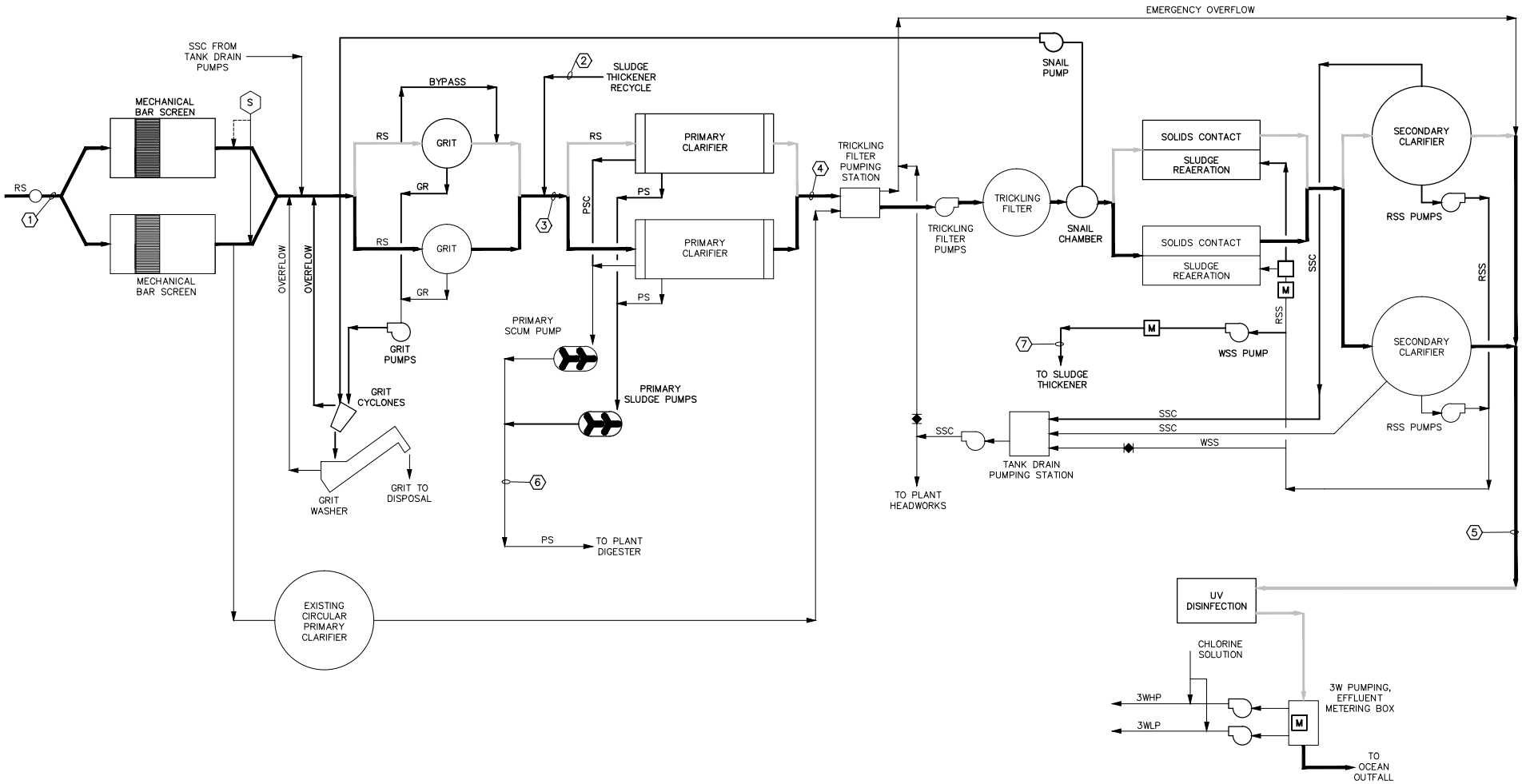
PLOT DATE October 28, 2015

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF BROOKINGS*** ***WASTEWATER SYSTEM IMPROVEMENTS***	FIGURE NO.
DATE: MARCH 2015 PROJECT NO.: 145.49	***EXISTING WWTP SITE***	***2.1.6***



LEGEND

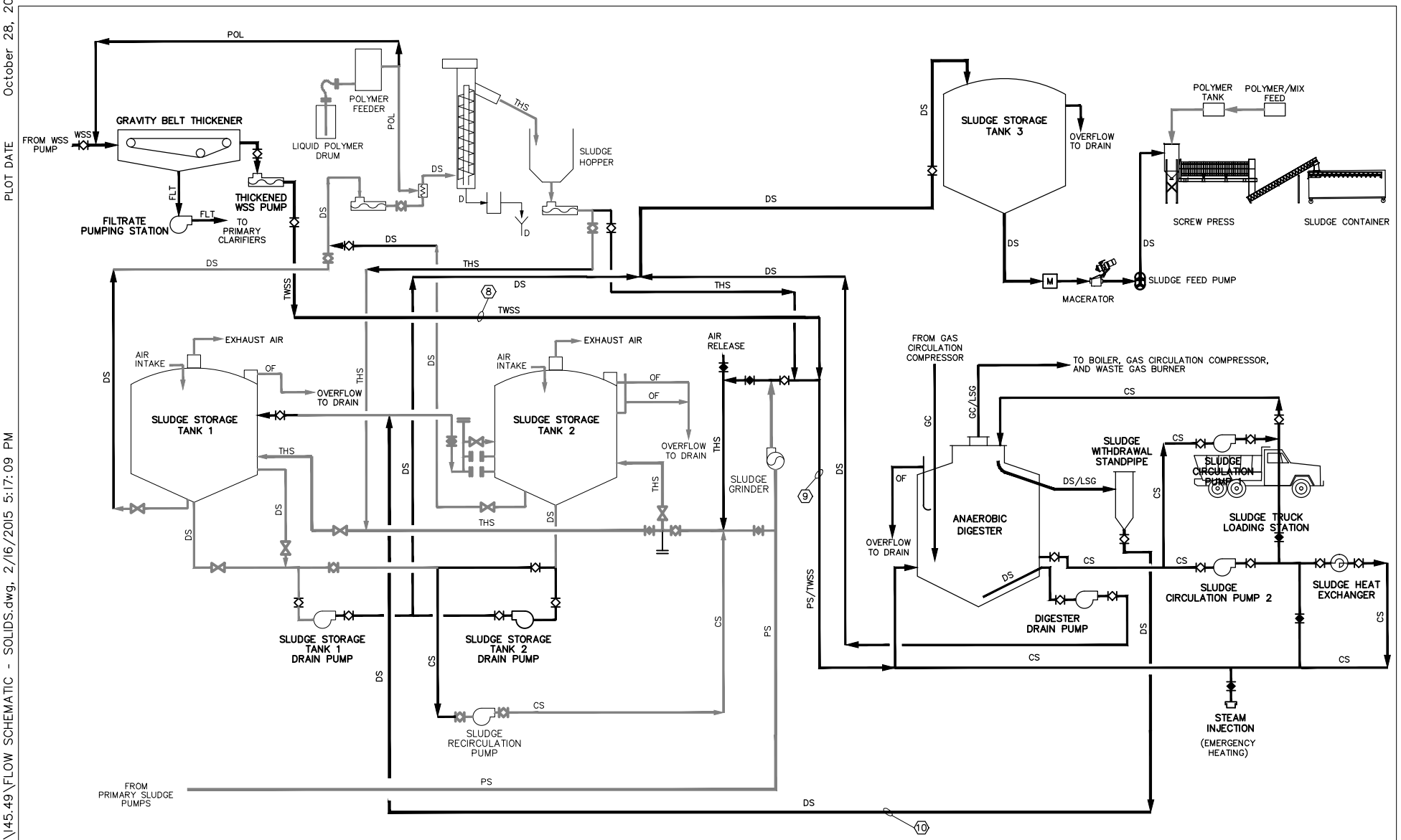
M FLOW METER

1 FLOW/MASS BALANCE STATION (SEE DRAWING G9)

1 COMPOSITE SAMPLER

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF BROOKINGS WASTEWATER SYSTEM IMPROVEMENTS***	FIGURE NO.
DATE: JULY 2014	***FLOW SCHEMATIC - LIQUID STREAM***	***2.1.7***
PROJECT NO.: 145.49		

\\DYER\Projects\01Active\145.49\FLOW SCHEMATIC - LIQUID.dwg, 2/16/2015 5:32:57 PM PLOT DATE October 28, 2015



LEGEND

M FLOW METER

1 FLOW/MASS BALANCE STATION (SEE DRAWING G9)

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF BROOKINGS WASTEWATER SYSTEM IMPROVEMENTS***	FIGURE NO.
DATE: JULY 2014	***FLOW SCHEMATIC - SOLIDS STREAM***	***2.1.8***
PROJECT NO.: 145.49		

\\DYER\Projects\01Active\145.49\FLOW SCHEMATIC - SOLIDS.dwg, 2/16/2015 5:17:09 PM PLOT DATE October 28, 2015

TABLE 2.3.1.1.1
WASTEWATER COLLECTION SYSTEM INVENTORY

Item	Item Description	Unit	Quantity
1	6" Sanitary Sewer line	FT	3,130
2	8" Sanitary Sewer line	FT	134,000
3	10" Sanitary Sewer line	FT	15,070
4	12" Sanitary Sewer line	FT	10,070
5	15" Sanitary Sewer line	FT	290
6	18" Sanitary Sewer line	FT	3,760
7	20" Sanitary Sewer line	FT	4,180
8	21" Sanitary Sewer line	FT	1,340
9	24" Sanitary Sewer line	FT	2,980
10	36" Sanitary Sewer line	FT	310
11	Force Main	FT	19,000
12	Manholes	EA	866
13	Pump Stations	EA	13

2.3.1.2 Infiltration and Inflow

Infiltration and inflow (I/I) is a problem affecting many sanitary sewer systems. Inflow and infiltration, which is defined as groundwater and rainwater that enters a sanitary sewer collection system creating many wastewater-related problems. Rain-induced sewer flows can hydraulically overload a wastewater treatment plant or pump station, increase the cost of operations, potentially cause a discharge of inadequately treated effluent, and lead to regulatory compliance issues. I/I can also cause flows to exceed the capacity of the pipes, thereby compromising the collection system. Excess flows can wash out soil from around pipes, erode larger holes in the pipe walls, cause sinkholes, create rodent dens, precipitate line collapses, and cause service line backflow problems. Sand and rock washed into a collection system with I/I exacerbate collection system hydraulic problems by further reducing line capacities, creating line blockages, and increasing the wear on pumps that are relied upon to convey sewage to the treatment plant.

Infiltration and inflow can be an escalating problem that, left unchecked over time, will generate greater and greater sewer flows. Eventually I/I can become so severe that lower system piping, pump stations, and treatment plants cannot adequately convey or handle the rainfall-induced flows. Ultimately, raw wastewater is either exfiltrated or bypassed into the surrounding environment.

2.3.1.3 Smoke Testing

Smoke testing was performed to identify potential deficiencies by allowing I/I into the collection system. Reference the *Smoke Test Report* of October 2014 by The Dyer Partnership Engineers & Planners, Inc. under separate cover. Some of the sources of I/I that smoke testing identifies include catch basins and roof drains tied to the sewer system, leaks in main and lateral sewer lines, leaky cleanouts, and deteriorated manholes.

Detailed, individual reports were developed to document each “smoke sign”. Each report includes a photograph of the observed smoke, and hand-drawn map of the location of the smoke, a written description of the source of the smoke, and other pertinent information. The ultimate and intended purpose of smoke testing is to assist the City in focusing on problem areas.
Smoke testing was performed from October 28 through October 30, 2013, from June 18 through June 20, 2014 and from June 30 through July 3, 2014. The smoke testing was successful in indicating possible

inflow. Table 2.3.1.3.1 lists the types and numbers of deficiencies that were indicated by the presence of smoke. Table 2.3.1.3.2 correlates the types of deficiencies with the Smoke Test Reports. Figure 2.3.1.3.5 illustrates the numbers and percentage of types of deficiency. Tables and figures can be cross-referenced with the Smoke Testing Maps to show which sewer lines were tested, the location of each deficiency discovered, which manholes were smoked, and the section of the City's collection system that was not tested.

TABLE 2.3.1.3.1
SMOKE TESTING NUMBER AND TYPE OF DEFICIENCIES

Type of Deficiency	Deficiency Code	Number of Issues
Leaking Service Lateral LSL		33
Leaking Main Line	LML	4
Catch Basin	CB	2
Leaking Manhole	LMH	9
Open Cleanout	OCO	67
Plugged House Vent	PHV	2
Roof Drain	RD	5
TOTAL DEFICIENCIES:	**122**	

FIGURE 2.3.1.3.5
SMOKE TESTING RESULTS SUMMARY
NUMBER OF VIOLATIONS BY TYPE

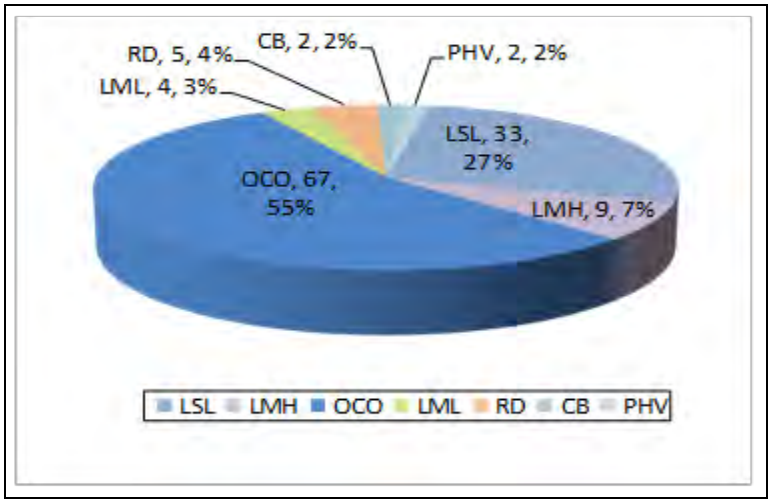


TABLE 2.3.1.3.2
REPORT NUMBERS ACCORDING TO DEFICIENCY TYPE

Deficiency Type	Deficiency Code	Smoke Test Report Number			
Plugged House Vent	PHV	2-55	2-57		
Catch Basin	CB	1-17	1-43		
Leaking Main Line	LML	1-8	1-10	1-38	1-44
Roof Drain	RD	1-46	1-51	2-15	2-39
		1-48			
Leaking Manhole	LMH	1-28	1-60	1-62	2-14
		1-29	1-61	1-63	2-50
		1-40			
Leaking Service Lateral	LSL	1-2	1-16	1-42	2-9
		1-4	1-18	1-52	2-24
		1-5	1-21	1-59	2-33
		1-6	1-23	2-2	2-46
		1-7	1-24	2-3	2-51
		1-9	1-31	2-5	2-54
		1-11	1-33	2-6	
		1-13	1-35	2-7	
		1-14	1-39	2-8	
Open Cleanout	OCO	1-1	1-47	2-18	2-37
		1-3	1-49	2-19	2-38
		1-12	1-50	2-20	2-40
		1-15	1-53	2-21	2-41
		1-19	1-54	2-22	2-42
		1-20	1-55	2-23	2-43
		1-22	1-56	2-25	2-44
		1-25	1-57	2-26	2-45
		1-26	1-58	2-27	2-47
		1-27	2-1	2-28	2-48
		1-30	2-4	2-29	2-49
		1-32	2-10	2-30	2-52
		1-34	2-11	2-31	2-53
		1-36	2-12	2-32	2-56
		1-37	2-13	2-34	2-58
		1-41	2-16	2-35	2-59
		1-45	2-17	2-36	

2.3.1.4 Flow Mapping

Flow mapping occurred on two separate occasions. The first occasion was on February 20, 2014 from 10:57 PM to 5:12 AM, and the other was on March 5, 2014 from 10:55 PM to 5:19 AM. The first occasion was done during a dry period while the second was done approximately 48 hours after heavy rainfall. Problem areas are identified in the flow poke maps. These maps can be seen as Figures B1 through B8 located in Appendix B.

Flow mapping studies are performed to determine the relative quantities and general areas where sources of extraneous water enter the collection system. The sources of water identified during flow mapping studies originate from infiltration sources, manhole joint failure, cracks in the pipe, pipe joint failures, improper service taps, root intrusion, or inflow sources such as storm drains, roof drains, and contributions from manhole lids or open cleanouts. By comparing flow measurements between manhole sections, problem areas can be identified and impacts from infiltration and inflow prioritized for further investigation, based on relative increases in the measured flow.

In order to differentiate I/I flows from sanitary flows, flow mapping studies are typically conducted at night between midnight and 5 AM. It is presumed that during late night hours, most residential users are sleeping and the domestic flow component in the sewer is negligible.

2.3.1.5 Collection Sewer Summary

Both tests indicated a number of deficiencies that need to be addressed. A site visit must take place at each of these locations to determine what action must be taken to repair or rehabilitate each problem. Some of the repairs can be easy to correct, such as leaky cleanouts, while others such as catch basins, may require more extensive efforts to reroute flows to nearby drainages. Some of the deficiencies may also require additional television inspection to see the extent of deterioration of sewer main lines, sewer laterals, and lateral connections.

In some cases, the problem is located within the public right-of-way and should be repaired or rehabilitated by the City. In other cases, the deficiency is located on private property and the private property owner should be required to address and repair the problem. It is recommended that letters be sent to all private property owners where deficiencies were noted.

2.3.1.6 Pump Stations

Pump station locations are shown on the preceding inserted collection system maps Figures 2.1.1-2.1.5.

Constitution Way Pump Station

Constitution Way Pump Station is located at the intersection of Highway 101 and North Bank Chetco River Road. It was constructed to serve an adjacent area that has yet to be developed. Once the station is fully utilized, it is recommended that this station install a high pressure jet washing system to remove grease and solids from the floats, pumps, walls and floor of the station where unwanted material often accumulates. A draw down test was recently performed on both pumps, and also on both pumps combined, for a flow rate of 414 gpm.

Macklyn Cove (Zwagg Rock) Pump Station

The Macklyn Cove (or Zwagg Rock) Pump Station is located to the south of Mill Beach Road and along Macklyn Cove Drive. Macklyn Cove Pump Station was constructed in 1978 and has two pumps that are currently operational. Both pumps are new and were purchased within the past year. This station is fully functional but due to old age, it is showing signs of wear and tear. A new pathway has been rebuilt for

improved access to the pump station. A draw down test was recently performed for Pump No. 2 and it resulted in a flow rate of 369 gpm.

Sea Cliff Terrace Pump Station

Seacliff Terrace Pump Station is located directly to the northwest of the Chetco River entrance and to the south of the intersection of Memory Lane and Del Norte Lane. The pump station was originally constructed in 1978, then replaced within the last 15 years with a small package station in a fiberglass housing. Currently there are two pumps that are fully operational. A draw down test was recently performed on both pumps, and also on both pumps combined, for a flow rate of 220 gpm.

Beach Avenue (Sea View) Pump Station

Beach Avenue (or Sea View) Pump Station is located to the west of Highway 101 at the south end of Beach Avenue. This station was constructed in 1978. Two pumps are enclosed in fiberglass housing and one is out of commission due to a bad check valve. Root intrusion from surrounding trees is embedded in the gravity inlet and along the bottom two 48-inch rings. A draw down test was recently performed on one pump and resulted in a flow rate of 124 gpm.

Cypress Cove (The Cove) Pump Station

Cypress Cove (or The Cove) Pump Station is located south of Wharf Street and to the east of the wastewater treatment plant. This station was constructed in 1997 and currently has heavy grease buildup, especially along the guide rails. As a result of the grease and rust, both pumps cannot be pulled out for maintenance. Replacement of the guide rails, along with installing a high pressure jet washing system to remove grease and solids from the floats, pumps, walls and floor of the station where unwanted material often accumulates, is highly recommended. One of the two pumps has been replaced within the past year. A draw down test was recently performed on both pumps, and also on both pumps combined, for a flow rate of 203 gpm.

Dawson Tract No. 1 Pump Station

Dawson Tract No. 1 Pump Station is located directly to the west of Highway 101 and to the east of Ridgeway Street. This station was constructed in 1992. It has been modified since to include an addition to the top of the building, two new cranes, and radiant heat. There are signs of corrosion and possible leakage throughout the pump station. The fuel tank for this site is located underground and will need to be moved above ground. A draw down test was recently performed on both pumps, and on both pumps combined, for a flow rate of 930 gpm.

Dawson Tract No. 2 Pump Station

Dawson Tract No. 2 Pump Station is located at the end of Pacific Heights Road and just south of the intersection of Pacific Heights Road and Ridgeway Street. This station was constructed in 1992. Station siding, paint, roof and landscaping have been upgraded to match the adjacent residence. A draw down test was recently performed on both pumps, and on both pumps combined, for a flow rate of 294 gpm.

Dawson Tract No. 3 Pump Station

Dawson Tract No. 3 Pump Station is located at the west end of Shorewood Terrace Street. This station was constructed in 1992. Station siding, paint, roof and landscaping have been upgraded to match the adjacent residence. Moisture within junction boxes and electrical conduits has been an ongoing issue at this pump station. Currently there are no devices to monitor moisture within any of the existing electrical equipment and fittings.

Dawson Tract No. 4 Pump Station

Dawson Tract No. 4 Pump Station is located at the east end of Park Spur (road) and just west of Highway

101. The fuel tank for this site is located underground and will need to be moved above ground. A draw down test was recently performed on both pumps, and on both pumps combined, for a flow rate of 434 gpm.

Dawson Tract No. 5 Pump Station

Dawson Tract No. 5 Pump Station is located at the south end of West Ocean Drive. This station was constructed in 1992 and currently has heavy grease buildup, especially along the guide rails. Neither pump can be pulled out for maintenance as a result of the grease and rust. Guide rails will need to be replaced and better maintained to prevent any similar issues. A draw down test was recently performed on both pumps, and on both pumps combined, for a flow rate of 109 gpm.

Buena Vista Loop (BV Loop) Pump Station

Buena Vista Loop Pump Station (or BV Loop) is located off Buena Vista Loop and is just west of the Sea Cliff Terrace Pump Station. This station was constructed in 1968 on Buena Vista Loop to serve the southeastern portion of the City and was remodeled in 2000-2001. Pump No. 2 and Pump No.3 both have been rebuilt in the last two years while Pump No.1 will be rebuilt in the near future. There is a heavy amount of grease buildup especially along the guide rails. As a result of the grease and rust, neither pump can be pulled out for maintenance.

Mill Beach Pump Station

Mill Beach Pump Station was constructed in 1958 and was remodeled in 1972 when a stand-by generator was added. It was remodeled again in 1989. It is located on Mill Beach Road and serves the west and southwest portions of Brookings. There is a heavy amount of grease buildup especially along the guide rails. As a result of the grease and rust, both pumps cannot be pulled out for maintenance. A high pressure jet washing system can be installed to help remove grease and solids from the floats, pumps, walls and floor of the station where unwanted material often accumulates. Roof trim also needs paint. Debris tends to accumulate on the influent bar screen; staff clean the screen daily and more often on rainy days.

Riverview Pump Station

Riverview Pump Station is located off Riverview Drive and is southwest of the Highway 101 Bridge crossing between Harbor and the City of Brookings. This station was constructed in 2009 and is currently in good condition. It is anticipated that all valves will need replacing in the next 15 to 20 years. A draw down test was recently performed on both pumps, and on both pumps combined, for a flow rate of 129 gpm.

2.3.1.7 Miscellaneous Pump Station Items

Below is a list of items that pertain to either most or all of the pump stations in the City of Brookings:

- Control panels are beginning to show their age and will soon need to be replaced.
- All lighting inside and outside of each pump station will soon need replacing with LED lighting.
- All pump stations that are utilizing submersible pumps will soon need to replace all guide rails due to rust and heavy grease accumulation.
- All valves need replacing especially for larger pumps.
- All pump stations built after 1990 could use Meltric switch-rated decontactor plugs and receptacles instead of using hardwire connections to eliminate the need for routine hiring of an outside electrician.
- A moisture detection device is needed for most pump stations.

2.3.2 Existing Treatment Facilities

A site map of the wastewater treatment plant is inserted previously as Figure 2.1.6.

2.3.2.1 Headworks

Present Condition. The physical condition of the climbing bar screens is poor and the grit removal portion is in fair condition. It is suspected that the paddles in the grit system are worn, but staff has not been able to take this unit down to inspect it. One of the two bar screens is out of operation due to broken parts. The original climbing bar screen (No. 1) has extensive corrosion damage to its frame. The single grit classifier unit has corrosion damage. The grit pumps are over 20 years old.

Suitability and Adequacy. Bar Screen No. 1 is in such poor condition that replacement is recommended. This is in part due to obsolescence and the difficultly in acquiring replacement parts. The grit removal system is currently adequate as long as parts remain available for periodic repair. The controls for the headwork units, as is the case with many other units at the WWTP, are outside and exposed to the weather, and some rain water leakage at switches, lights, and panel seals appear to be occurring.

TABLE 2.3.2.1.1
BAR SCREENS AND GRIT REMOVAL CHAMBER CAPACITIES

Bar Screens (Pre-2001)	Value
Number	1
Capacity Each, PWWF, MGD	11.6
Opening Size, Inches	5/8
Bar Screens (Post-2001)	
Number	1
Capacity Each, PWWF, MGD	11.6
Opening Size, Inches	5/8
Grit Removal Chamber (Pre-2001)	**Value**
Number	1
Type	Vortex
Diameter, Ft.	10
Treatment Capacity Each, MGD	7
Hydraulic Capacity Each, MGD	8
Grit Removal Chamber (Post-2001)	**Value**
Number	1
Type	Vortex
Diameter, Ft.	10
Treatment Capacity Each, MGD	7
Hydraulic Capacity Each, MGD	8
Grit Pumps (Pre-2001)	**Value**
Number	1
Capacity, GPM	200
Grit Pumps (Post-2001)	**Value**
Number	1
Capacity, GPM	200

2.3.2.2 Primary Sedimentation

Present Condition. The physical condition of the rectangular clarifier is good. Metal parts show rust which should be cleaned and recoated, but all components appear to be functioning correctly with the following exceptions. Several check valves associated with the system leak and require repair or replacement. The sludge meter is not functioning and requires repair or replacement. The sludge density meter does not function and requires repair or replacement. The circular clarifier has not been in operation for some time and is not believed by staff to be operational. It is anticipated that a new drive and gearbox would be required to return the circular clarifier to service with some structural repair of the sweep arms necessary as well.

Suitability and Adequacy. Fortunately, the rectangular units are adequate for the current and anticipated future loadings and the circular unit is not required. With respect to solids loading, the existing primary clarifier units are only loaded at 1/3 of their average and ½ of their peak design capacity.

TABLE 2.3.2.2.1
PRIMARY SLUDGE CLARIFIERS CAPACITY

Primary Sludge Clarifiers - Rectangular	Value
Number	2
Capacity Each, PWWF, MGD	7.75
Length, FT	82
Width, FT	21.5
Surface Area, SF	1,763
Side Water Depth, FT	8.4
Est. BOD_5 Remove. Eff. Each %	30
Primary Sludge Clarifiers - Circular	**Value**
Number	1
Capacity Each, PWWF, MGD	2.2
Diameter, FT	35
Surface Area, SF	960
Peak Day Overflow Rate, GPD/SF	2,300

2.3.2.3 Primary Sludge and Scum Pumping

Present Condition. The pumps are operational but problematic in that the repair parts are difficult to obtain and expensive due to approaching obsolescence. Within the below-ground primary clarifier pipe gallery, heavy rains cause leakage into the room.

Suitability and Adequacy. The pump capacity is adequate for the current and anticipated future loadings. However the pumps have only two speeds unlike modern pumps which can provide pumping over an adjustable range. Within the pipe gallery, the lighting, while adequate, is energy intensive and the bulbs are difficult to access and change. Operators have suggested that the installation of modern LED type of lighting would be a great improvement. The operators also noted that the gas and fire alarm systems are very old and should be replaced with modern, easier to maintain equipment.

TABLE 2.3.2.3.1
PRIMARY SLUDGE AND SCUM PUMP CAPACITIES

Primary Sludge Pumps	Value
Number	4
Capacity Each., GPM	50
Primary Scum Pumps	**Value**
Number	1
Capacity Each., GPM	50

2.3.2.4 Trickling Filter

Present Condition. The tricking filter, media, distributer, blowers, pumps and aluminum dome are in fair condition except for seals which are leaking in the rotating influent distributer.

Suitability and Adequacy. During periods of low flow, there is insufficient force to drive the hydraulically powered rotating influent distributor. A motorized drive would be useful. As is the case for the sludge pumps, the type of pumps installed are two-speed designs which do not allow optimum pump rates under all flow conditions. The blowers for the odor control system are not able to operate efficiently under the throttled condition at which they are run and often run at a higher speed than necessary.

TABLE 2.3.2.4.1
TRICKLING FILTER CAPACITIES

Trickling Filter	Value
Number	1
Diameter, Ft.	70
Plastic Media Volume, CF	61,575
Trickling Filter Pumps (Old)	**Value**
Number	2
Capacity Each, MGD	4.5
Trickling Filter Pumps (New)	**Value**
Number	2
Capacity Each, MGD	6.5
Trickling Filter Odor Control	**Value**
Type	Activated Carbon
HP	30
Capacity, SCFM	4,000

2.3.2.5 Snail Removal

Present Condition. The worn out snail removal pump was replaced in 2015 and is currently in good condition. The concrete basin is in fair condition.

Suitability and Adequacy. The system fulfills its purpose.

TABLE 2.3.2.5.1
SNAIL REMOVAL AND PUMP CAPACITIES

Snail Removal	Value
Number	1
Type	Vortex
Diameter, Ft.	12
Treatment Capacity Each, MGD	12
Hydraulic Capacity Each, MGD	12
Snail Pump	**Value**
Number	1
Capacity, GPM	250

2.3.2.6 Solids Contact/Sludge Re-aeration Basins

Present Condition. The basins are in good condition. The blowers are in fair condition. With respect to the building housing the blowers and motor control centers, the masonry walls leak when rain is occurring. The metal doors at this building (like many other doors at the WWTP), are extensively corroded at the bottom and open to the outside. The building has a large non-functional air conditioner unit which contributes to roof leakage, is not required, and should be removed. The passive louvers for this building are completely corroded, do not move and are always open.

Suitability and Adequacy. The control of air must be made using throttling. The blowers are not able to operate efficiently under the throttled condition. Modern blowers which can operate at various speeds would be more energy efficient. With repair, the masonry building housing motor control centers and blowers would be adequate. There is a need for a bypass line around the trickling filter so that bypass may occur for both operational and maintenance reasons.

TABLE 2.3.2.6.1
BASIN AND AERATION BLOWER CAPACITIES

Basin (Pre-2001)	Value
Number	1
Volume, CF	13,200
Side water Depth, FT	12.2
Basin (Post-2001)	**Value**
Number	1
Volume, CF	16,200
Side water Depth, FT	12.2
Aeration Blowers (Pre-2001)	**Value**
Number	2
Capacity Each, SCFM	850
Aeration Blowers (Post-2001)	**Value**
Number	1
Capacity Each, SCFM	850

2.3.2.7 Secondary Clarifiers

Present Condition. The physical condition of the secondary clarifiers is good. Metal parts show rust which should be cleaned and recoated, but all components appear to be functioning correctly.

Suitability and Adequacy. The units are more than adequate for current and anticipated future loadings. Reviewing Daily Monitoring Records (DMRs) from the beginning of 2010, the largest flow of record appears to have been 5.76 MGD on 12/28/2010. The combined capacity of the secondary clarifiers is 17 MGD. This indicates that the units are only loaded at about 1/3 of their capacity.

TABLE 2.3.2.7.1
SECONDARY CLARIFIER CAPACITIES

Secondary Clarifier	Value
Number	2
Capacity Each, PWWF, MGD	8.50
Diameter, FT	80
PWWF Overflow Rate, GPD/SF	1,700
Side Water Depth, FT	16
Surface Area, SF	5,060

2.3.2.8 Return Activated Sludge (RAS) and Clarifier Drain Pumps

Present Condition. As is the case for other sludge pumping at the wastewater treatment facility, the existing pumps are becoming obsolete and repair parts to keep them operational difficult and expensive to obtain. The tank drain pumps were in service prior to 2001 and are therefore nearing the end of service life.

Suitability and Adequacy. The two-speed setting design of the existing pumps is less than desirable from the standpoint of optimizing RAS flow rates with conditions and would be better served with the use of VFD controlled pumps.

TABLE 2.3.2.8.1
RAS AND CLARIFIER DRAIN PUMP CAPACITIES

RAS Pumps (Pre-2001)	Value
Number	3
Capacity Each, MGD	0.80
RAS Pumps (Post-2001)	**Value**
Number	2
Capacity Each, MGD	0.80
Clarifier Drain Pumps	**Value**
Number	2
Capacity Each, MGD	0.6

2.3.2.9 Disinfection

Present Condition. The ultra-violet (UV) disinfection basin is in good condition. The UV power and bulb system is generally adequate but becoming antiquated.

Suitability and Adequacy. The medium intensity UV system is obsolete and not cost effective in comparison to modern high intensity systems. Parts and bulbs are becoming difficult and expensive to obtain. The heat exchangers for the cooling system requires significant repair due to corrosion. There is no communication with the plant's SCADA system for UV equipment. The addition of this would improve operations.

TABLE 2.3.2.9.1
ULTRA VIOLET DISINFECTION SYSTEM CAPACITIES

Ultraviolet Disinfection System	Value
Type	Med. Pressure
Configuration	Open Channel
Dose, MW-Sec/Cm^2	24,000
Capacity, MGD	15.5
Number of Banks	2
Number of Modules per Bank	8
Number of Lamps per Module	4

2.3.2.10 Sludge Thickener

Present Condition. The sludge thickener is in good condition and there are no operational problems reported. The belt for the press appears to have been replaced recently. The air compressor is located in the same room as the filter thickener and is showing signs of corrosion.

Suitability and Adequacy. The sludge thickener is adequately sized for the present and future requirements of sludge thickening. It is anticipated that periodic replacement of the belts will be required in the next 20 years. The air compressor should be relocated to a drier location such as on the other side of the wall in the boiler room.

TABLE 2.3.2.10.1
SLUDGE THICKENER CAPACITIES

Thickener	Value
Number	1
Type	Belt
Width, Meters	1.5
Concentration Produced %	5-6
Capacity Each, LBS/HR	900

2.3.2.11 Digester

Present Condition. Elements of the digester system require repair and rehabilitation. The concrete structure, connections, piping, fitting and valves were investigated in detail in early 2014 and found to be sound, with the following exceptions:

- Gas compressor pump requires replacement due to wear.
- The heater on the top of the digester in the gas circulation rotary valve shelter is inoperative.
- Rotary valve gas pipe, components and fittings require replacement with stainless steel which is occurring as piping develops leaks.

- The three-way plug valve and methane pressure/vacuum relief assembly were leaking and were replaced in 2015. It is currently in good condition.
- The most significant problem associated with the digester system is the lack of methane storage capacity. The digester must frequently be heated using diesel fuel rather than by the methane produced. This is because the production of gas is limited due to the low amount of organic loading relative to its size, and because there is little capacity for methane gas storage.
- A more efficient burner is desired by the operators.

Suitability and Adequacy. The anaerobic digester provides adequate treatment to produce Class B biosolids. Federal regulations require that Mean Cell Residence Time (MSRT) for processes with temperatures ranging from 95° F to 131° F be at least 15 days. Operating temperature at the Brookings digester is 97° F ± 1 degree. Mean cell residence time currently exceeds 100 days. The digester has significant capacity for future growth and is currently larger than required.

At times when methane production is surplus to the needs of heating, the extra gas must be flared off as there is little storage space available in the head space at the top of the digester. It was anticipated that the current digester constructed in 2001 would be supplemented with a secondary digester in the future and significantly more gas storage would have been provided in that unit. Because growth forecasts did not materialize, the second unit was not constructed.

TABLE 2.3.2.11.1
DIGESTER CAPACITIES

Anaerobic Digester	Value
Number	1
Diameter, ft.	45
Liquid Volume, Cu. Ft.	47,300
Gas Volume, Cu. Ft.	268
Side Water Depth, Ft.	30

2.3.2.12 Sludge Storage

Present Condition. The two smaller sludge storage tanks were originally the primary and secondary digester units for the wastewater plant. With the sludge digester equipment removed, these concrete tanks continue to provide adequate service for sludge storage. There are signs of rust on exposed piping, but both units are serviceable for the foreseeable future. The concrete roof on one of the storage tanks is spalled badly and should be repaired immediately before the reinforcement bars are exposed to the weather.

The large sludge storage tank was constructed in 2001 and is generally in very good condition. Mixers have had to be replaced on several occasions in the last ten years and they appear to be undersized. Mixing remains a problem for this large tank. In order to adequately mix sludge for dewatering runs, both the mixers and the aeration system must be operated. However, within a few hours of the aeration, the sludge pH falls from about 7.5 to 5.5 which interfere with dewatering.

Suitability and Adequacy. The combination of sludge storage tanks provides adequate capacity for the foreseeable future. An improved mixing approach is required for the large tank. The two smaller tanks both have approximately four feet of grit which requires removal.

TABLE 2.3.2.12.1
SLUDGE CAPACITIES

Small Sludge Storage Tanks	Value
Number	2
Diameter, ft.	30
Volume, Each Cu. Ft	12,000
Large Sludge Storage Tank	**Value**
Number	1
Diameter, ft.	110
Volume, Cu. Ft	267,400

2.3.2.13 Sludge (Biosolids) Dewatering

Present Condition. The sludge dewatering facility was added to the wastewater treatment plant in 2010. It consists of a screw press with associated polymer mixing equipment, sludge conveyance equipment, and enclosed dewatered biosolids conveyance to a sludge dumpster hopper located in a covered shelter. The facility also includes odor control equipment. Being relatively new, it is in very good condition. Some of the fiberglass air handling ducting requires minor repairs, but these deficiencies are generally of an aesthetic rather than functional nature. Provision was made for the installation of a second future unit. A class B biosolids is produced.

Suitability and Adequacy. The current biosolids production requirement is for 220,000 pounds dry solids per year (110 tons). The current single screw press equipment is capable of producing this in about 30 days (8 hours production per day). The 2010 design was sized to provide production in a period of about 65 days per year (to accommodate dry season land application). The existing equipment is therefore required to operate at only about 46% capacity.

TABLE 2.3.2.13.1
SLUDGE DEWATERING SYSTEM CAPACITY

Sludge Dewatering System	Value
Number	1
Capacity dry LB/HR	900

2.3.2.14 SCADA System

Present Condition. The SCADA system for the plant is generally in good condition. Improvements have been made periodically since installation.

Suitability and Adequacy. The SCADA system requires that a software update be made to insure compatibility with modern PLCs and computers.

2.3.2.15 Electrical System Including Generator

Present Condition. The electrical system for the plant is generally in good condition. Improvements have been made periodically since installation.

Suitability and Adequacy. The electrical system including the generator appears to be suitable and adequate for service. Components should be replaced as necessary during the 20-year planning period.

2.3.2.16 Plant Water Pumps

Present Condition. The water pumps are old. Valves have been replaced as necessary.

Suitability and Adequacy. The water pumps, valves, and check valves are likely to need replacement within the next 20-year period due to age and wear.

TABLE 2.3.2.16.1
PLANT WATER PRESSURE

Low Pressure Plant Water	Value
Number	2
Type	Submersible
Capacity, Each, GPM	150
High Pressure Plant Water	**Value**
Number	2
Type	Submersible
Capacity, Each, GPM	84

2.4 Financial Status

2.4.1 Financial Statement

Complete financial records for the wastewater collection and wastewater treatment system are included in Appendix D. These consist of eight pages of detailed financial information extracted from the City's complete 2013-2014 budget.

A summary of the revenues and resources based on utility user fees for the wastewater system is shown below in Table 2.4.1.1. This is distinct from the wastewater system replacement fund program and from the system development charge program.

TABLE 2.4.1.1
WASTEWATER REVENUE AND RESOURCES

Item	$ Amount
Net Working Capital	844,000
Utility User Fees	2,410,000
Utility Connection Fees	9,000
Harbor SD Charges for Services	317,000
Harbor SD Charges for Debt	56,000
Harbor SD Charges for WW Loan Debt	40,000
Interest Income	1,000
Other Revenue	0
Total	3,676,000

A summary of the wastewater system expenditures is shown below in Table 2.4.1.2. This is distinct from the wastewater system replacement fund program and from the system development charge program.

TABLE 2.4.1.2
WASTEWATER EXPENDITURES

Item	$ Amount
Collection Personal Services	475,680
Treatment Personal Services	446,888
Collection Materials & Service	257,150
Treatment Materials & Services	509,000
Collection Capital Outlay	36,900
Treatment Capital Outlay	636,900
Transfer Out – General Fund	35,299
Transfer Out – General Reserve	0
Transfer Out – WW Loan Fund	1,046,932
Transfer Out – Technology Fund	12,570
Contingencies & Reserves - Treatment	218,681
Total	3,676,000

A summary of the revenue and resources based on the wastewater System Replacement Fund (SRF) program is shown below in Table 2.4.1.3.

TABLE 2.4.1.3
SRF REVENUE AND RESOURCES

Item	$ Amount
Net Working Capital	1,150,000
Interest Income	500
System Replacement Fees	145,000
Harbor SD Interceptor Line Revenue	4,500
Total	1,300,000

A summary of the expenses based on the wastewater System Replacement Fund (SRF) program is shown below in Table 2.4.1.4. Note that SRF are used for major repairs and replacements of existing infrastructure.

TABLE 2.4.1.4
SRF EXPENSES

Item	$ Amount
B-H Interceptor Line	110,729
Construction	851,891
Emergency Repairs/Improvements	300,000
Transfer Out – Storm Loan Fund	37,380
Total	1,300,000

A summary of the Revenue and Resources based on the System Development Charge (SDC) program is shown below in Table 2.4.1.5.

TABLE 2.4.1.5
SDC REVENUE AND RESOURCES

Item	$ Amount
Net Working Capital	990,000
Interest Income	2,000
Harbor SD SDCs	5,000
Improvement Fees	10,000
Interest Income	1,000
Harbor SD System Reimb. Fees	5,000
Reimbursement Fees	10,000
Total	1,023,000

A summary of the expenses based on the System Development Charge (SDC) program is shown below in Table 2.4.1.6. This program provides for both capital improvements and system replacement. Note that improvement construction funds are used only for capital improvements which increase system capacity. Reimbursement construction funds are less restricted and may be used for both system capacity improvements and for major repairs or replacements of existing wastewater infrastructure.

TABLE 2.4.1.6
SDC EXPENSES

Item	$ Amount
Improvement Construction	302,500
Reimbursement Construction	645,500
Transfers Out – WW Loan Fund	75,000
	1,023,000

2.4.2 Current Rate Schedule

The City Council of Brookings established new sewer rates effective July 1, 2014. The rates are comprised of two parts, the Base Rate and the Sewer Replacement Fund (SRF). Sewer service is provided only to inside-city limits customers. The complete schedule of water and sewer rates is contained in Appendix D. Sewer base rates and sewer replacement fund rates for single and multi-family sewer service are flat rates per unit per month. All other base rates are per 100 cubic feet (CF) per month of water use and the sewer replacement fund charges are per EDU per month. Sewer rates are shown in Table 2.4.2.1 below.

TABLE 2.4.2.1
MONTHLY SEWER RATES

Type	$ Base Rate	$ SFR
Single Family*	58.88	3.76
Multi Family*	58.88	3.76
General Commercial	6.45	3.76
Restaurant	7.33	3.76
Industrial	11.44	3.76
Schools	3.83	3.76
Churches	3.72	3.76

* Base Rate & SFR per Residential Unit. All other base rates per 100 CF of water & SFR per EDU.

2.4.3 Annual O&M Costs

The City's yearly operating budget for *wastewater collection* operation and maintenance (O&M) is listed in Table 2.4.3.1 below. A more detailed breakdown of these items is shown in the eight pages of detailed financial information extracted from the City's complete 2013-2014 budget and included as Appendix D.

TABLE 2.4.3.1
WASTEWATER COLLECTION SYSTEM O&M

Item	$ Amount
Personnel Services	475,680
Office Supplies	7,500
Equipment Maintenance	5,000
Uniform Allowance	2,400
Operating Supplies	40,000
Misc. Safety Supplies	3,300
Building Maintenance	1,000
Pump Station Maintenance	0
I/I Program	49,000
GIS Update Maintenance	20,250
Engineering Services	0
Contract Services	70,000
Account Collection Expense	500
Bank Fees	12,000
Insurance/Bonds	15,000
Training/Travel	2,500
Utilities	28,000
Communications	700
Total	732,830

The City's yearly operating budget for *wastewater treatment* operation and maintenance (O&M) is listed in Table 2.4.3.2 below. A more detailed breakdown of these items are shown in the eight pages of detailed financial information extracted from the City's complete 2013-2014 budget and included as Appendix D.

TABLE 2.4.3.2
WASTEWATER TREATMENT O&M

Item	$ Amount
Personnel Services	446,888
Office Supplies	800
Equipment Maintenance	10,000
Uniform Allowance	2,000
Operating Supplies	65,000
Misc. Safety Supplies	8,200
Building Maintenance	10,000
Pump Maintenance	15,000
Contract Services	50,000
Biosolids Disposal	60,000
Dewatering Engineering	0
Chemicals	60,000
Insurance/Bonds	18,000
Training/Travel	4,500
Utilities	180,000
Communications	7,500
Total	937,888

2.4.4. Capital Improvement Program

Tables 2.4.4.1 and 2.4.4.2 address capital improvements paid from the base sewer fees which are distinct from the wastewater system replacement fund (SRF) and system development fee (SDC) programs. The latter two funds provide for both major repair and replacement of existing infrastructure and, in the case of the SDC program, the improvements portion is used only for capacity increasing infrastructure improvements.

A more detailed breakdown of these items is shown in the eight pages of detailed financial information extracted from the City's complete 2013-2014 budget and included as Appendix D. Note from previous Table 2.4.1.6 that the System Development Charge (SDC) program is budgeted to provide $302,500 in capital improvements which increase wastewater collection or treatment capacity, in addition to the capital improvements shown in the following Tables 2.4.4.1 and 2.4.4.2.

TABLE 2.4.4.1
WASTEWATER COLLECTION SYSTEM CAPITAL IMPROVEMENTS

Item	$ Amount
Improvements	0
Vehicle	12,500
Equipment	12,000
Emergency Repairs	10,000
Tower Lease	2,400
Total	36,900

The City's yearly operating budget for wastewater treatment capital improvements is listed in Table 2.4.4.2 below. A more detailed breakdown of these items are shown in the eight pages of detailed financial information extracted from the City's complete 2013-2014 budget and included as Appendix D.

TABLE 2.4.4.2
WASTEWATER TREATMENT CAPITAL IMPROVEMENTS

Item	$ Amount
Improvements	597,000
Vehicle	12,500
Equipment	15,000
Emergency Repairs	10,000
Tower Lease	2,400
Total	636,900

2.4.5 Debts and Reserve Accounts

The City maintains a wastewater loan fund to provide for wastewater system loan payments and reserve funds. Details of the fund are included in Appendix D. Budgeted resources and income for this fund are summarized in Table 2.4.5.1 following.

TABLE 2.4.5.1
WASTEWATER LOAN FUND REVENUE AND RESOURCES

Item	$ Amount
New Working Capital	1,123,000
Interest Income	500
Transfer In Wastewater Fund	1,046,932
Transfer In Wastewater SDC	75,000
Total	2,245,432

Budgeted loan and reserve expenses for this fund are summarized in Table 2.4.5.2 following.

TABLE 2.4.5.2
WASTEWATER LOAN FUND EXPENSES

Item	$ Amount
Legal/Admin Services	0
Debt Service Principal	900,681
Debt Service Interest	222,035
Contingencies/DEQ Reserve	1,122,716
Total	2,245,432

2.4.6 Tabulation of Users by Category

The City currently has 4,148 services (water meters) which also receive sewer service. Based on a single-family residence (SFR) usage rate, the City has 5,446 wastewater EDUs. Oregon Business Development Department Infrastructure Finance Authority (IFA) EDUs are based on a usage rate of 7,500 gallons per month. The City has 2,770 IFA EDUs. Infrastructure Finance Authority EDUs are used to evaluate user rates at a national level. Tables 2.4.6.1 list the user type and EDUs.

TABLE 2.4.6.1
USER TYPES and EQUIVALENT DWELLING UNITS (EDUs)

Description	Number Of Users	Total Usage (Gal./year)	Usage Per User (Gal./Month)	*EDUs Per SFR Rate	**EDUs Per OBDD-IFA
Residential	3885	177,807,478	3,814	3,885	1,976
Church	15	1,332,527	7,403	29	15
General Commercial	187	35,990,722	16,039	786	400
Industrial	19	21,589,526	94,691	472	240
Restaurant	29	6,347,363	18,240	139	71
School	13	6,195,186	39,713	135	69
Total	4148	249,262,802	5,008	5,446	2,770

2.5 Water/Energy/Waste Audits

2.5.1 General WWTP

Solids Handling
Several energy audits have been performed with focus on the ratio of methane and diesel fuel usage for the boiler which heats the digester. One was produced in the form of a Technical Memorandum titled "Digester Gas Storage", April 23, 2003 by Brown and Caldwell. The report confirmed that during the winter, methane production was frequently insufficient (for at least part of the day) to provide adequate heating for the digester. During these periods, the digester heating boiler would switch over from methane and burn diesel fuel. One improvement was suggested in that memorandum that involved the addition of a low pressure gas storage tank on the ground adjacent to the digester. The digester in its current configuration can store only 268 SCF of methane gas. This additional 4,500 gallon tank would store 512 SCF of methane gas. This was estimated to provide an additional 30 minutes of heating time per day which under some conditions would be sufficient to "bridge" the times between gas generation surplus and deficiency. The installation was estimated at the time to cost between $50,000 to $70,000. The solution did not appear to be cost effective.

A more though study was completed August 2014. It is titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation", by The Dyer Partnership. Following are findings from the report

- The digester is operating at about 36% of its hydraulic design capacity and about 43% of its solids design capacity. The digester is under-loaded.
- The digester operation appears to be stable, with good gas production rates for the volatile solids loading it receives. This suggests that mixing is not a problem.

- Because of the relatively low loading rate in comparison to the size and resulting surface area of the digester, heat loss, particularly via the concrete roof is significant (about 47% of total heat demand). Insulation of the roof was considered and found not to be cost effective.
- The heat loss through the exposed outside piping is relatively low (about 7% of total heat demand). Replacement of the insulation on the piping was considered, but was not found to be cost effective.
- Reducing the operating temperature of the digester from 101° F to 98° F results in immediate fuel savings at no cost.

This study determined that the gas deficiency was greater than the earlier technical memorandum of 2003 indicated. A portion of the increased deficiency was likely due to increased methane gas leakage, primarily in the top pressure relief value system which may not have been occurring at the time of the memorandum. The report also determined that it would not be cost effective to provide additional insulation to the digester tank or pipes. The value of the produced methane BTU energy was computed for estimates of the produced methane satisfaction of heat load caused by warming the tank contents and heat loss. It was determined that the methane produced daily would generally be adequate for heat demands if a larger quantity of gas could be stored during the day. Currently, the digester will sometimes experience a deficiency of methane production in cold mornings and diesel fuel is required to maintain heat, while later in the day, methane production has increased but with no further storage space, must be flared off. Several alternatives were investigated based on the energy audit which included operational changes as well as additional construction. The first step was to reduce the operational temperature from 101.5° F to 98° F. This one change is estimated to save 1,022 gallons of diesel fuel per year with no reduction of digester efficiency. The second step is to replace the leaking pressure relief system on the digester. The rate of methane gas leakage was not measurable during the study, but is expected to be significant; replacement is required due to environmental and safety concerns. The third recommended step is to reduce the operating liquid level of the digester to create a greater head space for gas storage in the digester. As noted in the findings, the digester is very oversized and this reduction in liquid level will not negatively affect operation. Additional storage of 4,700 SCF was determined to be necessary for elimination of diesel fuel burning under most conditions. The recommended modification to the digester by lowering the liquid operation level will provide an additional 6,300 SCF for methane gas storage. This modification could save up to 2,444 gallons of diesel fuel per year in addition to the fuel savings realized by operational temperature reduction.

The determination to construct the dewatering facility at the Brookings Wastewater Treatment Plant in 2010 was based primarily upon energy economics. Trucking liquid sludge at a 1-1.5% solids concentration to a location that would accept this material versus dewatering to 22-23% solids concentration reduces the volume of material to be disposed of to 4.24% of its previous volume. This roughly translates to the same reduction in the number of truck trips which must be made as well. Further, because the dewatered material produced can be disposed of at the local county transfer station rather than driven to the City of Grants Pass Jo-Gro facility for composting, the mileage (and therefore energy reduction) is very significant. The energy required to operate the facility is very small in comparison to energy costs required for delivery of the non-dewatered material.

SECTION 3: **NEED FOR PROJECT**

3.1 Health Sanitation, and Security

This section discusses relevant regulations and associated state and federal regulations. The Clean Water Act (CWA) prohibits discharges of wastewater to waters of the state without a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits contain effluent limits that are developed to protect the beneficial uses. NPDES permits are generally renewed every five years, at which time any changes to the rules will be included in the renewed permit. The U.S. Environmental Protection Agency (EPA) has delegated NPDES permitting authority in Oregon to the Oregon Department of Environmental Quality (DEQ).

Anti-degradation
A fundamental premise of the CWA is the maintenance and restoration of the chemical, physical, and biological integrity of the Nation's waters. The CWA requires states to develop water quality standards. Oregon Administrative Rules (OAR) Chapter 340 Division 41 contains Oregon's water quality standards. These standards are benchmarks established to assess whether the quality of Oregon's rivers and lakes are adequate for beneficial uses.

OAR 340-041-0004 states that the purpose of the Anti-degradation Policy is to guide decisions that affect water quality. It aims to protect, maintain, and enhance existing surface water quality to ensure full protection of all existing beneficial uses. OAR 340-041-0007 through 340-041-0350 are intended to supplement the Anti-degradation Policy.

Receiving Stream Description
The City of Brookings WWTP discharges treated disinfected wastewater to the Pacific Ocean. This part of the Pacific Ocean is termed the Territorial Seas of the State of Oregon. This region comprises the seabed and waters within three geographic miles of the Oregon coast and sometimes further if offshore islands or rocks provide a more seaward point for measurement.

Beneficial Uses
OAR 340-041-0300 Beneficial Uses to Be Protected in the South Coast Basin Table 300A lists the beneficial uses for which water quality will be protected. Table 300A can be found in Appendix A. Included in Table 300A *For Estuaries & Adjacent Marine Waters* are:

- Industrial water supply
- Fish and aquatic life
- Wildlife and hunting
- Fishing
- Salmonid fish passage
- Salmonid fish rearing
- Industrial water supply
- Boating
- Water contact recreation
- Aesthetic quality
- Commercial navigation and transportation

3.1.1 Current NPDES Permit Requirements

Goals 6 and 19 of Oregon's Statewide Planning Goals and Guidelines and Oregon's Territorial Seas Plan require that the State's marine resources be conserved. Federal rules (45CFR125.120 —

CFR125.124) require that a discharge into territorial seas is to be permitted under the NPDES program. The City of Brookings operates its wastewater system under NPDES Waste Discharge Permit No. 101773, issued November 7, 2011 by the Department of Environmental Quality (DEQ). In order to renewal this permit, the application must be submitted at least 180 days before the expiration date of October 31, 2016. A copy of the City's NPDES permit is included in Appendix A. A summary of regulatory requirements within the NPDES permit is provided below.

SCHEDULE A
(NPDES Permit Number 101773)

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Outfall 001 – Treated Effluent

(1) November 1st - April 30th:

Parameter	Average Effluent Concentrations		Monthly Average	Weekly Average	Daily Maximum
	Monthly	Weekly	lbs/day	lbs/day	lbs
BOD_5	25 mg/l	30 mg/l	730	1,100	2,000
TSS	25 mg/l	30 mg/l	730	1,100	2,000

(2) May 1st - October 31st:

Parameter	Average Effluent Concentrations		Monthly Average	Weekly Average	Daily Maximum
	Monthly	Weekly	lbs/day	lbs/day	lbs
BOD_5	15 mg/l	25 mg/l	260	400	570
TSS	15 mg/l	25 mg/l	260	400	570

(3) Year-round:

Other parameters	Limitations
Enterococci Bacteria	Must not exceed a monthly geometric mean of 35 organisms per 100 mL.
Fecal Coliform Bacteria	Must not exceed a monthly median of 14 organisms per 100 mL. Not more than 10 percent of the samples per month may exceed 43 organisms per 100 mL.
pH	Must be within the range of 6.0 to 9.0.
BOD_5 and TSS Removal Efficiency	Must not be less than 85% monthly average for BOD and 85% monthly for TSS.

(4) No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR 340-041 applicable to the Oregon South Coast Basin except as provided for in OAR 340-045-0080 and the following regulatory mixing zone:

The allowable mixing zone is that portion of the Pacific Ocean contained within a 300-foot radius of the point of discharge. The Zone of Immediate Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within thirty (30) feet of the point of discharge.

(5) Chlorine and chlorine compounds must not be used as a disinfecting agent of the treated effluent and no chlorine residual due to chlorine used for maintenance purposes is allowed in the discharged effluent.

3.1.2 Potential Future Regulatory Issues

This section discusses some of the potential future requirements that could become important to municipalities based on current regulatory trends. Future regulatory requirements cannot be thoroughly analyzed, since they are under development and have not yet been implemented. New effluent limits may be incorporated in the NPDES permit at the time of renewal.

The Oregon Department of Environmental Quality developed water quality criteria to address pollutants and to protect aquatic organisms and human health. Current toxic compound standards that may be incorporated in the next NPDES permit renewal are in Tables 30, 31 and 41 which are provided in Appendix A.

3.2 Design Criteria and Considerations

Design criteria for future conveyance system expansions are based on topography and the estimated future flows discussed in Section 3.6. Treatment planning must take into account existing and projected loadings and flows, and regulatory requirements. General design considerations incorporated in the development and evaluation of alternatives are discussed below.

3.2.1 Design Period

The design period must be long enough to ensure the new facilities will be adequate for future needs, but short enough to ensure effective use within their economic life. Collection system pump stations serving the properties within the Urban Growth Boundary (UGB) will be based on a design period of 20 years from the date of commissioning. Gravity collection line sizing will be based on ultimate build-out. Treatment facility recommendations will be based on a 20-year planning period from the date the improvements are commissioned.

3.2.2 Collection System

Gravity Sewers
Collection systems must be designed to consider natural ground slope, subsurface conditions, capacity requirements, minimum slope considerations, minimum flow velocities required to maintain solids suspension, and potential sulfide and odor generation. Collection sewers should be designed for ultimate development of areas.

Force Mains
The City currently operates numerous force mains from its sanitary sewer pump stations. DEQ guidelines for force mains are important to help ensure proper performance and longevity.

DEQ issued the current version of *Oregon Standards for Design and Construction of Wastewater Pump Stations* in May 2001, which includes guidelines for force main design.

Pump Stations

Design of pump (lift) stations is a critical element of sanitary sewer collection systems. New pump stations must be designed to meet the *Oregon Standards for Design and Construction of Wastewater Pump Stations*, issued in May 2001 by DEQ. The EPA Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability are to be used to determine the minimum number and sizing of components. Reliability Class I criteria are to be utilized in design.

The pump station must be able to handle the peak instantaneous flows in the system without overflowing. The pump stations should be designed so as not to increase the total sulfide generation potential of the collection system. Contemporary design practice requires some wet well storage of wastewater plus retention in the force main, both of which tend to increase the potential sulfide generation when supplemental aeration is not provided. To minimize hydrogen sulfide generation, wet wells should be as small as possible while still allowing for future growth. Wet well detention times of 30 minutes or less are recommended to avoid hydrogen sulfide generation. When detention times in the pump station force main exceed 25 to 30 minutes, a system to control hydrogen sulfide generation and the accompanying odor and corrosion problems is recommended.

Pump stations should have redundant pump equipment and provisions for emergency generator operation. Power outage frequency and duration must be considered in pump station design to ensure that overflows do not occur due to power loss. In some cases, a portable generator connected to the pump station with a manual transfer switch will suffice. In larger pump stations, a permanent standby generator may be required. Level controls should include a redundant high wet well level sensor.

Wastewater treatment facilities, including pump stations, are also regulated under National Fire Protection Association (NFPA) 820, *Fire Protection in Wastewater Treatment and Collection Facilities*. OSHA Permit Required Confined Spaces Standard 29 CFR 1910.146 limits individual access to spaces that might trap a person or contain noxious atmospheres.

3.2.3 Wastewater Treatment Facility

Primary consideration will be given to the degree of treatment required to meet the discharge requirements of the receiving water, and to sufficient sizing of the facility to handle future projected peak hydraulic and organic loads.

Flexibility

Conveyance and treatment design should allow for flexibility in operation and maintenance. The treatment plant operator must have the ability to alter plant flows around the major process units without significantly degrading effluent quality. This goal can be achieved by providing redundant units and multiple interconnections between units when appropriate. Conveyance and treatment equipment design should also be such that maintenance, both routine and emergency, can be performed without excessively loading other components. Flexibility is also needed to ensure that discharge requirements can be met during changing influent conditions and to allow construction and connection of new process units as needed.

Plant Reliability Criteria

Reliability of treatment processes depends on proper application of unit loading factors and conservative selection of equipment to ensure long life and minimum maintenance costs. Each unit process should be selected based on its capabilities to effectively treat the waste characteristics for the specific application. Capabilities of the treatment plant operator and the community should also be considered. Processes that require a high degree of manual labor and specialized instrumentation should be avoided in most cases. Redundancy is also a key factor in reliability. This proposed facility will be designed to meet EPA Reliability Class I standards because the facility discharges into a "public water supply, shellfish, or primary contact recreation waters, or as a result of its volume and/or character, could permanently or unacceptably damage or affect the receiving waters or public health if normal operations were interrupted."

For components included in the design of Reliability Class I, the following backup requirements apply:

- **Mechanically Cleaned Bar Screens.** A backup bar screen, designed for mechanical or manual cleaning, shall be provided. Facilities with only two bar screens shall have at least one bar screen designed to permit manual cleaning.

- **Pumps.** A backup pump shall be provided for each set of pumps performing the same function. The capacity of the pumps shall be such that, with any one pump out of service, the remaining pumps will have the capacity to handle the peak flow.

- **Comminution Facility.** If comminution of the total wastewater flow is provided, an overflow bypass with a manually-installed or mechanically-cleaned bar screen shall be provided. The hydraulic capacity of the comminutor overflow bypass should be sufficient to pass the peak flow with all comminution units out of service.

- **Primary Sedimentation (Clarifier) Basins.** The units should be sufficient in number and size so that, with the largest-flow-capacity unit out of service, the remaining units should have a design flow capacity of at least 50 percent of the total design flow.

- **Final Sedimentation (Clarifier) Basins and Trickling Filters.** The units shall be sufficient in number and size so that, with the largest-flow-capacity unit out of service, the remaining units shall have a design flow capacity of at least 75 percent of the total design peak day flow. These units are sized for peak day winter flows and large enough to treat MMDWF with one out of service.

- **Contact Stabilization/Re-aeration Basin.** A backup basin will not be required; however, at least two equal-volume basins are recommended. A single basin is permissible.

- **Aeration Blowers, Rotors or Mechanical Aerators.** There shall be a sufficient number of blowers or mechanical aerators to enable the design oxygen transfer to be maintained with the largest-capacity unit out of service. It is permissible for the backup unit to be an uninstalled unit, provided that the installed units can be easily removed and replaced. However, at least two units shall be installed.

- **Air Diffusers.** The air diffusion system for each aeration basin shall be designed so that the largest section of diffusers can be isolated without measurably impairing the oxygen transfer capability of the system.

- **Disinfectant Contact Basins or Units.** The units shall be sufficient in number and size so that, with the largest-flow-capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow.

- **Electrical Power Sources.** Two separate and independent sources of electric power shall be provided to the plant either from two separate utility substations or from a single substation and a works-based generator located at the plant. As a minimum, the capacity of the backup power source for the treatment plant shall be sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions.

Operability

Operation of a wastewater system entails considerable responsibility and cost while providing public health benefits. For these reasons, personnel assigned to operate and maintain a treatment facility must be trained appropriately. The more sophisticated the process or equipment, the greater the level of expertise needed. Qualified individuals are usually available in metropolitan areas, as is financial support for their employment. However, small communities often have a problem in finding the personnel and the money with which to pay them. Consequently, the selection of a treatment process and equipment should reflect the regional and local level of training of operations and maintenance.

Durability

Conveyance and treatment systems should consist of materials and equipment that are capable of satisfactory performance over the entire design life of the wastewater system components. The selection of durable wastewater system components is a matter of judgment based on a number of factors including type and intensity of use, type and quality of materials used in construction, quality of workmanship during the initial installation, and expected maintenance to be performed during life of the component.

Capacity

Individual treatment components must be capable of handling the hydraulic flow through the plant during peak wet weather periods and be capable of being sized to treat the mass loads projected for the facility. The following guidelines will be used in this plan:

- In general, all processes after the headworks are designed to operate for peak daily flow.
- Influent pump stations are designed to operate for peak instantaneous flow.
- The headworks should be sized for peak instantaneous flows.
- Primary clarifiers, when present, should be sized for peak daily flows.
- Aeration basins should be sized using modeling to generate desired treatment in the final effluent.
- Per DEQ, the secondary clarifiers should be sized for either the peak day with all clarifiers operational or the MMDWF with the largest clarifier off-line, whichever results in the greater treatment capacity. Overflow rates for the separate seasons should be used. (e.g. 1,200 GPM for winter and 800 GPM for summer)
- Per EPA, the secondary clarifiers should be able to handle 75% of peak daily flow with the largest unit out of service.
- The disinfection system should be sized for peak daily flow. The contact chamber should be sized for at least 15 minutes of contact time at the peak hour flow, 20 minutes at peak day, or 60 minutes at ADWF, whichever results in the largest basin.
- Sizing of the digester is based on the estimated volume of suspended solids of the incoming mixed liquor, in addition to the holding time required for the digesters. The assumption is made that sludge is held for a minimum 60 days and that biosolids are removed at 2% solids.

Expandability
Expandability is a difficult factor for consideration in the design of wastewater treatment facilities. Designs are created that meet the current regulatory environment. Future regulatory requirements could have dramatic effects on the compliance of even the newest designs. Therefore, expandability is considered from a current regulatory compliance viewpoint. The treatment alternatives considered are expandable as long as specific design capacities of the system are not exceeded.

Miscellaneous
Consideration of site location, daily operational tasks, public perception, health and safety concerns, noise, access to equipment, human factors, and hazardous areas all have to be analyzed when assessing the conveyance and treatment alternatives.

3.3 Aging Infrastructure

The City of Brookings owns and operates a wastewater collection and treatment system. The system consists of a gravity flow collection system with 13 pump stations and a wastewater treatment plant with an ocean outfall. Flows from the Harbor Sanitary District are conveyed to the Brookings system for treatment and disposal.

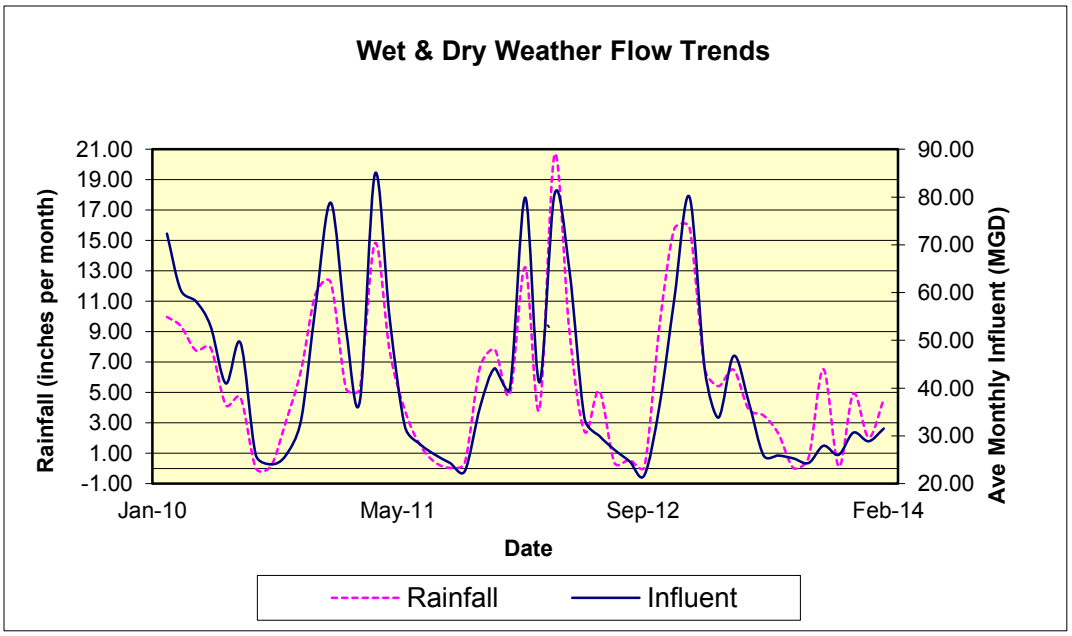
3.3.1 Infiltration and Inflow

An aging and degraded collection system can result in an increase in wastewater flows due to infiltration and inflow (I&I). Infiltration and inflow is groundwater (infiltration) and surface rainwater (inflow) that leaks into the sanitary sewer collection system. During wet weather periods high ground water and surface flows enter the system through defects (holes, cracks, and failed pipe joints). Infiltration and inflow can cause wastewater flows to exceed the capacity of the pipes causing backups into buildings and overflowing manholes. Rain induced sewer flows can hydraulically overload a wastewater treatment plant, increase costs of sewer system operations, and require oversized treatment systems. Exfiltration (loss of wastewater into the surrounding soil) can erode the soil and in some cases cause sinkholes. Leakage of sewage into the surrounding soil can lead to groundwater and soil contamination.

Collection systems and wastewater facilities will continue to age and degrade. Pipe gaskets develop leaks. Pipes and manholes crack. Pumps wear out. Tanks must be painted. Grounds must be maintained. Aeration equipment has a limited life. Investment is required to perform wastewater Capacity Management with an Operations and Maintenance program (CMOM). An Infiltration and Inflow (I/I) study is a basis for a CMOM program.

Flow Trends
Brookings receives very little rainfall from June through September. Monthly average flows at the WWTP for July are lower than in May, reflecting the reduction in rain and subsequent I/I. Wet weather flows are heavily influenced by rain and the condition of the system, with the highest flows occurring between November and April. The average wet weather monthly plant inflow volume has a strong correlation to total monthly wet weather rainfall for the years of the study period.

FIGURE 3.3.1.1
WWTP PLANT FLOW TRENDS 2010-2013



Flow measurements are taken from an effluent meter. Peak hour flows may be higher that records indicate due to equalization within the treatment plant tanks and ponds. Monthly flow rates are at least 2 to 2.5 times higher in the winter months, compared to summer months.

EPA Non-excessive Infiltration

The EPA guidelines (40 CFR 133.103) establish procedures on how to determine whether excessive I/I exists, and how to certify that excessive I/I has been sufficiently reduced through sewer rehabilitation. Infiltration occurs when groundwater enters a sewer system through broken pipes, defective pipe joints or illegal connections of foundation drains. System flows are analyzed under various conditions and compared to benchmarks that have been established for acceptable sanitary sewage flow rates.

Non-excessive infiltration is analyzed by investigating plant flows during periods of seasonal high groundwater with little sustained rainfall. Seven to fourteen day periods during winter months of high groundwater (December through May) were identified where little or no rainfall is measured. The average per capita flow for the system is calculated and compared to the EPA maximum flow criteria of 120 gpcd. Under these conditions, all flows below 120 gpcd are considered to have a non-excessive infiltration component.

The seven day period with little or no rainfall and the highest flow day occurred during the week ending January 28, 2011. It is assumed that groundwater levels were high during this period. The highest flow day of that week was 1.527 MGD. Based on a 2013 population of 9,259, the resulting flow rate is calculated at 165 gpcd. Since the flow is more than 120 gpcd, the collection system has excessive infiltration.

EPA Non-excessive Inflow

Non-excessive inflow is analyzed by investigating plant flows during periods of intense winter rainfall. Major rainfall events and the resulting system flows during winter months are analyzed. Inflow is surface runoff that enters a sewer system through manhole covers, cleanout covers, cross connections between storm sewers and sanitary sewers, and illegal connections of roof drains, yard drains, or catch basins. EPA's non-excessive inflow criteria are based on "the average daily flow during periods of significant rainfall (i.e. storm event that creates surface ponding and surface runoff; this can be related to a minimum rainfall amount for a particular geographic area)". The average per capita flow for the system is calculated and compared to the EPA maximum flow criteria of 275 gpcd. Flows can exceed EPA guidelines if the plant operation is not impeded by such flows. Under these conditions, provided the treatment plant does not experience hydraulic overloads during storm events, flows below 275 gpcd are considered to have a non-excessive inflow component.

For the City of Brookings, the average daily flow recorded during a period of significant rainfall occurred the week ending November 20, 2012. Flows of 5.802 MGD were generated after receiving rainfall of 6.72 inches in one day. Under these conditions and based on a 2013 population of 9,259, the resulting system flows (combined infiltration and inflow) were determined to be 627 gpcd. Since the flow is over 275 gpcd, a cost effective analysis is needed to determine if the inflow is excessive.

The EPA I/I analysis is summarized in Table 3.3.1.1.

TABLE 3.3.1.1
I/I ANALYSIS SUMMARY

Description of Flow Condition	Flow Rate	EPA Criteria (Maximum Flow)
Base Sewage	88 gpcd	NA
Infiltration (High Ground Water)	165 gpcd	120 gpcd
Inflow (High Rainfall Levels)	627 gpcd	275 gpcd

Inflow in the system is greater than the EPA guidelines. An ongoing Capacity Management with an Operations and Maintenance program (CMOM) is required. A CMOM program typically includes video inspection of the entire collection system every five years and repair of collection system defects. In addition, a new sanitary sewer system evaluation (SSE) should be performed in the five-year intervals. An SSE typically includes line grit removal and cleaning, video inspection, physical inspection of manholes, performance of flow testing at structures, smoke testing of lines, evaluation of Daily Monitoring Reports and mapping of results. The first priority for the City is to repair deficiencies identified during smoke testing. As resources come available the infiltration deficiencies should be addressed.

3.4 Reasonable Growth

Reasonable growth capacity is determined by evaluating current sewage flow rates, current pollutant loads, and population growth forecasts. Flow and load projections are for a 20-year period from initiation of operations of new equipment. Daily flows and loads are determined from rainfall statistics and system flow records.

Flows and loads have specific recurrence intervals, or probabilities of occurrence, that utilize estimated future wastewater design flows and loads. Information regarding dry weather and wet weather flows as well as infiltration and inflow (I/I) are important in the design of wastewater collection, treatment and disposal facilities. The Maximum Monthly Dry Weather Flow (MMDWF) usually determines the maximum organic loading of the major treatment process units. The Maximum Monthly Wet Weather

Flow (MMWWF) determines the size and hydraulic capacity of the major process units necessary to provide the desired degree of treatment. The Peak Instantaneous Flow (PIF) determines the hydraulic capacity of pipelines, pumps, channels, and inlet structures, and the reserve capacity of units such as clarifiers and disinfection facilities.

The data used for this report is taken from the 2010 through 2013 Discharge Monitoring Reports (DMRs) for the Wastewater Treatment Plant (WWTP). The City's wastewater system staff records the readings on the influent meter, effluent meter and rain gauge at the plant daily. Wastewater is sampled and BOD_5 and TSS tests are run approximately two to three times a week. Rain data for this analysis is from the daily readings of the rain gauge at the wastewater facility.

DEQ Guidelines for Flow Projections

Unless otherwise noted, all calculations were made using the DEQ *Guidelines for Making Wet Weather and Peak Flow Projections for Sewage Treatment in Western Oregon*, 1996 revision. A summary of the calculations is included at the end of this chapter.

Precipitation Rates for Calculations

In Western Oregon, there is a relationship between peak storm events, ground water elevations and seasonal sewage flows. To reduce the probability of plant failure, Maximum Month Dry Weather Flows ($MMDWF_{10}$), Maximum Month Wet Weather Flows ($MMWWF_5$), Peak Day Average Flow (PDAF) and Peak Instantaneous Flow (PIF) are utilized in the design process. $MMDWF_{10}$ is the flow during a ten-year event (10% monthly probability of occurrence in May). $MMWWF_5$ is the flow during a five-year event (20% monthly probability of occurrence in January). Monthly probability rainfall values were taken from the National Oceanic and Atmospheric Administration's (NOAA) station "Brookings 2 SE" (COOP ID: 351055), Oregon (See Appendix D.). Peak design flows are based on a 24-hour (daily) rainfall event and are taken from NOAA Isopluvial charts. Rainfall events are summarized in Table 3.4.1

TABLE 3.4.1
CITY OF BROOKINGS STORM EVENTS

Source	20% Probability	10% Probability
NOAA - 24 hour Isopluvial	6.0" per day	7.0" per day
NOAA - Monthly Climatography	16.00" (Jan.)	8.03" (May)

3.4.1 Dry Weather Flow

AAF (Record)

Average Annual Flow (AAF) is the average of all flows over a year. The AAF was determined from analysis of treatment plant flow records for the years 2010 through 2013. Commercial and industrial contributions have been included in the total flow analysis, and AAF was determined to be 1.373 MGD or 148 gpcd (based on a 2013 population of 9,259).

ADWF (Record)

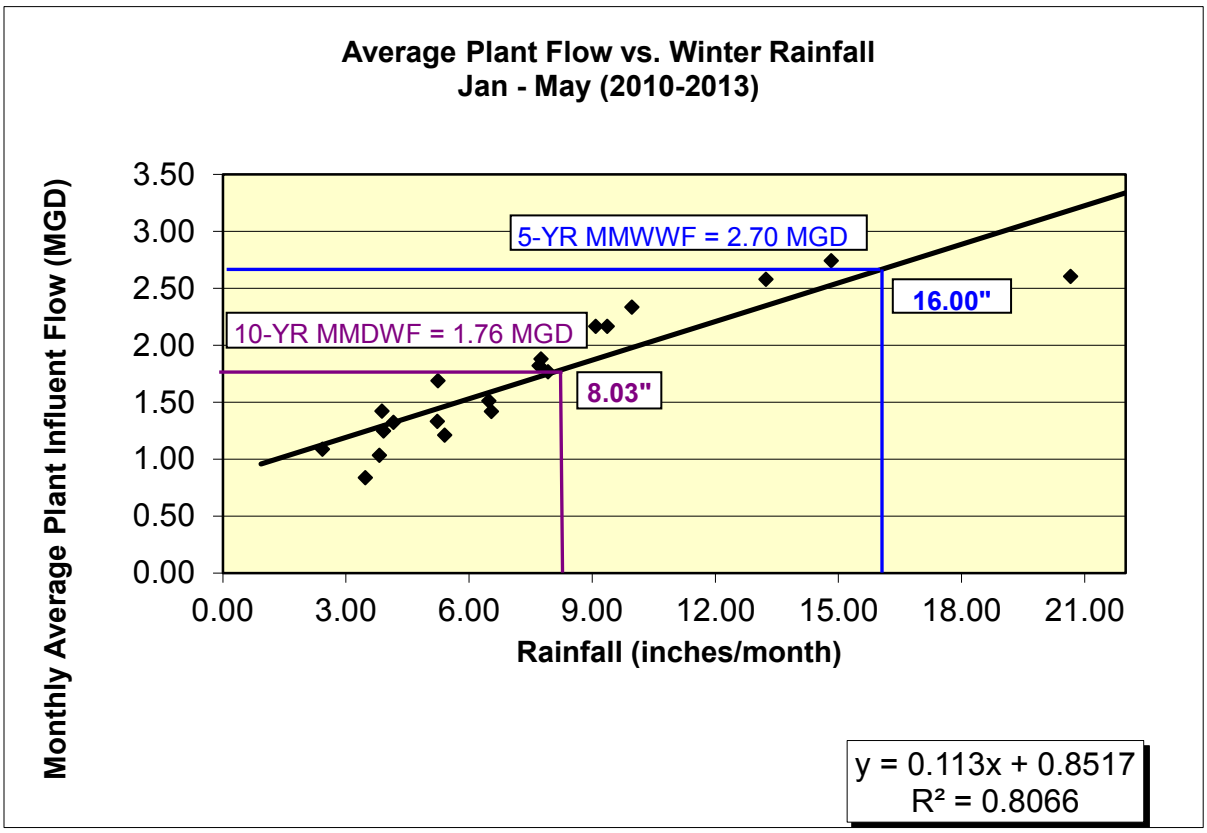
The average dry weather flow (ADWF) was determined from analysis of treatment facility flow records for the months June through October. For the years 2010 through 2013, the ADWF was determined to be 0.948 MGD or 102 gpcd.

The ADWF can be divided into two components: base sewage flows and base infiltration. The base sewage flow is the portion of the treatment plant flow attributed to sanitary sewage. Base Sewage flows were determined to be the ADWF for the months of July, August, and September when groundwater is not present. The base sewage flow to the treatment plant is calculated to be 0.815 MGD. In determining projected flows, allowance must be made for unavoidable infiltration that is dependent upon such factors as the quality of materials and workmanship in the sewers and building connections, the character of maintenance, and elevation of the surrounding groundwater in relation to that of the sewers. The base infiltration is found by calculating the difference of the ADWF and the base sewage flow. Base infiltration is calculated (0.948-0.815) to be approximately 0.133 MGD or 14 gpcd.

$MMDWF_{10}$ (Theoretical)

The Maximum Monthly Dry Weather Flow ($MMDWF_{10}$) is defined as the flow recorded at the plant when total rainfall quantities are at 10% probability of occurrence in any one year (usually in May). The $MMDWF_{10}$ was determined, following DEQ guidelines, by plotting January through May average plant flow versus monthly rainfall. This is illustrated in Figure 3.4.1.1 Average Plant Flow vs. Winter Rainfall. Linear regression was used to fit a line to the data. Ninety percent probability May rainfall values were taken from the National Ocean and Atmospheric Administration's *Climatography of the United States No. 81, 1971-2000* for the City of Brookings, Oregon. The Brookings May 90% approximate rainfall total is 8.03 inches. This calculated $MMDWF_{10}$ based on an 8.03 inch event is 1.76 MGD or 190 gpcd.

FIGURE 3.4.1.1
AVERAGE PLANT FLOW VS. WINTER RAINFALL



3.4.2 Wet Weather Flow

AWWF (Record)
The Average Wet Weather Flow (AWWF) is the average flow at the plant during the wet weather season (November through April). The AWWF was determined from an analysis of the treatment plant flow records for the years 2010 through 2013 and was determined to be 1.788 MGD (193 gpcd).

$MMWWF_5$ (Theoretical)
The Maximum Monthly Wet Weather Flow (MMWWF) was determined in a manner similar to that employed for determination of the $MMDWF_5$, following DEQ guidelines. The results can be seen in Figure 3.4.1. The analysis period was from January 2010 through May 2013. With linear regression analysis of average monthly plant inflow versus monthly rainfall, a $MMWWF_5$ of 2.70 MGD was calculated. DEQ guidelines suggest that the $MMWWF_5$ represents the highest monthly average flow attained during the winter high groundwater period, and has a 20% chance of occurring in any one year.

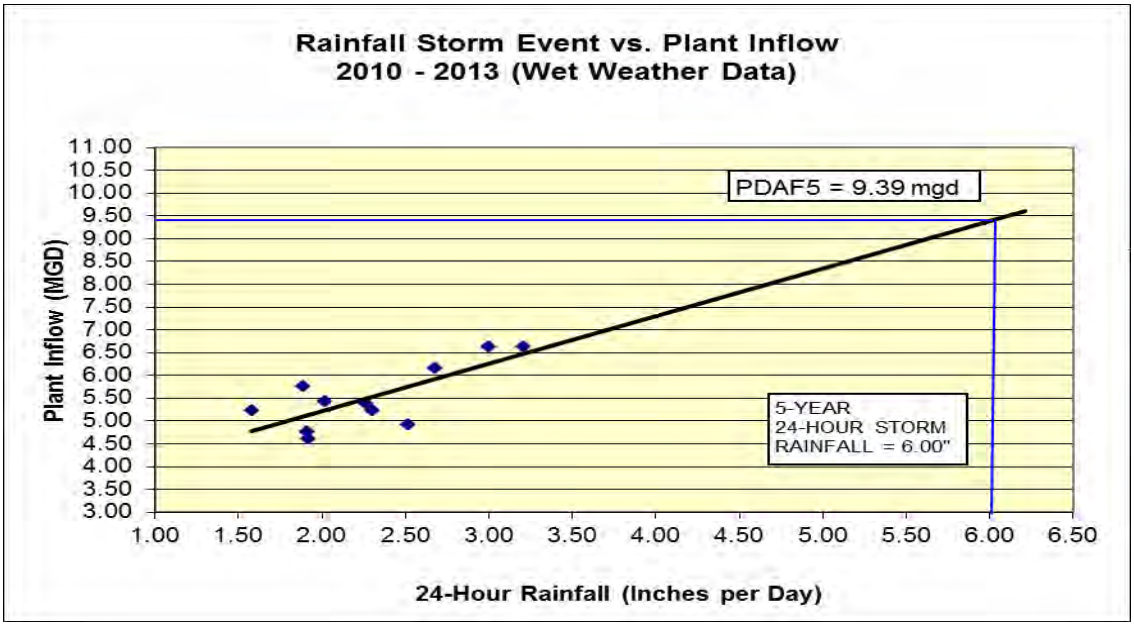
Peak Average Week (Record)
For this study, the Peak Average Week (PW) flow was taken as an average of the 2010 through 2013 flows and is the highest average daily flow rate during a seven-day wet weather data set. The peak week flow occurred in January 2012 at 4.919 MGD (or 531 gpcd). Averaging the peak week flows from 2010, 2011 and 2012 yields 3.881 MGD.

Peak Average Week (Theoretical)
Following DEQ guidelines, the theoretical Peak Average Week flow was estimated by assuming the PW occurs 1/52 of the time (1.9% probability). Based on extrapolation from the probability graph shown in Figure 3.6, the theoretical PW is calculated at approximately 5.500 MGD.

$PDAF_5$ (Theoretical)
The peak daily average flow associated with a five-year storm ($PDAF_5$) was estimated by following DEQ guidelines. Daily plant flow data was searched in order to find five-year available storm event data. Five-year storm event data was not found in the recent daily plant flow records. The five-year storm rainfall was approximated using Weather Bureau records in the document *NOAA Atlas 2*, Volume X Isopluvial Map. Daily plant inflows versus daily rainfall for selected storm events were plotted. Storms with rain exceeding the peak week flows established the DMR data set. The data period was from January through April for the years 2010 through 2013. DEQ recommends using 24-hour data to match plant flow data. Flows at the WWTP can be higher on the day after a high rainfall. The 24-hour rainfall for the first day was used for the rain quantity, and the higher of the two consecutive 24-hour flows (that day or the following day) was used for the flow. The five-year, 24-hour rainfall of 6.0 inches was taken from the above-referenced Weather Bureau document, which is provided in Appendix B. The resulting $PDAF_5$ is 9.39 MGD. Refer to Figure 3.4.2.1.

Peak Day (Record)
A peak day flow from the DMR records (2010-2013) was used to check the calculated theoretical Peak Daily Average Flow ($PDAF_5$). The peak day (highest 24-hour flow) in the 2010-2013 time period was 6.636 MGD. The total rainfall causing the high flow event was a four-day event totaling 7.34 inches (vs. a 6.0 inch five-year event).

FIGURE 3.4.2.1
RAINFALL STORM EVENT VS. PLANT INFLOW



PIF_5 (Theoretical)

The peak instantaneous flow associated with a five-year storm event (PIF_5) was estimated by using the annual average flow (AAF), maximum monthly wet weather flow ($MMWWF_5$) and peak daily average flow ($PDAF_5$). These values were plotted on logarithmic probability paper, as outlined by DEQ. Such a projection is based on the principle that an average monthly flow is likely to occur 6/12 of the time or 50%, and a peak monthly flow occurs 1/12 of the time or 8.3%. Likewise, peak weekly flow will take place 1/52 of the time or 1.9%; peak daily flow occurs once in 365 days or 0.27%, a peak hour flow happens once in 8,760 hours or .011%. Plotting these numbers against probability gives a current PIF of 13.61 MGD.

A summary of existing flow rates as developed from flow data from 2010 to 2013 is provided below in Figure 3.4.2.2 and Table 3.4.2.1.

FIGURE 3.4.2.2
BROOKINGS WWTP (2013) EXISTING INFLOW RATES

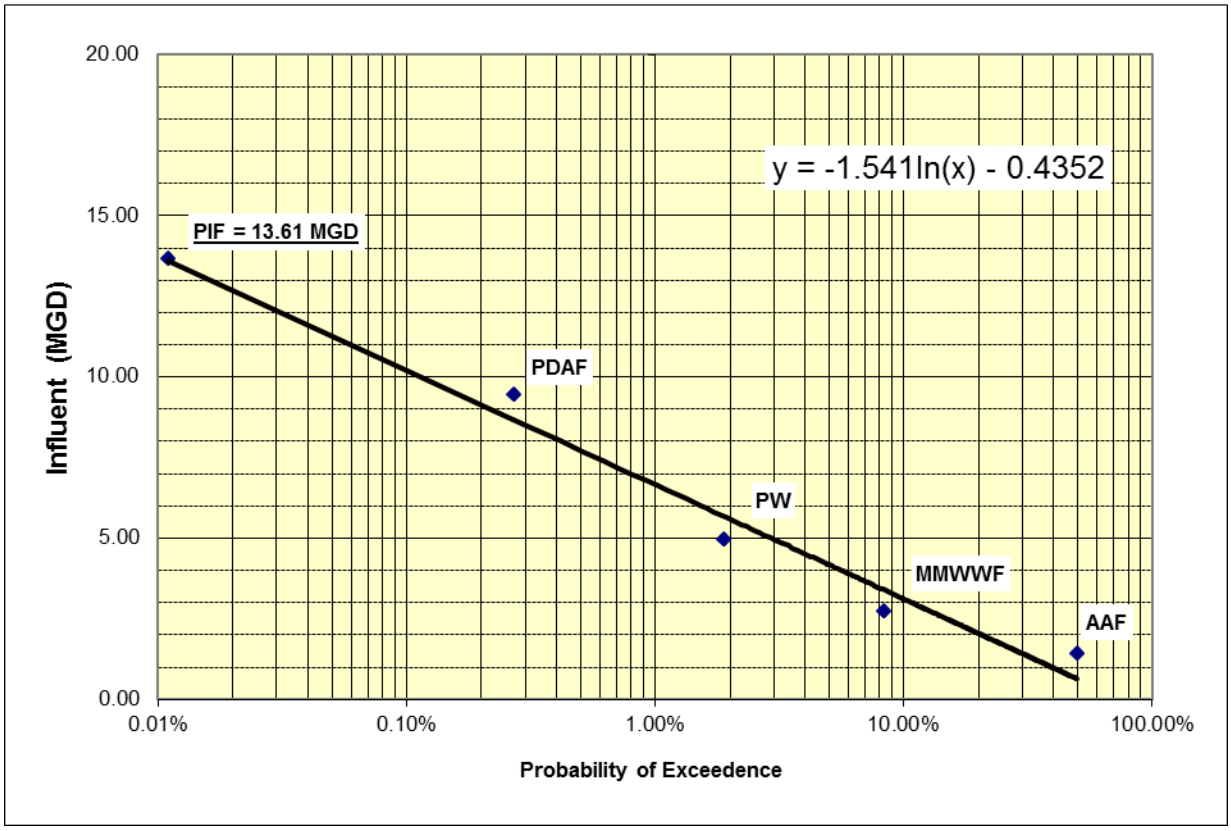


TABLE 3.4.2.1
BROOKINGS WWTP (2013) EXISTING INFLOW RATES

Parameter	Flow Values				Peaking Factor
Population	9259				
Base Sewage	0.815	MGD	88	gpcd	
Base Infiltration	0.133	MGD	14	gpcd	
AAF	1.37	MGD	148	gpcd	1.4
ADWF	0.948	MGD	102	gpcd	1.0
AWWF	1.79	MGD	193	gpcd	1.9
$MMDWF_{10}$	1.76	MGD	190	gpcd	1.9
$MMWWF_5$	2.70	MGD	292	gpcd	2.8
Peak Average Week	4.92	MGD	531	gpcd	5.2
$PDAF_5$	9.39	MGD	1,014	gpcd	9.9
PIF	13.61	MGD	1,470	gpcd	14.4

3.5 Wastewater Composition

Population growth and development will increase the organics and silts collected and conveyed to the treatment plant. All wastewater generated in Sutherlin is domestic in quality. No wastewater is collected from industrial processes. Wastewater is generated by residential, commercial and industrial sources. The wastewater composition and load from these separate sources cannot be ascertained, since they are not separately monitored for flows and composition. Monitoring results of influent wastewater represent wastewater combined from these sources. Treatment plant DMRs were reviewed for the years from 2010 to 2013 to determine the BOD_5 and TSS levels within the existing wastewater influent stream.

Analysis of Plant Records

The BOD_5 and TSS influent concentration and loads are summarized in Table 3.5.1 and are based upon DMRs and a sewer population of 9,259 persons. The accuracy of the findings depends wholly upon the accuracy of the DMR reports themselves.

Untreated domestic wastewater typically consists of 110 to 400 mg/L BOD_5 (0.17 to 0.20 ppcd) and 100 to 350 mg/L TSS (0.20 to 0.22 ppcd). In comparison, both the average BOD_5 and TSS concentrations in the City of Brookings influent wastewater are within the typical range during wet weather and dry weather periods. The average BOD_5 and TSS unit loading at the WWTP are within the normal ranges for similar communities.

TABLE 3.5.1
WWTP INFLUENT CONCENTRATIONS AND LOADS

Population: 9,259		WET WEATHER				DRY WEATHER			
PARAMETER		Average	Range			Average	Range		
BOD_5				-				-	
	mg/L	166	37	-	362	290	49	-	620
	ppd	2,477	1,428	-	3,922	2,293	923	-	4,276
	ppcd	0.27	0.15	-	0.42	0.25	0.10	-	0.46
TSS				-				-	
	mg/L	162	36	-	676	287	54	-	1,405
	ppd	2,412	1,177	-	5,711	2,266	1,109	-	9,691
	ppcd	0.26	0.13	-	0.62	0.24	0.12	-	1.05

Listed below in Table 3.5.2 are average wastewater composition values based on the 2010-2013 study period data from plant records with outlying values removed.

TABLE 3.5.2
WASTEWATER DESIGN COMPOSITION VALUES

PARAMETER	Concentration		Load	
BOD_5 Avg. Day	228	mg/L	2,385	ppd
BOD_5 Max. Avg. Month	358	mg/L	2,547	ppd
BOD_5 Max. Day	362	mg/L	3,922	ppd
TSS Avg. Day	224	mg/L	2,339	ppd
TSS Max. Avg. Month	477	mg/L	3,263	ppd
TSS Max. Day	1177	mg/L	5,711	ppd

3.6 Projected Wastewater Characteristics

Future sanitary sewer flows generated within the City come from a wide variety of collection system users. The average wastewater flows from these users are expected to grow at approximately the same rate as the overall population. Therefore, future sanitary flows are projected by applying the anticipated population growth rate to the current sanitary flows. Projections for ADWF, $MMDWF_{10}$ and AAF are made using a unit design value method based on gpcd extrapolated from the DMRs.

Projections of future wet weather flows require additional consideration due to the variability of I/I rates among existing and future developments. When utilizing a straight unit design factor based on existing peaking factors, future peak flows are overestimated. Therefore, 2035 peak flows are estimated using current wet weather I/I rates among for existing portions of the collection systems while using lower rates in areas with new sewers.

The current PIF of 13.61 MGD is greatly influenced by the presence of collection system deficiencies due to the age of the collection system. Older construction can be subject to poor or no joint gaskets, ridged pipe materials that develop cracking, and poor construction practices. Since improved construction materials and techniques in the new portions of the collection system will greatly reduce I/I sources, the projections of future peak wet weather flow must account for lower wet weather I/I rates in new developments. For the purposes of wet weather flow projections, new developments are assigned an EPA non-excessive I/I wet weather unit design factor of 395 gpcd (120 gpcd infiltration + 275 gpcd inflow). Future dry weather flow unit design factors are based on the existing AAF of 148 gpcd.

To maintain consistency with the growth of the PIF relative to the ADWF, the wet weather flows are estimated by interpolating a linear relationship between the PIF and the AAF on a semi-logarithmic flow probability chart. $MMWWF_5$ is calculated at 8.3% probability, peak week is based at 1.9% probability and $PDAF_5$ is based at 0.27% probability. A comparison of the 2013 and 2035 flow rates is shown in Figure 3.6.1 and flow projections are summarized in Table 3.6.1.

FIGURE 3.6.1
FUTURE PEAK FLOWS AND EXISTING FLOWS

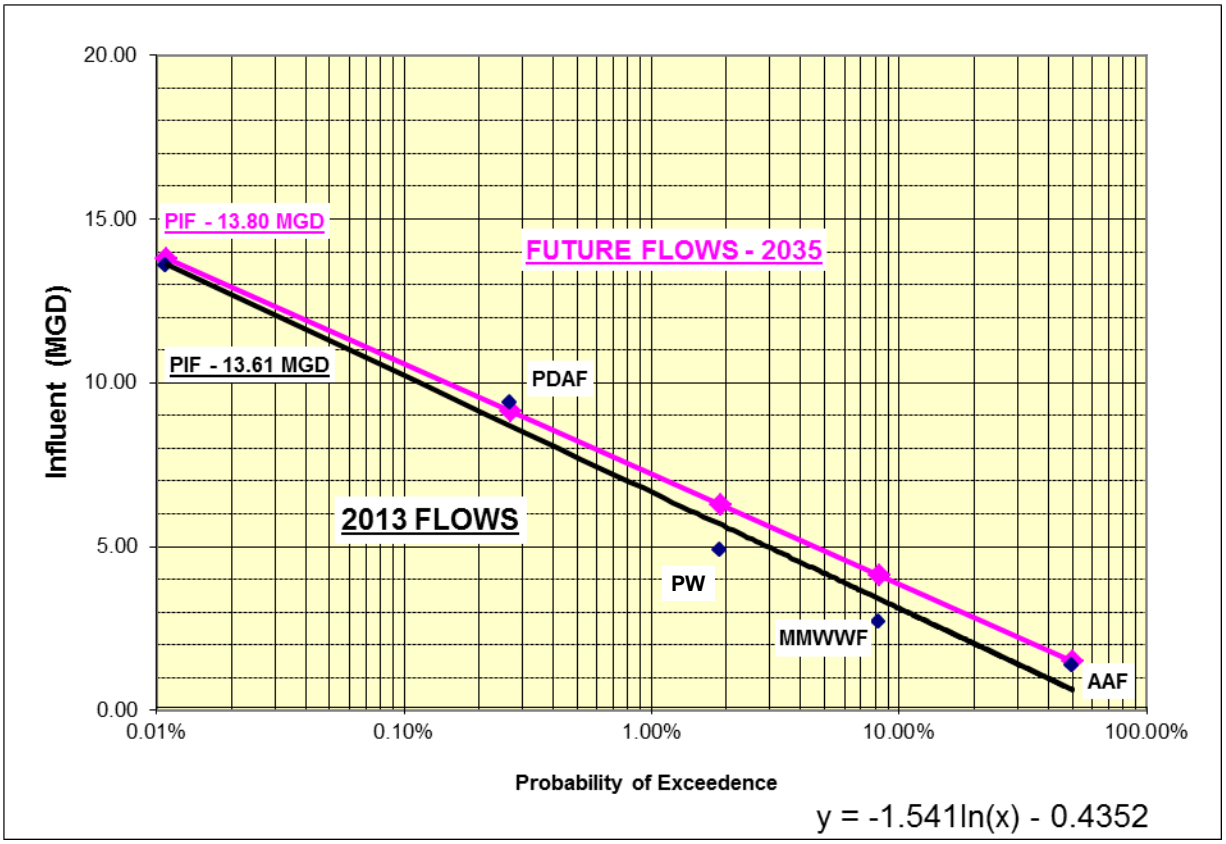


TABLE 3.6.1
WASTEWATER FLOWS

Parameter	2013	Projected (2035)	
Population	9,259	10,099	
Base Sewage	0.82 MGD	88 gpcd	0.89 MGD
Base Infiltration	0.13 MGD	14 gpcd	0.14 MGD
AAF	1.37 MGD	148 gpcd	1.50 MGD
ADWF	0.95 MGD	102 gpcd	1.03 MGD
AWWF	1.79 MGD	193 gpcd	1.95 MGD
$MMDWF_{10}$	1.76 MGD	190 gpcd	1.92 MGD
$MMWWF_5$	2.70 MGD	408 gpcd	4.12 MGD
Peak Average Week	4.92 MGD	622 gpcd	6.28 MGD
$PDAF_5$	9.39 MGD	904 gpcd	9.13 MGD
PIF	13.61 MGD	1,367 gpcd	13.80 MGD

Treatment unit design values are extrapolated from Tables 3.6.1 and 3.6.2. Table 3.6.2 summarizes the recommended design values for unit sizing. These values should be verified in the pre-design report based on completion of I/I projects and updated influent flow data.

TABLE 3.6.2
WASTEWATER TREATMENT DESIGN VALUES

	Flow	BOD5		TSS	
	MGD	mg/L	ppd	mg/L	ppd
AAF	1.50	208	2,600	204	2,550
$MMDWF_{10}$	1.92	156	2,500	155	2,470
$MMWWF_5$	4.12	110	3,780	107	3,680
PDAF	9.13	n/a	n/a	n/a	n/a
PIF	13.80	n/a	n/a	n/a	n/a

SECTION 4: **ALTERNATIVES CONSIDERED**

4.1 Gravity Collection System

Continuing inflow and infiltration (I/I) reduction projects are anticipated to be conducted annually in the future. Reducing I/I should enable the system to handle current and future flows during the study period without surcharging in the manholes. Currently I/I is 627 gpcd, which exceeds EPA's guidelines. Mitigating alternatives may include lining or replacing the pipe to repair separated joints and holes. In addition, manhole repair is necessary in several cases to correct leaking conditions.

Design Criteria
The following are general design guidelines for gravity sewer systems.

- Combined Inflow and Infiltration for the collection system is not to exceed EPA's 275 gpcd guideline.
- Minimum eight-inch diameter pipe slope is 0.50%.
- Preferred pipe material is ASTM D3034 (SDR35) PVC.
- Minimum Service lateral diameter is four inches.

Map
See the Flow Mapping Location Figures B1 through B8 in Appendix B.

4.1.1 Inflow/Infiltration (I/I) Reduction

Basic Alternatives

1. **No Action**
   The existing sewer collection system is capable of handling current peak flows without surcharging of manholes or overwhelming the wastewater treatment plant. Currently the MMWWF for the plant is 2.70MGD, the 2040 MMWWF is estimated at 4.15 MGD and the existing plant treatment MMWWF capacity is 4.90 MGD. The peak day average flow capacity is 10.9 MGD and the Peak wet weather flow design capacity is 15.5 MGD.

   Environmental Impacts
   Infiltration and inflow can result in wastewater flows exceeding the capacity of the pipes causing back-ups into buildings and overflowing manholes. Rain-induced sewer flows can hydraulically overload a wastewater treatment plant, and require oversized, less effective treatment systems. Exfiltration (loss of wastewater into the surrounding soil) can erode the soil and in some cases cause sink holes. Leakage of sewage into the surrounding soil can lead to groundwater and soil contamination.

   Land Requirements
   None, the existing collection system remains as is.

Potential Construction Problems
The City of Brookings has silty and sandy soils. As the piping and manholes continue to develop cracks and the gaskets continue to erode, the probability of inflow carrying silt and sand into the collection system increases, as does the probability of sinkholes.

Sustainability Considerations

a. Water and Energy Efficiency. Not addressing infiltration and inflow will continue to create many wastewater related problems. Rain induced sewer flows can hydraulically overload a wastewater treatment plant and pump station. Increased costs of energy and the use of more chemicals will be needed to treat the additional flow of sewage coming into the plant.

b. Green Infrastructure. Not applicable.

c. Other. Not addressing infiltration and inflow will lead to larger capital improvement projects in the future.

Cost Estimate
Not applicable, no action is taken.

2. **Continue I/I Investigation and Reduction Projects as an Annual Program**
Each year the City continues to repair and improve the wastewater collection system as resources become available. The City's wastewater infrastructure has adequate capacity in the short term. A recommended I/I reduction program is as follows:

a. Conduct video inspections in order to determine the type of I/I repair required. A video inspection program for the entire collection system should be completed over a five-year period (20% per year) and then continued on a five-year rotation.

b. Minor I/I deficiencies can be repaired by the existing city staff. Serious maintenance and repair issues will be corrected as funding sources become available.

c. A complete SSE (video, smoke testing and flow testing) should be completed at least every ten years.

Environmental Impacts
Removing I/I will improve the wastewater plant's ability to effectively treat the mixed liquor stream. Oscillating peak flows with variable BOD_5 concentrations are more difficult to treat. Successful I/I projects will also result in the reduction of groundwater, soil and surface water pollution.

Land Requirements
Most of the collection system lines are located in existing street right-of-way. However, some deficiencies are located on private property.

Potential Construction Problems
This alternative requires traffic control during inspection and repair, as well as citizen notification of smoke nuisances during testing.

Sustainability Considerations for Water and Energy
I/I deficiencies will increase the amount of flow coming into the WWTP and will in return increase WWTP operational costs.

Green Infrastructure
Not applicable.

Sustainability Considerations

a. Water and Energy Efficiency. Gone unchecked, I/I deficiencies will increase WWTP operational costs due to higher pumping cost and higher blower demand.

b. Green Infrastructure. Not applicable.

c. Other. Not applicable.

Other
Not applicable.

3. **Complete I/I Repair Projects**
The most recent investigation was performed by smoke testing and flow poking. See Figures B1 through B8 located in Appendix B for mapping of all I/I and smoke testing repair areas. The report identified a number of leaking manholes and leaking main lines. An infiltration rate in excess of 25 gpm between manholes is considered excessive and has been assigned a Priority 1. An infiltration rate of 16 gpm or less between manholes is a lower priority but accumulative I/I on multiple lines may become significant.

Environmental Impacts
Removing I&I will improve wastewater treatment system. Exfiltration (loss of wastewater into the surrounding soil) will be reduced. Successful I/I projects will result in elimination of groundwater, soil and surface water pollution.

Land Requirements
Most of the collection system lines are located in existing street rights-of-way. However, some deficiencies are located on private property.

Potential Construction Problems
Construction activities, noise and traffic can cause disturbances to homeowners and businesses near the work zone and will need to be monitored and planned to minimize potential impacts. Construction within narrow roadway areas may impact traffic flows within the work zone. Access during construction may be limited due to area confinements, minimal roadway, driveway widths and lengths.

Sustainability Considerations

a. Water and Energy Efficiency. I/I deficiencies will increase the amount of flow coming into the WWTP and will in return increase WWTP operational costs.

b. Green Infrastructure. Not applicable.

c. Other. Not applicable.

Project cost estimates for the Priority 1 projects include the following: 1) estimates to repair two catch basins that were found to be leaking that are recommended for rehabilitation; 2) seventeen leaking manholes; 3) approximately 3,000 lineal feet of line that measured a flow difference in excess of 26 gpm between manholes; and 4) fixing sixty-seven open cleanouts. See Figures 4.1.1.1 through 4.1.1.5 on the following pages for locations of Priority 1 projects. Determining the most effective repair method will require the line to be video-inspected before the method of repair is finalized. Annual operation and maintenance costs are anticipated to be absorbed into the City's existing sewer enterprise budget. The estimated construction budget for Priority 1 projects is shown in Table 4.1.1.1.

TABLE 4.1.1.1
PRIORITY 1 - I/I PROJECTS

Item	Costs
Construction Costs	$363,217
Other Non-Construction Costs	$195,000
Total Project Costs	$558,217

Project cost estimates for the Priority 2 projects include repairs to the following: 1) two plugged house vents; 2) five bad roof drain connections; 3) approximately 4,000 lineal feet of line that measured a flow difference between 16 and 25 gpm between manholes; and 4) approximately 33 leaking service laterals. See Figures 4.1.1.1 through 4.1.1.5 on the following pages for locations of Priority 2 projects. Before undertaking Priority 2 projects, the area of concern should be video-inspected to further define the most effective method and the extent of repairs. Annual operation and maintenance costs are anticipated to be absorbed into the City's existing sewer enterprise budget. The estimated construction budget for Priority 2 projects is shown in Table 4.1.1.2.

TABLE 4.1.1.2
PRIORITY 2 - I/I PROJECTS

Item	Costs
Construction Costs	$328,839
Other Non-Construction Costs	$184,000
Total Project Costs	$512,839

Selection

Alternative 2 above is recommended without further analysis because it takes into consideration existing City resources and addresses ongoing I/I reduction. The City continues to allocate a portion of the yearly maintenance staff budget for the I/I repair work. As funding is developed, Priority 1 and Priority 2 projects can be addressed. As I/I investigation continues, additional improvements may be recommended.

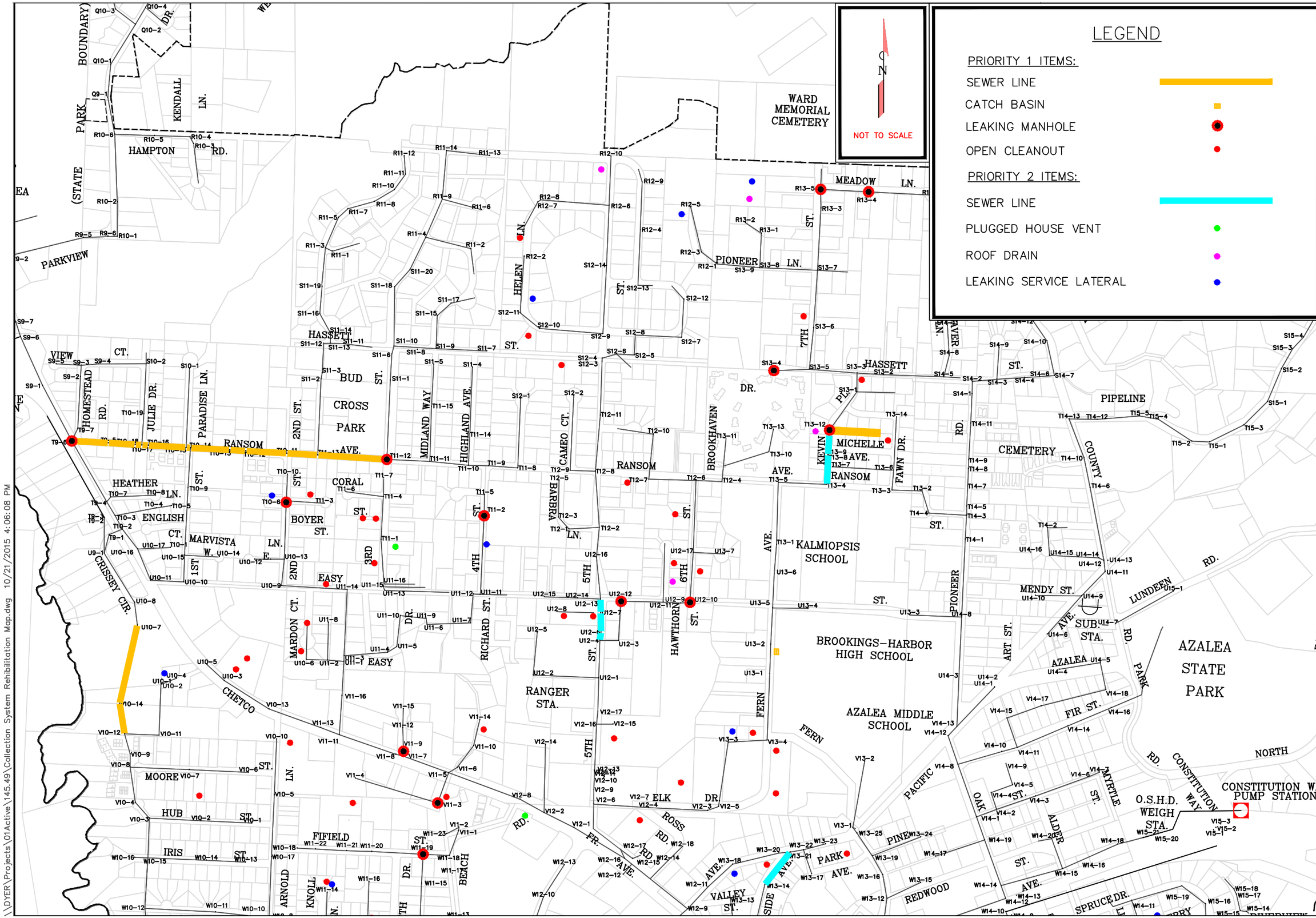


FIGURE NO. 4.1.1.3

CITY OF BROOKINGS
CURRY COUNTY, OREGON

I/I REDUCTION PROJECTS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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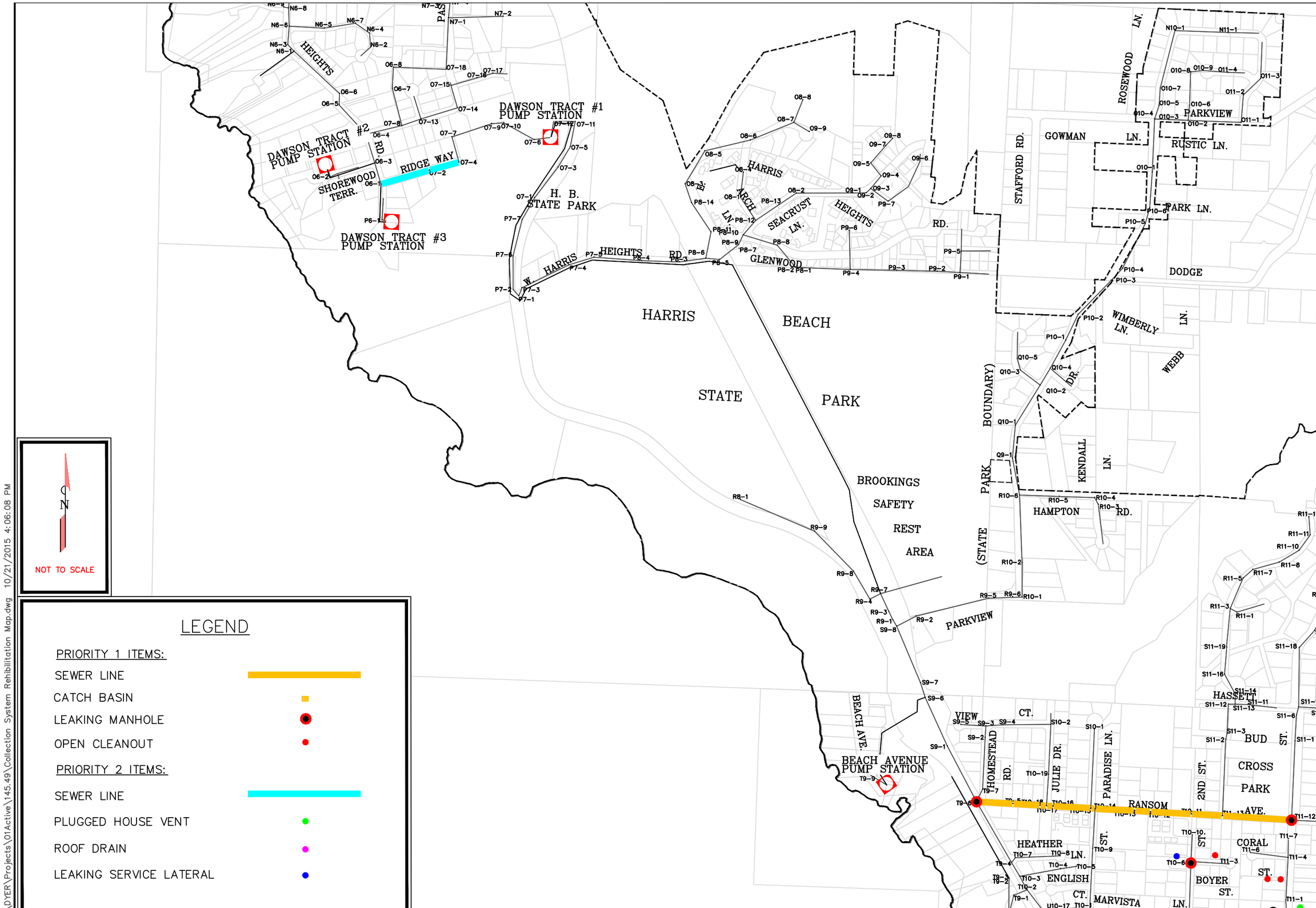

LEGEND

PRIORITY 1 ITEMS:

- SEWER LINE
- CATCH BASIN
- LEAKING MANHOLE
- OPEN CLEANOUT

PRIORITY 2 ITEMS:

- SEWER LINE
- PLUGGED HOUSE VENT
- ROOF DRAIN
- LEAKING SERVICE LATERAL

FIGURE NO. 4.1.1.4

CITY OF BROOKINGS
CURRY COUNTY, OREGON

I/I REDUCTION PROJECTS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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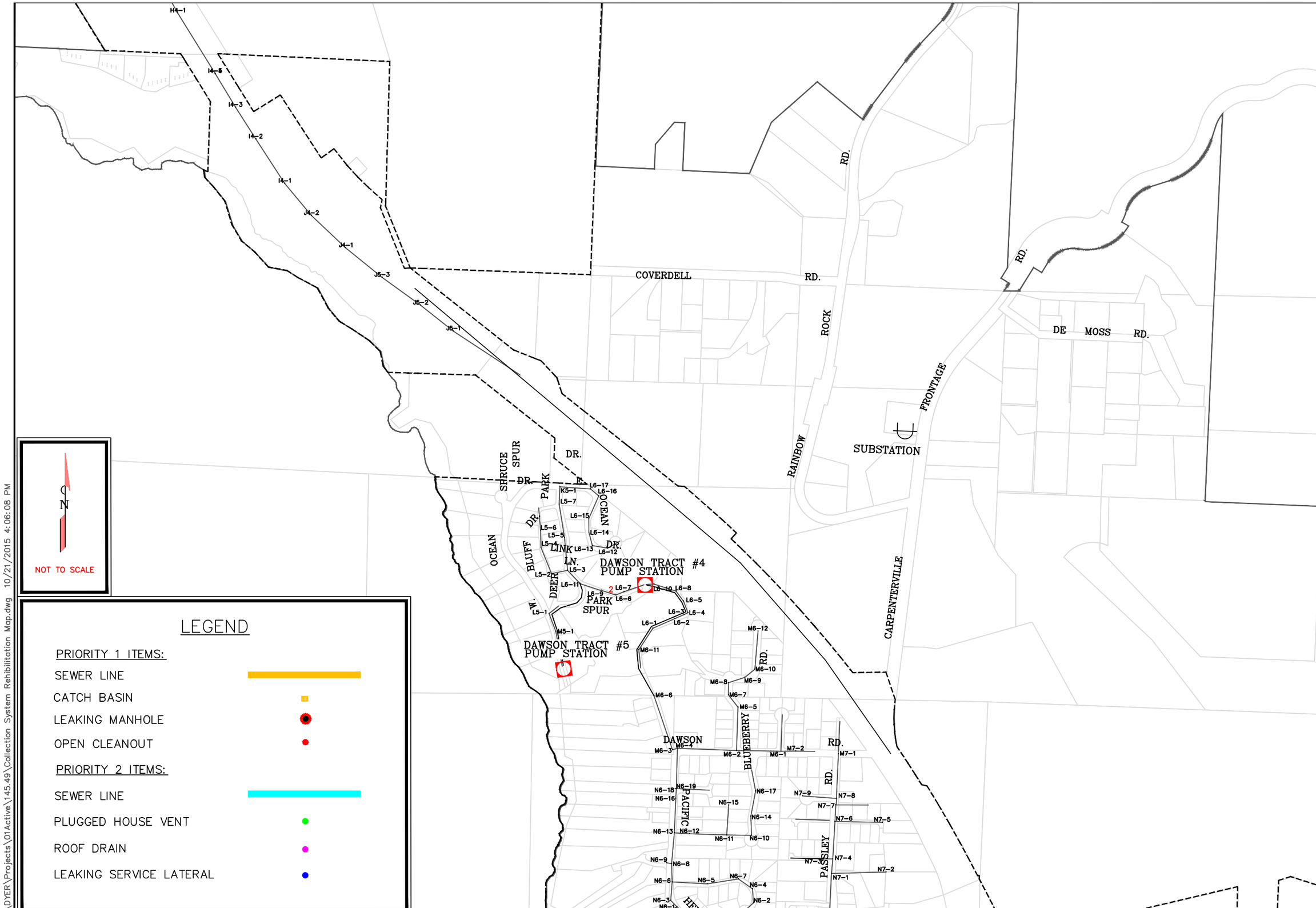

FIGURE NO.
4.1.1.5

CITY OF BROOKINGS
CURRY COUNTY, OREGON

I/I REDUCTION PROJECTS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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4.1.2 Priority 1 - New Sewer Improvements to Serve Lone Ranch Vicinity & Harbor Sanitary District

Basic Alternatives

1. No Action

The existing sewer collection system is not capable of handling flow volumes projected from this development nor do sewer lines currently exist to link the development to Brookings. No action will prevent significant development north of Brookings along Highway 101, particularly in the Lone Ranch Development area.

Environmental Impacts

The area will remain lightly developed with future development possible only on larger lots using septic tanks. Ultimately, this will lead to an increase of groundwater pollution from leaking or overloaded septic systems.

Land Requirements

None, the existing collection system remains as is.

Potential Construction Problems

None, the existing collection system remains as is.

Sustainability Considerations

a. Water and Energy Efficiency. Not applicable.

b. Green Infrastructure. Not applicable.

c. Other. Not addressing construction of the necessary lines providing adequate capacity for future development in this area will result in larger capital improvement projects in the future when construction of the sewer lines will face conflict with future development along the route.

Cost Estimate

Not applicable, no action is taken.

2. **Construct Improvements to Serve Lone Ranch Vicinity and Harbor**

A significant portion of the projected growth in Brookings is anticipated to be in the Lone Ranch Development and surrounding area. There are seven projects in this category. This will require extension of the City sewage collection system northward. Closer to town, several of the existing mains will require replacement with higher capacity mains to convey the anticipated flows. Proposed similar improvements have previously been identified in the *Wastewater Facilities Plan* by HGE, Inc. in November 2007 as the "West Side Interceptor and Extensions North Projects". The need for these improvements, which in 2007 appeared imminent, abated when development activity ceased due to the recession. It is anticipated that the reviving economy will require a resumption of planned growth and the need for these previously planned improvements. A study titled “Lone Ranch Infrastructure Review”, by The Dyer Partnership, August 2015 investigated the previous recommendations and updated then in view of the current plans to develop Lone Ranch in terms of infrastructure sizing and routing. Significant changes

from the previous recommendations regarding the southern portion of the proposed sewer improvements as they approach the WWTP have been made.

In addition, it has become apparent that conveyance capacity from Harbor Sanitary District must also be increased, and sooner than previously thought, due to an increase in the pump station flow rate from Harbor Sanitary District. This improvement was also included in the previous *Wastewater Facilities Plan* by HGE, Inc. in November 2007 as Priority III Project 18. There are a total of six projects now in the Priory 1 category. Projects 2 through 5 are of equal priority and are required before significant additional demand from the north portion of the City including Lone Ranch can be adequately transported. Project #6 can be delayed, as the exiting Mill Beach Pump Station will have adequate capacity to convey anticipated early stage development flows from Lone Ranch. However, it is recommended that Project #6 be completed as soon as practical after projects #1 through #5 in order to allow decommissioning of the Mill Beach Pump Station. This will significantly reduce operations and maintenance costs and improve system reliability. A recommended sequence of construction of these improvements is as follows:

a. Project 1. *Oak, Hemlock, Railroad, and Wharf Streets – 18-inch Relief Interceptor*. This project will provide relief for an undersized 20 on Oak, Hemlock, Railroad and Wharf Streets with 3,280 feet of 18-inch gravity line. This project was generally Priority III (18) in the previous facility plan, but due to concerns regarding the adequacy of the existing flow conveyance capacity to the WWTP for Harbor Sanitary District flows has been reclassified. Harbor installed a larger pump station after the previous facility plan was completed; this project now has a higher need. This project has the designation of Priority 1, Phase 1. A portion of this project is currently under design to be installed prior to highway work by ODOT so as to avoid cutting the new roadway work.

b. Project 2. *Rowland Lane, West End of Rowland Lane to Mill Beach Road – 24-inch Interceptor*. This project will replace an undersized 9- and 12-inch sewer with 1,930 feet of 24-inch gravity line. This project will provide required capacity for future development to the north and will eliminate overflows at the west end of Rowland Lane during heavy rain. This was Project I in the previous facility plan. This project has the designation Priority 1, Phase 2.

c. Project 3. *Crissy Circle to Moore Street – 21-inch Interceptor*. This project will replace an undersized 10-inch sewer with 1,250 feet of 21-inch gravity line. This project will provide required capacity for future development to the north. Furthermore, the existing 10-inch line is in poor condition and graded incorrectly in some locations. This was Project G in the previous facility plan. This project has a designation of Priority 1, Phase 3.

d. Project 4. *Taylor Creek Pump Station*. This station will be located on Highway 101 near the intersection with Commercial Road. It will connect to an existing 12-inch gravity sewer (former Facility Plan Project B) and discharge into an existing 8-inch force main (former Facility Plan Project D) that were both previously constructed in anticipation of the Lone Ranch Development by the Borax Company. The Taylor Creek Pump Station was Project C in the previous facility plan. This project has a designation of Priority 1, Phase 4.

e. Project 5. *Highway 101, 8-inch Force Main,* end of existing 8-inch force main at Carpenterville Road to existing 24-inch gravity sewer at Park View Drive consists of 3,960 feet of 8-inch force main. A portion of this line parallels the existing 8-inch force main from Dawson Tract Pump Station No. 1 and will discharge to the same 24-inch gravity sewer. It completes the force main from Taylor Creek Pump Station to existing gravity sewer lines in Brookings. This was Project E in the previous facility plan. This project has a designation of Priority 1, Phase 5.

f. Project 6. *Mill Beach Pump Station to WWTP – 24-inch Interceptor*. This 2,240 foot segment of 24-inch gravity sewer will complete the gravity flow capacity increase for flow southward to the WWTP. It will replace the force main from the Mill Beach Lift Station and allow elimination of that station. It is routed differently than and replaces Projects J, K, and L from the previous facility plan. This project is designated Priority 1, Phase 6.

Environmental Impacts
Providing adequate conveyance capacity for development in the northern part of Brookings will avoid overflows and reduce the installation of septic systems in that area (with their attendant risk of groundwater contamination).

Land Requirements
Most of the routing is in existing road and street rights-of-way. Some segments, particularly for the Railroad to Wharf Street interceptor, will require easements on private property. Project #6 will require a new easement along the edge of a lumber storage area consisting of fill.

Potential Construction problems
The projects will require traffic control during construction. Due to the depth or nature of soils of some of the interceptors, foundation stabilization, trench shoring and groundwater control may be necessary.

Sustainability Considerations for Water and Energy

a. Water and Energy Efficiency. Conveyance of wastewater by gravity lines to the extent possible for centralized treatment is generally recognized as a positive step with regard to water and energy efficiency.

b. Green Infrastructure. Not applicable.

c. Other. Construction of the necessary lines as soon as possible to provide adequate capacity for future development in the area to the north of Brookings will result in reduced capital improvement project costs with respect to the future, when construction of the necessary sewer lines will face conflict with future development along the route.

The estimated project costs for Priority 1 projects are shown in Table 4.1.2.1. See Figures 4.1.2.1 through 4.1.2.5 on the following pages for locations of Priority 1 projects.

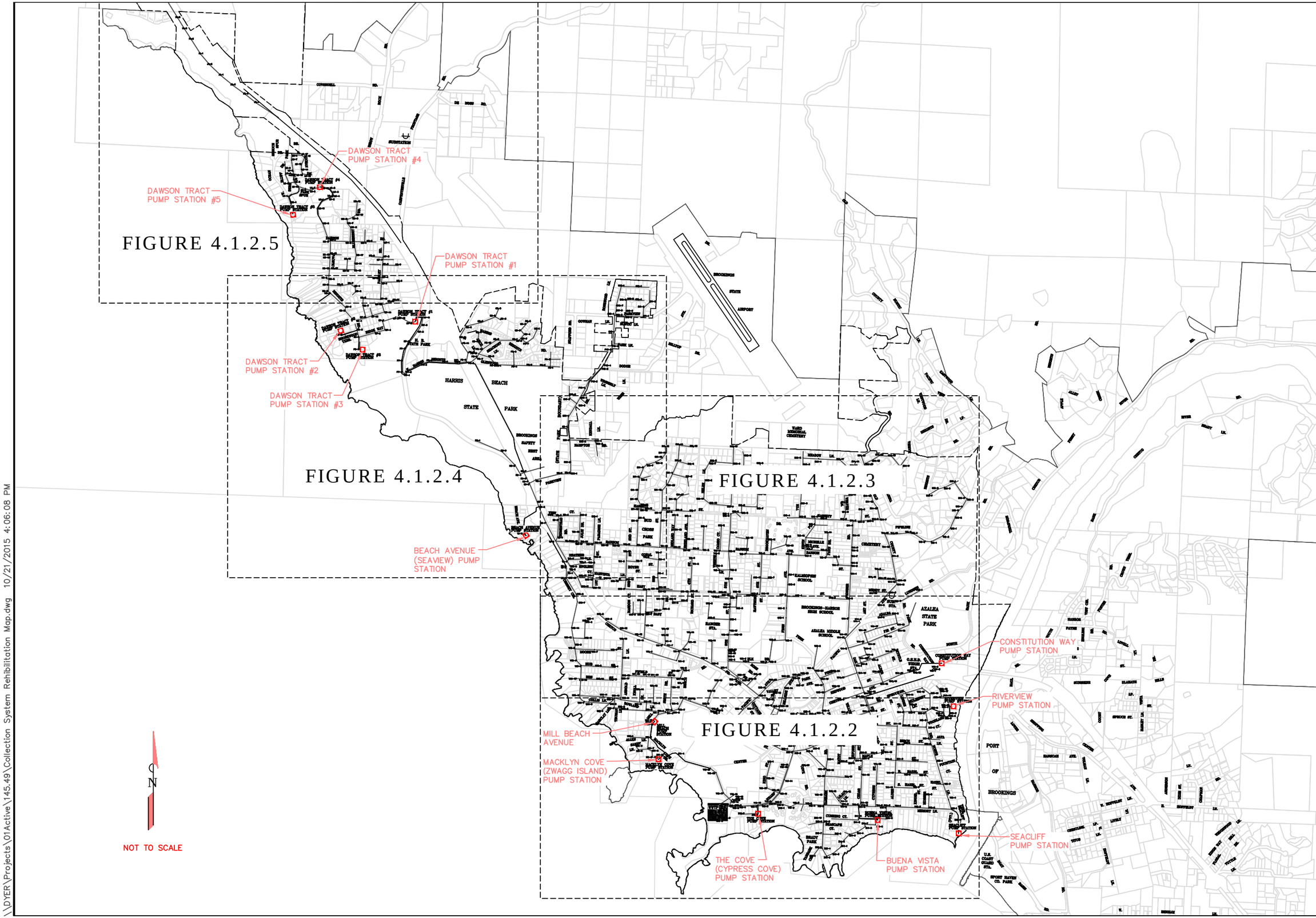

FIGURE NO.
4.1.2.1

CITY OF BROOKINGS
CURRY COUNTY, OREGON

NEW SEWER REPLACEMENT/REHABILITATION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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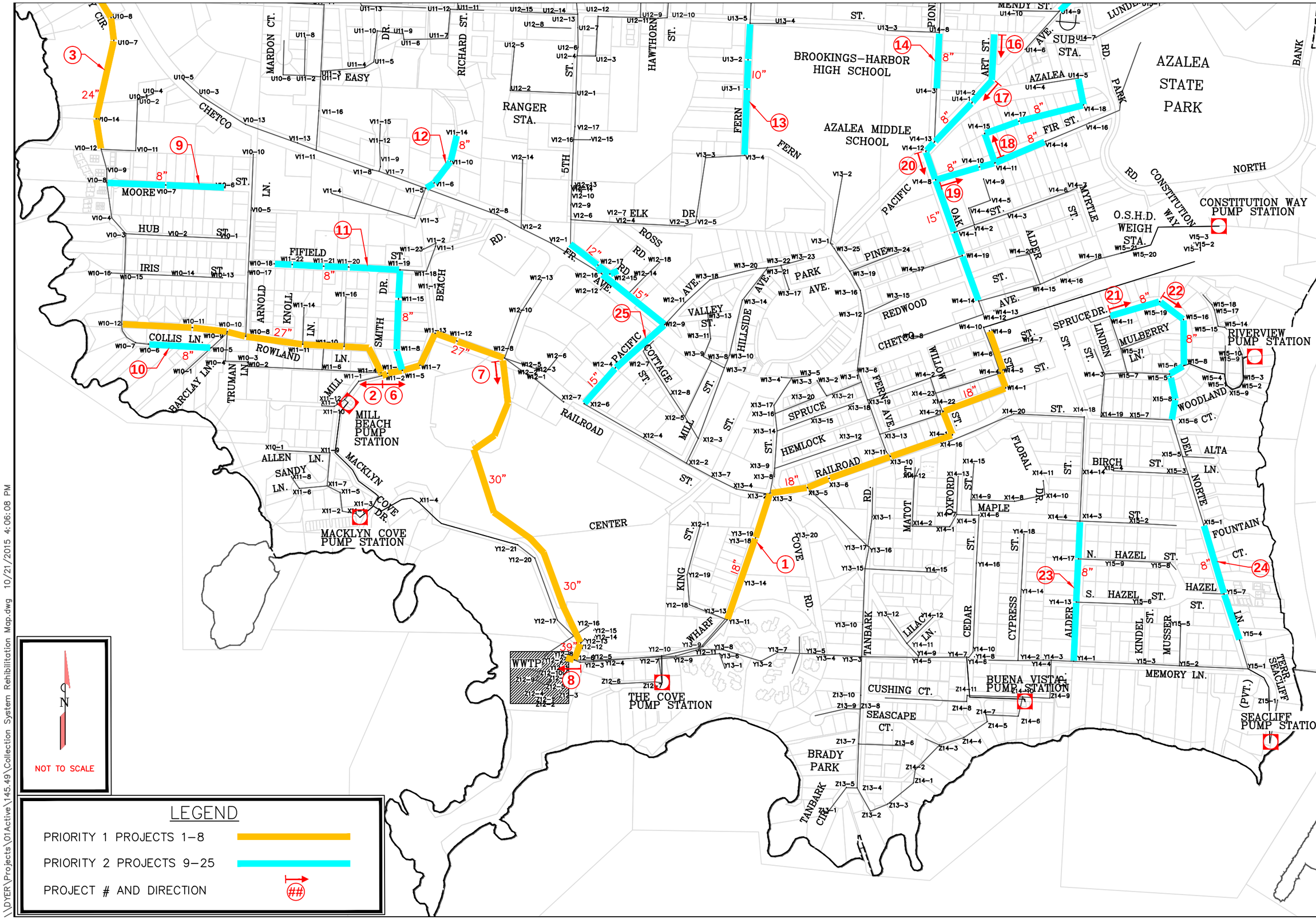

FIGURE NO. 4.1.2.2

CITY OF BROOKINGS
CURRY COUNTY, OREGON

NEW SEWER REPLACEMENT/REHABILITATION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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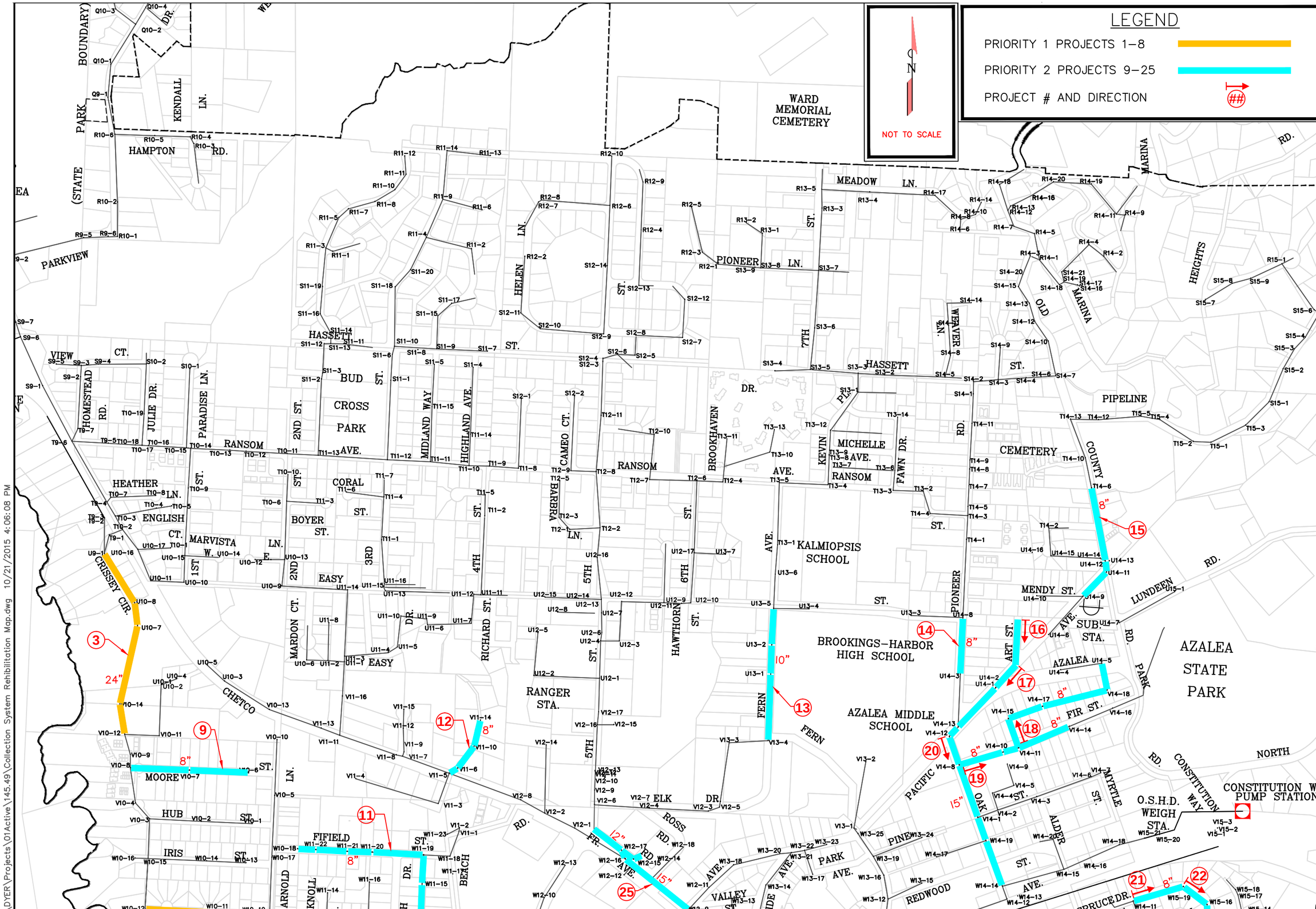

FIGURE NO. 4.1.2.3

CITY OF BROOKINGS
CURRY COUNTY, OREGON

NEW SEWER REPLACEMENT/REHABILITATION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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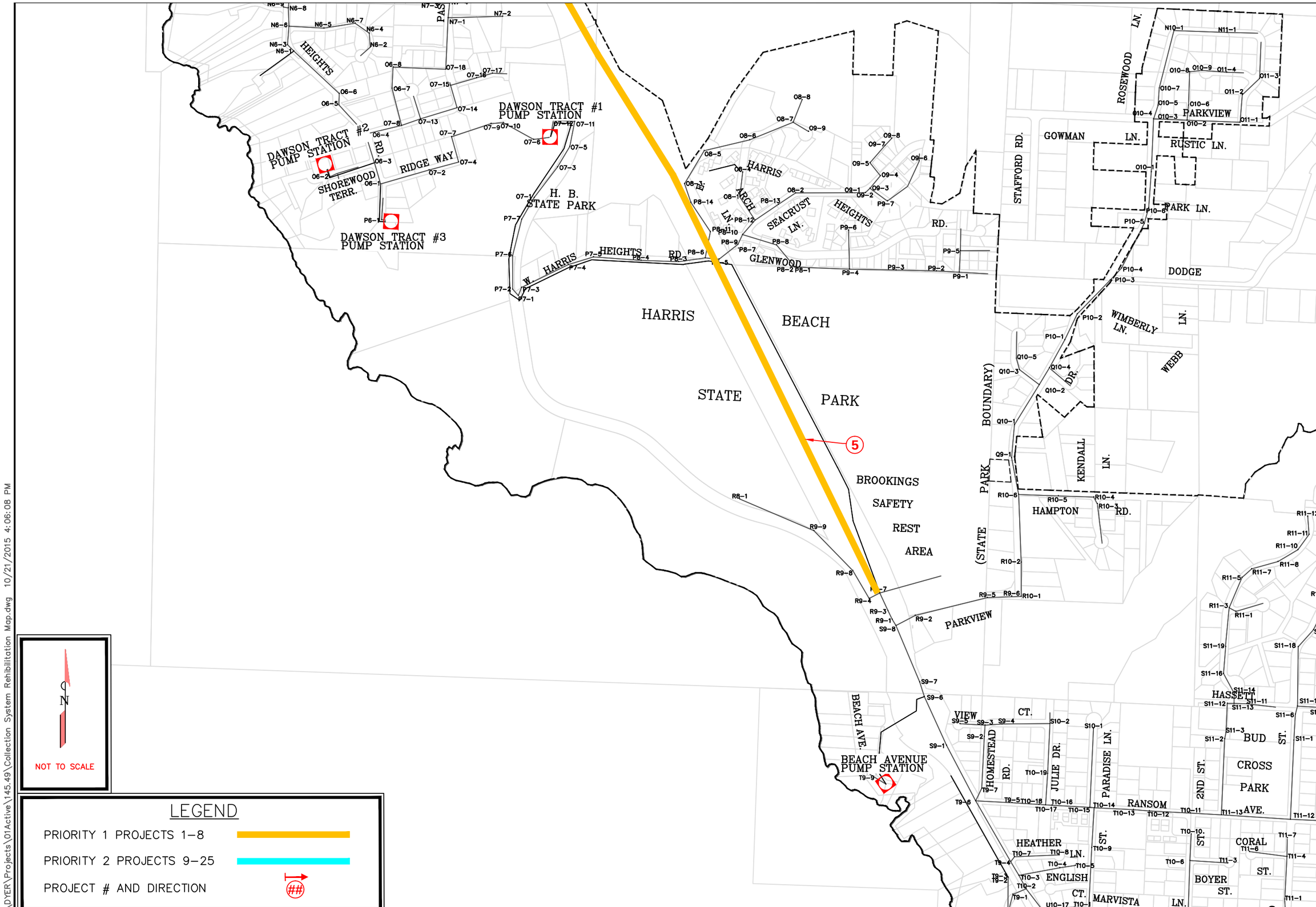

FIGURE NO. 4.1.2.4

CITY OF BROOKINGS
CURRY COUNTY, OREGON

NEW SEWER REPLACEMENT/REHABILITATION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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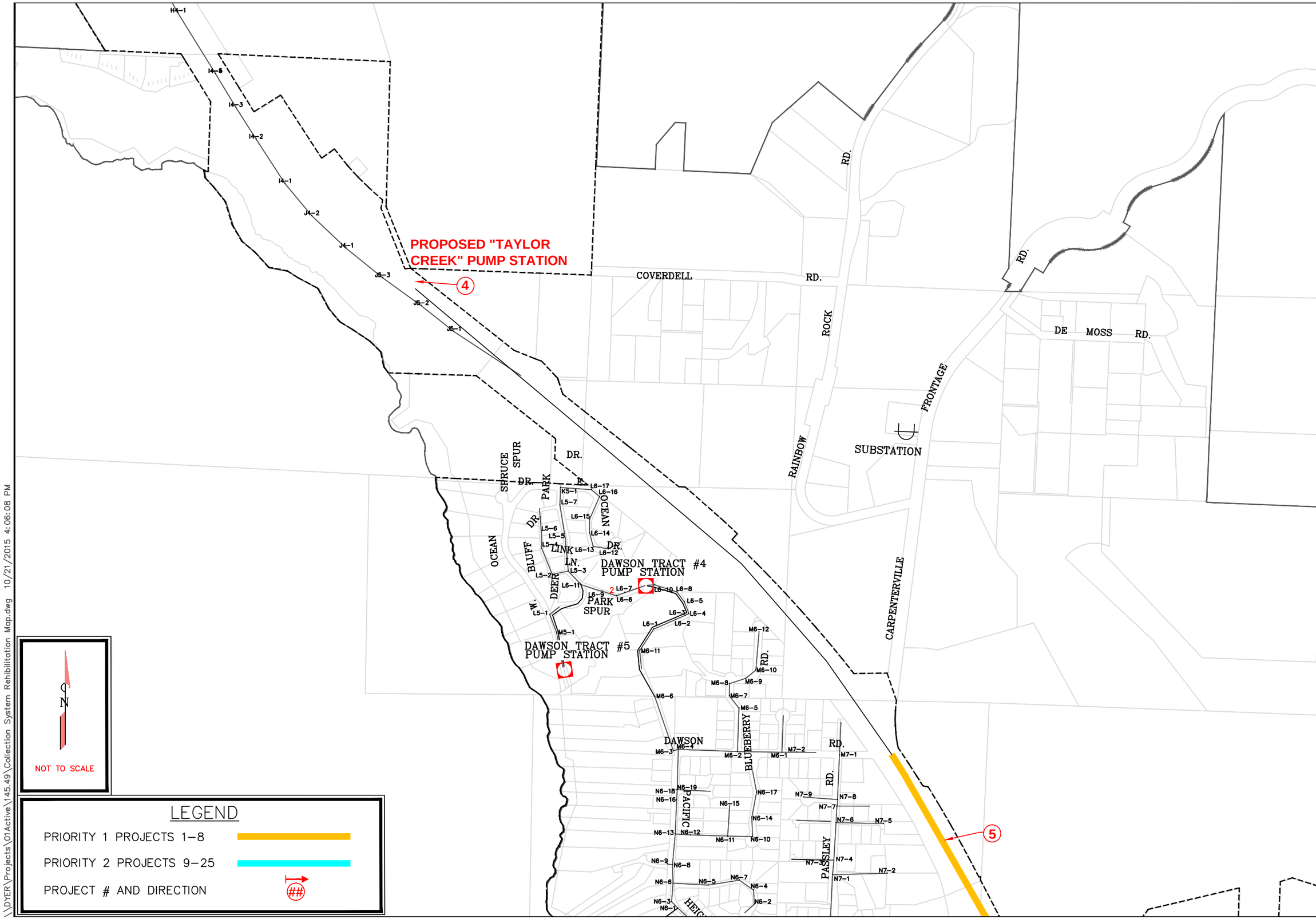

FIGURE NO.
4.1.2.5

CITY OF BROOKINGS
CURRY COUNTY, OREGON

NEW SEWER REPLACEMENT/REHABILITATION

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: JANUARY 2015

PROJECT NO.: 145.49

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TABLE 4.1.2.1
PRIORITY 1 – PROJECT COSTS TO SERVE LONE RANCH & HARBOR

Project #	Length Feet	Existing Line Dia. Inch.	New Line Dia. Inch.	Est. Const. Cost	Total Project Cost
1	3,050	12 & 15	18	$838,850	$1,102,850
2	1930	9	24 & 21	$554,810	$724,010
3	1,220	10	24	$338,420	$441,820
4	Pump Sta.	NA	NA	$471,810	$627,810
5	5360	NA	8 FM	$600,220	$703,620
6	2240	8" FM	24"	$378,750	$507,550
	Totals			$3,182,860	$4,107,660

Selection

Alternative 2 is recommended. It is necessary to provide for anticipated development and to avoid overwhelming portions of the existing sewage conveyance system. Project 6 provides for the elimination of the aging Mill Beach lift station and its force main and significantly reduces operation and maintenance costs.

4.1.3 Priority 2 - Sewer Main Replacements/Rehabilitation

Basic Alternatives

1. No Action

These 17 projects involve main replacements or rehabilitation for pipes with deficiencies or are undersized with respect to capacity. The sewers are all currently providing service but were selected to address capacity issues, structural defects and to achieve infiltration reduction. No action will result in continued I/I, potential line breaks, overflows, and inadequate capacity for service.

Environmental Impacts

Defective sewer pipes can result in I/I exfiltration or even collapse and blockage resulting in wastewater flows exceeding the capacity of the pipes or causing backups into buildings and overflowing manholes. Leakage of sewage into the surrounding soil can lead to groundwater and soil contamination.

Land Requirements

None, the existing collection system remains as is.

Potential Construction Problems

None, the existing collection system remains as is.

Sustainability Considerations

a. Water and Energy Efficiency. Not applicable.

b. Green Infrastructure. Not applicable.

c. Other. Not addressing construction of the necessary lines to provide adequate capacity for future development in this area will result in larger capital improvement projects in the future when construction of the sewer lines will face conflict with future development along the route.

Cost Estimate
Not applicable, no action is taken.

2. **Construct Sewer Main Replacements or Rehabilitation**
The proposed improvements have previously been identified in the *Wastewater Facilities Plan* by HGE, Inc. in November 2007 as Priority II and one Priority III Improvement. No specific phase order is recommended. Note that where sewer pipe sizes will remain the same, that rehabilitation should be considered as an alternative to replacement where feasible. This should be determined on a case by case basis early in the design phase. Conservatively, costs estimates are provided for replacement. The projects proposed are as follows:

a. Project 9. *Replace/Rehabilitate Existing 8-inch Sewer along Moore Street*. This project will correct a defective 8-inch sewer 750 feet in length. This was project Priority II (1) in the previous facility plan.

b. Project 10. *Replace/Rehabilitate Existing 8-inch Sewer along Collins Street*. This project will correct a defective 8-inch sewer 390 feet in length. This was project Priority II (2) in the previous facility plan.

c. Project 11. *Replace/Rehabilitate Existing 8-inch Sewer from Fifield Street south through a Backyard Easement to Mill Beach Road*. This project will correct a defective 8-inch sewer 1,290 feet in length. This was project Priority II (3) in the previous facility plan.

d. Project 12. *Replace/Rehabilitate Existing 8-inch Sewer along Chetco Lane at the Senior Center*. This project will correct a defective 8-inch sewer 345 feet in length. This was project Priority II (4) in the previous facility plan.

e. Project 13. *Replace/Rehabilitate Existing 10-inch Sewer along Fern Avenue*. This project will correct a defective 10-inch sewer 620 feet in length. This was project Priority II (5) in the previous facility plan.

f. Project 14. *Replace/Rehabilitate Existing 8-inch Sewer along Pioneer Road*. This project will correct a defective 8-inch sewer 700 feet in length. This was project Priority II (6) in the previous facility plan.

g. Project 15. *Replace/Rehabilitate Existing 8-inch Sewer along Old County Road and Pacific Avenue to Mendy Street*. This project will correct defective 8-inch sewer 670 feet in length. This was project Priority II (7) in the previous facility plan.

h. Project 16. *Replace/Rehabilitate Existing 8-inch Sewer on Art Street*. This project will correct a defective 8-inch sewer 300 feet in length. This was project Priority II (8) in the previous facility plan.

i. Project 17. *Replace/Rehabilitate Existing 8-inch Sewer on Pacific Avenue between Art Street and Pioneer Road*. This project will correct a defective 8-inch sewer 545 feet in length. This was project Priority II (9) in the previous facility plan.

j. Project 18. *Replace/Rehabilitate Existing 8-inch Sewer through Backyard Easements from Fir Street to Azalea Park Road*. This project will correct a defective 8-inch sewer 1,030 feet in length. This was project Priority II (10) in the previous facility plan.

k. Project 19. *Replace/Rehabilitate Existing 8-inch Sewer through along Fir Street*. This project will correct a defective 8-inch sewer 745 feet in length. This was project Priority II (11) in the previous facility plan.

l. Project 20. *Replace Existing 8-inch Sewer along Oak Street and Pacific Avenue to Pioneer Road*. Line size is to be increased to serve growth tributary and to be consistent with existing 18-inch line across Highway 101. This project will replace defective and undersized 8-inch sewer with 1,093 feet of 15-inch sewer line. This was project Priority II (12) in the previous facility plan.

m. Project 21. *Replace/Rehabilitate Existing 8-inch Sewer along Spruce Street near Linden Lane.* This project will correct a defective 8-inch sewer 332 feet in length. This was project Priority II (13) in the previous facility plan.

n. Project 22. *Replace/Rehabilitate Existing 8-inch Sewer along Spruce Street to Woodland Court*. This project will correct a defective 8-inch sewer 920 feet in length. This was project Priority II (14) in the previous facility plan.

o. Project 23. *Replace/Rehabilitate Existing 8-inch Sewer along Alder Street*. This project will correct a defective 8-inch sewer 870 feet in length. This was project Priority II (15) in the previous facility plan.

p. Project 24. *Replace/Rehabilitate Existing 8-inch Sewer along Del Norte Lane*. This project will correct a defective 8-inch sewer 665 feet in length. This was project Priority II (16) in the previous facility plan.

q. Project 25. *Replace Existing 10-inch sewer along Highway 101 from the Intersection of Fifth Street and Elk Drive to the Existing 12-inch Interceptor with 260 feet of 12-inch Sewer Line*. Replace existing 10-inch sewer along Highway 101 to Pacific Avenue with 1,310 feet of 15-inch sewer line. This was project Priority III (17) in the previous facility plan.

Environmental Impacts
Providing sound, non-leaking and adequate conveyance capacity for Brookings will avoid overflows and potential line failures with resulting surface water contamination.

Land Requirements
The routing is in existing road and street rights-of-way.

Potential Construction problems
The projects will require traffic control during construction. Due to the depth of some of the sewers, trench shoring and groundwater control may be necessary.

Sustainability Considerations for water and energy

a. Water and Energy Efficiency. Conveyance of wastewater by gravity lines to the extent possible for centralized treatment is generally recognized as a positive step with regard to water and energy efficiency.

b. Green Infrastructure. Not applicable.

c. Other. Not applicable.

The estimated project costs for Priority 2 projects are shown in Table 4.1.3.1. See Figures 4.1.2.1 through 4.1.2.5 inserted previously for locations of Priority 2 projects.

TABLE 4.1.3.1
PRIORITY 2 – COSTS FOR SEWER MAIN REPLACEMENT/REHABILITATION

Project #	Length Feet	Existing Line Dia. Inch.	New Line Dia. Inch.	Est. Const. Cost	Total Project Cost
9	750	8	8	$190,110	$248,110
10	390	8	8	$105,470	$137,670
11	1,290	8	8	$260,610	$340,210
12	345	8	8	$150,780	$196,780
13	620	10	10	$152,040	$198,440
14	700	8	8	$151,440	$197,640
15	670	8	8	$156,860	$204,760
16	300	8	8	$82,060	$107,060
17	545	8	8	$132,340	$172,640
18	1,030	8	8	$185,070	$241,570
19	745	8	8	$176,130	$229,830
20	1,095	8	15	$263,888	$344,388
21	332	8	8	$86,962	$113,562
22	920	8	8	$218,050	$284,650
23	870	8	8	$199,980	$260,980
24	665	8	8	$159,780	$194,180
25	1,570	10	12,15	$364,720	$475,920
	Totals			$3,036,290	$3,948,390

Selection

Alternative 2 above is recommended. It is necessary to reduce I/I, provide adequate capacity and avoid overflows and sewer line failures.

4.2 Pump Stations

Many of the pump stations in the City of Brookings are more than 20 years old, are difficult to maintain, and have heavy amounts of unwanted accumulated material such as grease, moisture, and rust. If not properly maintained, the result could lead to sanitary sewer overflows into various unauthorized areas within the City of Brookings. All pump stations are recommended for improvement to prevent any future overflows.

Design Criteria
The following are general design criteria for a pump station design:

- DEQ guidelines: *Oregon Standards for Design and Construction of Wastewater Pump Stations*.
- Provide a 20-year design life.
- Force main at a minimum velocity of 3.0 feet per second to maintain solids suspension.
- Preferred force main pipe materials are PVC or HDPE.
- Provide a firm capacity (largest pump out of service) for a five-year, peak hourly wet weather flow.
- Provide air release valves at pipe high points.

The following alternatives in the subsections below are evaluated in order of priority. Priority items were selected from several factors that include but are not limited to: 1) maintaining safety for the general public and city maintenance staff; 2) keeping the collection system fully operational; 3) cost; and 4) allowing the collection system to be environmentally friendly at all times. All pump station structures are adequate for the next 20 years and the improvement considerations will only include the alternative of refurbishing the pump stations. Pump station location as shown on the previously inserted Figures 4.1.2.1 through 4.1.2.5.

4.2.1 Priority 1 – Pump Station Improvements

Buena Vista Loop, Cypress Cove, Mill Beach, and Dawson Tract No. 5, are currently using submersible pumps that are not accessible due to rust and a heavy amount of grease buildup along the guide rails. Because each pump cannot be properly lifted, they have become very difficult to maintain. Pump motors and other accessories will soon begin to wear.

Dawson Tract Nos. 4 and 5 both have fuel tanks located underground. Having underground tanks can be viewed as a violation by DEQ and especially if they begin to leak. Leaking underground tanks can be considered harmful to the general public by potentially contaminating the surrounding groundwater and soil. For this reason DEQ's goal is to remove most underground tanks in the State of Oregon. Oregon's Underground Storage Tank Program handles issues related to tank registration, operating certificates, cleanup of soil and groundwater contamination, financial liability protection for future leaks, and enforcement of Oregon's Underground Storage Tank rules.

All pump stations in the City of Brookings are experiencing a high amount of moisture resulting in corrosion buildup within electrical power systems, instrumentation data, communications data, alarm signals, fittings, conduit, windings and in other areas within the pump station. Dawson Tract No. 3 is currently experiencing more corrosion than any other pump station within the City of Brookings. Electrical system outages can be very costly. An electrical power or control system outage can cause critical safety problems for the facility's personnel and people in the adjacent community.

Basic Alternatives

1. **No action, operate all pump stations in their existing condition**. Based on the current conditions of the guide rails, the pumps will not last mechanically for the next 20 years since they are currently too difficult to access for routine maintenance. Buena Vista Loop, Cypress Cove, Mill Beach, and Dawson Tract No. 5 all have the potential for a sanitary sewer overflow if the pumps eventually stop working. Dawson Tract No. 4 and 5 each have the potential for their underground storage tanks to contaminate the surrounding groundwater and soil. As it's the State of Oregon's goal to remove most underground storage tanks, both of these stations could easily be or become in violation, and, as a result, face costly fines. Unknown amounts of moisture buildup within each of the pump stations can become very dangerous and costly when an electrical system outage takes place. This option is not recommended.

2. **Refurbish Buena Vista Loop, Cypress Cove, Mill Beach, Dawson Tract No. 3, 4, and 5 Pump Stations.** This alternative recommends the refurbishment of the existing pump stations that are mentioned above, which will extend the useful life for a 20-year period. Buena Vista Loop, Cypress Cove, Mill Beach, and Dawson Tract No. 5 are major contributors to the wastewater collection system. Replacing the guide rails in each of these pump stations will allow for proper routine maintenance on each of the pumps and reduce the amount of wear and tear that they are currently receiving. Dawson Tract No. 4 and 5 are both located in the northern portion of the City of Brookings inside a residential area. Due to the extremely close proximity of residential housing to these two pump stations any soil or groundwater contamination could be catastrophic. This will not only be a very costly cleanup but is also considered a safety hazard to the community. Having both of these underground tanks moved aboveground will help eliminate these risks. Dawson Tract No. 3 moisture buildup can lead to system outages, damaged equipment, corrosion, and is a potential safety hazard for the facility's personnel. A moisture detection device is recommended for Dawson Tract No. 3, and will allow facility personal to resolve the moisture problem before any damage can be done.

Environmental Impacts
All underground tanks have the potential for contaminating surrounding groundwater and soil.

Land Requirements
All work is to be completed in the existing rights-of-way.

Potential Construction Problems
Construction activities, noise, and traffic can cause disturbances to homeowners and businesses in the immediate area of the work zone. A plan to monitor and minimize the impacts will be needed. Construction within narrow roadway areas may impact traffic flows within the work zone. Access during construction may be limited at times due to area confinements including minimal roadway and driveway widths and lengths.

Sustainability Considerations Water and Energy
Having improved access to all submersible pumps will allow for frequent maintenance in a more timely fashion. As a result, the pumps will be able to achieve their peak performance and conserve energy.

Green Infrastructure
Not applicable.

Other
Not applicable.

Project cost estimates includes replacement of guide rails at four pump stations, installation of one moisture detector, and replacement of two underground fuel tanks with aboveground tanks. The present worth of estimated O&M and periodic repair cost savings over the study period lifetime is conservatively $50,300. The estimated construction budget for the Priority 1 project is shown in Table 4.2.1.1.

TABLE 4.2.1.1
PUMP STATION IMPROVEMENTS PRIORITY 1

Item	Costs
Construction Costs	$118,680
Other Non-Construction Costs	$49,000
Total Project Costs	$167,680

Selection

Alternative 2, refurbishment of pump guide rails for Buena Vista Loop, Cypress Cove, Mill Beach, Dawson Tract No. 3, 4, and 5 Pump Stations to allow for a 20-year life is the preferred alternative. DEQ fuel storage requirements will be met by relocating the underground tanks aboveground. The risk of damaging electrical power systems, instrumentation data, communication data, alarm signals, and windings will be significantly reduced by having moisture detection devices in place at Dawson Tract No. 3 Pump Station. Installation of new guide rails at the majority of the pump stations is recommended to improve maintenance care of the pumps and provide better energy efficiency, extend pump life and reduce operational costs.

4.2.2 Priority 2 – Pump Station Improvements

All pump station valves and control panels within the City of Brookings will need to be replaced at some point. Many of the valves for the larger pumps are currently experiencing leakage. Common reasons for these leaks are age and possible damages to the seal or seat. Age is also a reason for the control panels showing signs of wear and tear. Normal wear and tear of old components within the control panel can cause system failures. Eventual loosening of electrical connections can cause excessive amperage draw and heat, which can lead to constant tripping of circuit breakers or major component damage.

Mill Beach, Buena Vista Loop, Cypress Cove, and Constitution Way are all experiencing accumulations of unwanted material, such as grease and solids from the floats, guide rails, pumps, walls and floors of the stations. These systems require occasional cleaning and maintenance.

Dawson Tract No. 4 and Beach Avenue are both experiencing leakage. Dawson Tract No. 4 has leakage along the influent pipe, but it is still contained within the wet well. Beach Avenue has root intrusion in the wet well at the gravity inlet, the bottom two 48-inch rings, and along the base. All pumps in both of the pump stations have to perform “extra” work due to the leaks and as a result, it is causing unnecessary

wear on the pumps. There is a possibility both pump stations are or could be in violation of DEQ regulations due to leakage and root intrusions. Leaks and root intrusions both have the potential to containment surrounding soils and groundwater.

Basic Alternatives

1. **No action, operate the pump stations in their existing conditions**. Based on the current conditions of Dawson Tract No. 4 and Beach Avenue, both have the potential for further leakage and run the risk of facing fines from DEQ. As a result, both stations will not last for a 20-year period in their current conditions. Mill Beach, Buena Vista Loop, Cypress Cove, and Constitution Way are all experiencing accumulations of unwanted material. If no action is taken, the unwanted material will continue to accumulate, creating a safety hazard and the potential for damaging equipment within the pump stations. Control panels showing signs of wear will continue to do so and could eventually malfunction with the risk of causing an emergency situation. This option is not recommended.

2. **Refurbish Stations.** This alternative is to replace all control panels for each pump station within the City of Brookings during the study period, rehabilitate the existing leaks at Dawson Tract No. 4 and Beach Avenue, and purchase a portable high pressure jet washing system. In many cases, a portable high pressure jet washing system will allow preventative maintenance by removing the unwanted material. For example, routine maintenance with a high pressure jet washing system would have prevented the guide rails from being in their current condition, as mentioned in Section 4.2.1. Repairing the influent pipe at Dawson Tract No. 4 and the wet well at Beach Avenue will prevent further maintenance costs caused by the extra work being performed by the pumps. Also, it will remove the possibility of contaminating the surrounding groundwater and soil. Replacement of the current control panels will reduce the possibility of system failures and major component damage. An allowance will need to be set aside to accommodate these purchases in a timely manner. It is proposed that for three pump stations, control panels, gate valves and check valves, be replaced immediately with the remaining nine station's control panels and valves replaced in the next 5-15 year period. It is also recommended that all pumps be re-built or placed in the next 10-15 years.

   Environmental Impacts
   Dawson Tract No. 4 and Beach Avenue both have the potential for contamination of the surrounding groundwater and soil.

   Land Requirements
   All work is to be completed in the existing right-of-way.

   Potential Construction problems
   Construction activities, noise, and traffic can cause disturbances to homeowners and businesses in the immediate area of the work zone; a plan to monitor and minimize the impacts will be needed. Construction within narrow roadway areas may impact traffic flows within the work zone. Access during construction may be limited at times due to area confinements including minimal roadway and driveway widths and lengths.

   Sustainability Considerations Water and Energy
   Preventing leakage will reduce the work caused by the pumps, and therefore the wastewater collection system will be more energy efficient.

Green Infrastructure
Not applicable.

Other
Not applicable.

Project cost estimates include replacement of all control panels for each pump station within the City of Brookings, rehabilitation of the existing leaks at Dawson Tract No. 1 and Beach Avenue, purchase of a high pressure jet washing system, and replacement of all valves within the next 20 years. An allowance will need to be set aside to accommodate these purchases in a timely manner. A breakdown of this allowance can be seen in the cost estimate titled Preliminary Cost Estimate – Priority 2 Pump Station Improvement Items in Appendix C. The estimated annual operating cost savings is approximately $7,000. The estimated construction budget for the immediate Priority 2 project is shown in Table 4.2.2.1. The estimated construction costs and present worth costs for the 5, 10, and 15 years improvements are shown in Table 4.2.2.2.

TABLE 4.2.2.1
PUMP STATION IMPROVEMENTS PRIORITY 2 - IMMEDIATE

Item	Costs
Construction Costs	$124,800
Other Non-Construction Costs	$51,000
Total Project Costs	$175,800

TABLE 4.2.2.2
PUMP STATION IMPROVEMENTS PRIORITY 2 - FUTURE

Item	Costs	PW Cost
Construction Costs	$1,193,813	$ 987,245
Other Non-Construction Costs	$ 397,928	$ 329,082
Total Project Costs	$1,591,750	$1,316,327

Selection

Alternative 2, refurbish stations, is the preferred alternative. Scope of work will include rehabilitation of the existing leaks at Dawson Tract No. 4 and Beach Avenue, purchase of a portable high pressure jet washing system, and replacement of all control panels, major valves, and pumps within the next 20 years. This alternative was selected to improve energy efficiency, eliminate any potential environmental violations, extend pump station life, and reduce operational costs.

4.2.3 Priority 3 – Pump Station Improvement Items

Lighting systems outside and inside the pump stations are one of the more frequently criticized design problems of pump stations. This is because lighting has a much more noticeable effect to the pump station while routine maintenance and inspections are taking place. Some examples of the design problems are improper choice of light source for various occupancies, light switches trapped behind

doors, inadequate emergency lighting, inadequate lighting through glares or shadows, and failure to consider efficiency, power factors, noise level, and temperature when specifying ballasts.

The electrical system at each pump station currently requires the City to hire an outside electrician when performing routine pump maintenance. Installing a Meltric Switch-Rated Decontactor Plug and Receptacle instead of using hardwire connections will eliminate the need for routine hiring of an outside electrician. City staff will have quick access to most components within each pump station, which is essential for an emergency situation where safety and timing are extremely important.

Constitution Way, Seacliff Terrace, Beach Avenue, Dawson Tract No. 2, Dawson Tract No. 3, and Dawson Tract No. 5 are all without a back-up generator because the stations do not have adequate room for a generator. Currently, one portable trailer-mounted engine generator is available to all pump stations if their primary power source were to discontinue working. Where this is an option for the pump stations, provisions for power connections should be made. For example, the generator power receptacles for each of the pump stations are currently in bad condition and need to be replaced. Also, provisions need to be made in case several pump stations are simultaneously without power.

For level control applications within each pump station there is no need to keep an exact wastewater level. Instead, it is most important to keep the wastewater level within a specified range. When the wastewater reaches the maximum level, the motor is started and wastewater is pumped until the level reaches the minimum mark. Due to the repetitive nature of the powering on and off of each pump, a soft starter application for each of the pumps will conserve energy and increase the life expectancy of each pump. Currently, these pumps have soft starters; Dawson Tract No. 1 - Pumps 1 and 2; Mill Beach - Pumps 3 and 4; and Buena Vista - Pumps 1, 2, and 3.

Basic Alternatives

1. **No action, operate the pump stations in their existing conditions**. Lighting systems outside and inside the pump stations still allow the wastewater collection system to remain fully operational. The electrical system at each pump can become an issue when there is an emergency situation and the WWTP cannot immediately hire an outside electrician to perform a simple task. A secondary source of power for the pump stations is becoming scarce and can become a major issue when multiple pump stations are in need of power. The wastewater collection system still remains fully operational under this condition; however taking no action is not recommended.

2. **Refurbish Stations.** This alternative recommends immediately refurbishing station lighting to LED, supplying Meltric Switch-Rated Decontactor Plugs and Receptacles for each pump station (four stations immediately and the remainder over a 5-15 year period). The purchase of an additional 60 KW trailer-mounted engine generator now and another in five years is recommended. Installing soft starters for each pump that is currently without this application is recommended as soon as possible. Each of these improvements will allow for an increase in safety and reduction in energy, operational and maintenance costs and ability of city maintenance staff to more quickly address an emergency situation at any of the pump stations. The installation of Meltric Switch-Rated Decontactor Plugs will simplify and reduce the costs of pump maintenance.

Environmental Impacts
None.

Land Requirements
All work is to be completed in the existing rights-of-way.

Potential Construction problems
Construction activities, noise, and traffic can cause disturbances to homeowners and businesses in the immediate area of the work zone. A plan to monitor and minimize the impacts will be needed. Construction within narrow roadway areas may impact traffic flows within the work zone. Access during construction may be limited at times due to area confinements including minimal roadway and driveway widths and lengths.

Sustainability Considerations Water and Energy
LED lighting will increase safety, reduce costs and conserve energy in the future. A soft starter application for each pump will increase each pump's life expectancy and conserve energy.

Green Infrastructure
Not applicable.

Other
Not applicable.

Project cost estimates include changing station lighting to LED, supplying Meltric Switch-Rated Decontactor Plugs for each pump station, purchasing three additional trailer-mounted engine generators, and installing soft starters to each pump that currently is without this application. An allowance will need to be set aside to accommodate these purchases in a timely fashion. A breakdown of this allowance can be seen in the cost estimate titled Preliminary Cost Estimate – Priority 3 Pump Station Improvement Items in Appendix C. The estimated construction budget for this Priority 3 project is shown in Table 4.2.3.1.

TABLE 4.2.3.1
PUMP STATION IMPROVEMENTS PRIORITY 3

Item	Costs
Construction Costs	$248,000
Other Non-Construction Costs	$93,000
Total Project Costs	$341,000

TABLE 4.2.3.2
PUMP STATION IMPROVEMENTS PRIORITY 3 - FUTURE

Item	Costs	PW Cost
Construction Costs	$ 96,093	$ 84,415
Other Non-Construction Costs	$ 32,031	$ 28,139
Total Project Costs	$128,125	$112,554

Selection

Alternative 2, refurbish stations. This alternative allows for an improvement in energy conservation, quick access for City maintenance staff to work on an emergency situation, and will improve operational costs as well as maintenance costs.

4.3 WWTP Upgrades

Description
Throughout the WWTP, there are multiple deficiencies existing which, if not addressed, will affect maintenance efforts and longevity of the plant. Corrosion protection, equipment upgrades, and changes in process systems will reduce maintenance, improve performance and extend the useful life of the plant.

Design Criteria
The following are general design criteria for a pump station design:

- Provide equipment that is viable for a 20-year life.
- Reduce the operation and maintenance requirements.
- Improve operational efficiency of the system.

Land Requirements
There are no land requirements for these alternatives. All modifications and upgrades are to the existing plant site.

Environmental Impacts
If not corrected, these deficiencies will continue to degrade the plant's operation and effluent quality.

Potential Construction Problems
Retrofitting existing systems requires additional effort to work in confined spaces, to modify existing structures, and to work with out-of-date technologies.

Sustainable Considerations
Being pro-active in improving the operation of the equipment and preemptively maintaining the system will extend its useful life and reduce the probability of large replacement expenses in the future.

4.3.1 Alternatives Considered But Found Non-Viable

4.3.1.1 High Pressure Gas Storage Tank

This alternative considered providing a storage tank to be provided which stores methane gas produced by the anaerobic digester at a higher pressure than that of the digester, thereby storing more gas in a given

volume than the low pressure storage tank option. The Brown and Caldwell report of 2002 briefly mentioned this and suggested that it would require the addition of a compressor, which would not be cost effective. While high pressure gas storage allows a facility to store more gas in a smaller volume than low pressure storage, the high pressure spheres are expensive, involve a considerable amount of regulation, are costly to maintain and devalue the digester gas benefit because it consumes more energy to store it than storage at operating pressures. Use of these systems has been discontinued in a number of larger facilities due to cost and maintenance issues. The existing mixing compressor does not appear practical for this purpose and another compressor would be required. Therefore, this alternative was dropped from further consideration.

4.3.1.2 Low Pressure Gas Storage Tank

This alternative considered the installation of a 4,500 (512 SCF) gallon tank to supplement the existing limited storage in the digester fixed top head space of 268 SCF. Generally, the methane is either used or must be flared. To reduce the use of auxiliary diesel fuel for heating the boiler, it would be beneficial to store additional methane gas. A previous technical memorandum by Brown and Caldwell provided in the year 2002 recommended that a low pressure gas storage tank 19.5 feet long by 6.5 feet in diameter providing 4,500 gallons or 512 SCF be installed near the digester. The new storage tank would operate at the same pressure as the gas in the digester. The data provided in the Brown and Caldwell technical memo appears to indicate that only a few days per winter should require supplemental heating based on the theoretical heat (methane) production of the digester and the average heat demand. Analysis performed in Section 3 of this report tends to confirm this, especially if methane leakage is stopped and gas production rates per pound of introduced volatile solids are high. The report suggested that short duration peak heat demand during a day was not being met at times, thus requiring the boiler to be fired with diesel whenever methane supply was not adequate, and that for other portions of the day, methane gas being produced in more than adequate amounts had to be flared.

This increase would triple the existing gas storage capacity and allow the use of methane more frequently, “bridging” those periods of low methane production so that diesel fuel is not required. According to digester equipment suppliers however, diurnal heat change (cold in the morning and warm in the afternoon) should not be significant in a properly insulated digester. The estimated cost of this improvement was $50,000 to $70,000 in 2002 and would result in only 147,400 BTU hours of additional heat. With the digester roof uninsulated and operating at 101° F, this would provide a “bridge“ methane burn time of only a few hours at most. We do not recommend this as it is expensive, provides “bridging” for such a short period of time, will create additional maintenance requirements and in view of other alternatives being considered, is not as desirable.

4.3.1.3 Gas Dome Addition for Gas Storage

This alternative considered the addition of gas domes to either Sludge Storage Tanks No. 1 or 2 or to the digester to store gas. The addition of the domes to the sludge storage tanks would be less difficult than the addition to the existing digester. The additional gas storage would provide about 5,000 SCF of additional storage. The cost of installation as well as the membranes would likely exceed $400,000. This is simply not cost effective and this alternative was dropped from further consideration. In addition, this replacement is problematic in that the digester must be taken out of service for a period of several months. This alternative was dropped from further consideration.

4.3.1.4 Outside Pipe Insulation to Conserve Heat

This alternative considered the addition of outside pipe insulation to reduce the amount of heat loss in the digester system, thereby reducing fuel demand. Calculations made in the August 2014 report titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation" Section 3 estimates that approximately 7% of the heat loss is by way of the uninsulated exterior sludge and gas piping. During the six winter months, the piping accounts for about 15,200 BTU/hr heat loss. The exterior insulation would need to be covered with aluminum or stainless steel cladding. It is anticipated that heat loss could be reduced by 80%, thus saving 12,160 BTU/hr during the six winter months. This would cost about $50 per lineal foot, and there are about 400 lineal feet of exterior pipe. The estimated cost would be $50,000 to provide and install. This does not include the pipe conveying waste gas to the burner flare as this heat energy would be lost anyway. Nor is interior building pipe addressed as this is assumed to be even less cost effective. One issue regarding insulation of the pipe is that methane leaks would be very difficult to identify and there is a concern regarding the increased chance of pipe corrosion. Since diesel fuel through the Brookings boiler and heat exchanger has a burn value of about 104,000 BTUs per gallon, each 10-hour period during which diesel fuel would have to be used could see a savings of 1.17 gallons of diesel. With diesel fuel assumed to cost $4 per gallon, the payback period would be 106,838 hours of operation during which diesel would normally be burned.

Assuming conservatively that diesel burns as much as 20% of the time, the payback period (i.e. period required for present worth value of annual savings to equal cost to insulate) would be about 48 years. Note that this value was based upon the digester operating at 101° F, as was the case at the time of the referenced study. Since then, the operation temperature has been reduced to 97° F, as was recommended. The heat loss is therefore reduced so that diesel fuel savings would not be as great and the resulting payback period even longer. Considering the added maintenance costs, the concerns regarding accelerated pipe corrosion and the hidden pipe leaks, this does not appear to a cost effective candidate for recommendation.

4.3.1.5 Digester Roof Insulation to Conserve Heat

This alternative considers the placement of roof insulation to reduce the amount of heat loss in the digester system, thereby reducing fuel demand. Calculations made in the August 2014 report titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation" Section 3 estimates that approximately 46% of the heat loss is by way of the uninsulated concrete roof. During the six winter months, the digester roof accounts for about 457,830,000 BTUs of heat loss. The roof insulation would require that the existing concrete roof be carefully sealed and all cracks would be repaired. A rigid board type of insulation covered by a roofing type membrane would be applied with weight distribution mats installed for access to all piping, hatches and ports. The added weight would be minimal. The installation would cost about $30 per square foot and there are about 1,590 square feet of roof to cover. The estimated cost would therefore be $47,700. As developed in Table 3.3.6 of the report titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation", roof insulation could save 413 gallons of diesel fuel per year under current practice. Assuming diesel fuel has a cost of $4.00 per gallon, this could result in a savings of $1,652 per year. With an assumed cost to insulate the roof of $47,400, at an interest rate of 3%, the payback period (i.e. period required for present worth value of annual savings to equal cost to insulate) would be 68 years. Note that this value was based upon the digester operating at 101° F, as was the case at the time of the referenced study. Since then, the operation temperature was reduced to 97° F as was recommended. The heat loss is therefore reduced so that diesel fuel savings would not be as great, and the resulting payback period would be even longer. This does not appear to be a cost effective alternative.

4.3.1.6 Replace Existing Boiler with New Co-Burn Boiler

This alternative considered the replacement of the existing boiler with a new boiler that could co-burn diesel and methane at the same time. The reasoning was that such a boiler could utilize digester gas (in conjunction with use of the alternative fuel) down to a pressure of 1.5 inches water column pressure, thus making more efficient use of the existing methane. The current burner cannot use digester gas when it is available at less than 5 to7 inches of water column pressure (it is currently "tuned" for about 7 inches to produce optimum burn efficiency), and must switch over to diesel fuel when available gas pressure drops. However, upon investigation it was determined that there are no boiler heaters manufactured that can co-burn (simultaneous burn) digester gas and diesel fuel. In order to co-burn two different fuels, they have to be very close in BTU content. Natural gas and digester gas are close and can be co-burned in a heater. There is no natural gas available in Brookings. The existing burner is 15 years old, worn, and requires repair. It is not compatible with the SCADA system. The burner portion replacement is considered for replacement as a viable alternative.

4.3.1.7 Improved Digester Mixing

A digester equipment representative recommended that we consider mixing improvements. It was suggested by an equipment supplier consulted during the preparation of the August 2014 report titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation" that the rotary valve gas mixing systems like the one currently in use at Brookings are "antiquated". The existing system recirculates methane pumped through a compressor, and gas flow is directed to six different equally spaced injectors around the digester tank. The system uses rotary valves to direct all gas flow through one injector at a time and then, based on a timer, advances to the next injector. This produces high velocity and mixing at each tank location in sequence. The vendor we consulted was promoting the purchase and installation of an "improved" hydraulic mixing system. There is a possibility, according to our equipment supplier, that the rotary gas mixer may not switch from leg to leg even though the panel indicator shows which leg is active and the system appears "on the indicator board" to be working correctly. However, during our inspection, it was apparent that the rotary valve "moved" when signaled to do so. A reliable parameter to determine if good mixing is actually occurring is to determine the volatile solids (VS) reduction percentage for the digester operation. Note that VS reduction is considered low but acceptable at 50% and high at 70%. Based on the information developed in the preparation of the referenced August 2014 report, the digester has an average monthly minimum day VS reduction of 50.4%, a maximum day VS reduction of 77.11% and an average of 66.08%. This places the Brookings digester in the high-rate gas production category. Therefore, we see no reason to suspect that current mixing is inadequate or that replacement with a new system should be considered at this time.

4.3.1.8 Feeding of F.O.G. (fats, oils and grease) to Digester

The digester is "under-loaded" with respect to its size. The original design values for the digester anticipated significantly greater volatile solids (VS) loading than is currently provided or expected in the near to mid-future. The digester could produce much more methane gas than it does now if it was "fed" more digestible materials.

A Fats, Oils and Grease (F.O.G.) program for restaurant and other food processing facilities grease and oil recovery, whereby the City provides pick up and disposes of the food establishment's grease and oil traps or tanks and brings it to a F.O.G. station constructed at the wastewater treatment plant, has been considered. The fat, oil, and grease are fed into a grinder and pump system. The material is conveyed, along with the primary raw sludge, directly to the digester feed. DEQ recommends that if such a program is to be

implemented, it be provided as a no-fee service to food facilities so as to insure maximum cooperation and participation.

This alternative creates a significantly greater amount of work for the treatment plant personnel who must collect and transfer it at the F.O.G. station and who would have to interact with the public during collection.

The amount of savings which might be achieved by increasing methane production is at most $11,776 per year based on the savings of 2,944 gallons of diesel fuel per year. The 20-year present worth value at 3% annual rate of return of this savings is $175,200. To be cost effective, the total sum of both the initial capital improvements and the present worth of the operation and maintenance (O&M) expenses for a F.O.G. program would have to be less than $175,200. It is clear that any F.O.G. system improvements (including the present worth of 20 years O&M expenses) would total more than $175,200. Therefore, this alternative clearly is economically non-viable.

4.3.1.9 Electrical Generation from Excess Methane

This alternative assumes that electrical generation equipment would be installed at the wastewater treatment plant. It would burn excess methane to generate electrical power. The power produced would offset plant electrical power usage or could be sold to the electrical utility for revenue. In order to produce enough excess methane for such a system to prove cost effective, it would be necessary to have a F.O.G. program in place. In view of the more promising digester improvements, it should be considered only in the long-term future, as it does not appear to be economically viable in the present planning period.

4.4 Viable WWTP Upgrades

Description

Throughout the WWTP, there are multiple deficiencies existing which, if not addressed, will affect maintenance efforts and longevity of the plant. Corrosion protection, equipment upgrades and changes in process systems will reduce maintenance, improve performance and extend the useful life of the plant.

Design Criteria

The following are general design criteria for a replacement and major repair of liquid stream components within the collection system and at the wastewater treatment plant:

- Provide equipment that is viable for a 20-year life.
- Reduce the operation and maintenance requirements.
- Improve operational and energy efficiency of the system.

Specific design criteria associated with digester improvements were developed in greater detail in a report titled “Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation” produced in August 2014 by The Dyer Partnership. It was estimated that the volume of stored gas required to bridge the worst day during the previously three years of operation was 4,700 SCF. The four-foot drop in liquid operation level would reduce the volume of the digester liquid to 87% of its current volume with a similar change in the mean residence time (MRT). Considering that the digester is currently under-loaded and averages well over 100 days of MRT (where 15 to 20 days is the goal) this would not have a negative impact on treatment. Monthly methane production is based on a rate of 8 SCF/lb to 12 SCF/lb of introduced volatile solids (VS). Each SCF of methane provides 550 BTU. Other specific criteria include the requirement that anaerobic digestion must achieve a mean cell residence time of at least 15 days at a temperature of greater than 95° F.

Land Requirements
There are no land requirements for these alternatives. All modifications and upgrades are to the existing plant site.

Environmental Impacts
If not corrected, these deficiencies will continue to degrade the plant's operation and effluent quality. Further, waste of methane gas via leakage or flaring contributes to the release of greenhouse gases without any offset of energy extraction use.

Potential Construction Problems
Retrofitting existing systems requires additional effort to work in confined spaces, to modify existing structures, and to work with out-of-date technologies. In the case of non-redundant units to be repaired or modified such as the digester, a bypass method and temporary treatment must be used.

Sustainability Considerations
Being pro-active in improving the operation of the equipment and preemptively maintaining the system will extend its useful life and reduce the probability of large replacement expenses in the future.

4.4.1 Coatings and Corrosion Protection

The WWTP is located in a coastal area that has a highly corrosive atmosphere. As depicted throughout Section 2, the plant is exhibiting corrosion in all process areas. Stainless steel, aluminum and PVC materials are performing satisfactorily. Galvanized coatings and painted coatings on steel surfaces are showing significant rust. At multiple locations, pipes, brackets, electrical boxes, and panels are showing signs of severe rust.

Basic Alternatives

1. **No action, operate the WWTP in its existing condition**. Piping, conduit, brackets, boxes and other appurtenances made of steel will continue to corrode and degrade. Left unchecked, this plant will not last for the next 20 years. Systems will eventually begin to fail or short-circuit, forcing major reconstructive repair. Taking no action is not recommended.

2. **Coatings Project**. Establish a program to repair all corrosion issues over a five-year period. This work would include a mix of the following:

   - Clean and coat accessible appurtenances.
   - Replace accessible appurtenances (support brackets, electrical boxes) with PVC or stainless steel.

   Cost Estimate
   Total capital costs for this alternative are estimated at $120,400. A summary of the cost estimate is shown in Table 4.4.1.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.1.1
CORROSION PROTECTION

Item	Costs
Construction Costs	$91,500
Other Non-Construction Costs	$28,900
Total Project Costs	$120,400

Selection

Alternative 2 is recommended to extend the life of the plant to 20 years.

4.4.2 Headworks

Bar Screen No. 1 has been inoperative since May 2014. This unit shows extensive wear and corrosion. Parts have been ordered but still have not arrived. Likewise grit classifier equipment at the headworks, in particular the gear box, shows considerable wear and corrosion. Both Bar Screen No. 1 and Grit Classifier No. 1 are the older of the two other units and both require frequent maintenance, have significant corrosion issues, are mechanically worn out, and are at the end of their useful life. Replacement is recommended.

Basic Alternatives

1. **No action, operate the headworks in its existing condition**. The older bar screen and grit classifier will continue to wear and corrode. These units will not last for the next 20 years. There will be no redundancy for the screening or grit collection. Within the downstream treatment units, decreasing treatment effectiveness and increasing cleaning and maintenance costs will result. Taking no action is not recommended.

2. **Replace Mechanical Bar Screen** No. 1 as soon as possible and the grit classifier unit within ten years. Inspect and replace worn equipment for the degritters, including paddles. Replace Mechanical Bar Screen No. 2 within ten years. Anticipate replacement of the grit pumps within ten years. This will reduce the ongoing maintenance cost and sustain a useful 20-year life.

   Cost Estimate
   Total capital costs for this alternative are estimated at $217,150 for immediate improvements. The second phase improvements for this alternative have a present worth cost of $319,030. A summary of the cost estimates are shown in Tables 4.4.2.1 and 4.4.2.2. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.2.1
REPLACE MECHANICAL BAR SCREEN - IMMEDIATE

Item	Costs
Construction Costs	$165,150
Other Non-Construction Costs	$52,000
Total Project Costs	$217,150

TABLE 4.4.2.2
REPLACE MECHANICAL BAR SCREEN
DEGRITTER AND CLASSIFIER REHABILITATION - 10-YEAR FUTURE

Item	Costs	PW Costs
Construction Costs	$326,050	$242,612
Other Non-Construction Costs	$102,700	$76,418
Total Project Costs	$428,750	$319,030

Selection

Alternative 2 is recommended to extend the life of the headworks to 20 years.

4.4.3 Primary Clarifiers

Both rectangular clarifiers are operational, but are showing wear with regard to chains, gears and flights. In addition, many of the pipes in the primary pipe gallery are showing corrosion. Replacement of worn components and recoating of pipes would sustain these units for a 20-year life and is recommended.

Basic Alternatives

1. **No action, operate the primary clarifiers in its existing condition**. The various parts will continue to wear and corrode, and be replaced in a piecemeal fashion. These units can be made to last for the next 20 years, but there will be periods when the units are out of service at inopportune times, potentially affecting operational performance. Taking no action is not recommended.

2. **Replace chains, gears, idlers, flights and motors within ten years**. Blast or mechanically surface prepare and recoat pipes and housings as soon as possible. This will reduce the ongoing maintenance cost and sustain a useful 20-year life.

   Present Worth Cost Estimate
   Total capital costs for this alternative (recommended for completion in ten years) are estimated at $168,898. A summary of the cost estimate is shown in Table 4.4.3.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.3.1
PRIMARY CLARIFIER REHABILITATION - 10-YEAR FUTURE

Item	Costs	PW Costs
Construction Costs	$172,785	$128,568
Other Non-Construction Costs	$54,200	$40,330
Total Project Costs	$226,985	$168,898

Selection

Alternative 2 is recommended to extend the life of the primary clarifiers to 20 years.

4.4.4 Trickling Filter

The walls of the trickling filter are leaking. Over time the reinforcement steel in those concrete walls could be damaged. The seals associated with the distributor are also leaking. In addition, the two-speed blowers associated with the odor control system at the trickling filters are antiquated and inefficient, with air flow controlled by throttling which wastes energy. Making repairs would sustain these units for a 20-year life and is recommended. Replacing the two older of the four pumps would allow more efficient use of energy and allow installation of a VFD for speed control. Replacing one of the two blowers with a modern turbo blower which could be speed controlled would allow more efficient use of energy. In addition, the bypass line for the trickling filter is undersized and requires a size increase along with the installation of magnetic meters.

Basic Alternatives

1. **No action, operate the trickling filter in its existing condition**. The wall will continue to deteriorate and require more extensive repair or replacement in the future. Operation with current pumps and blowers will forgo opportunity to provide better operational control and energy conservation. Taking no action is not recommended.

2. **Rehabilitate Trickling Filter**. Repair leaking concrete walls. Repair leaking distributor seal. Add new bypass line and magnetic meter. Replace two pumps with modern pumps and VFDs to provide better operational control and to save energy. Replace one of the blowers in the odor control system with a turbo blower and VFD to provide energy savings.

   Cost Estimate
   Total capital costs for this alternative are estimated at $265,550. A summary of the cost estimate is shown in Table 4.4.4.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.4.1
COST ESTIMATE - TRICKLING FILTER REHABILITATION

Item	Costs
Construction Costs	$201,950
Other Non-Construction Costs	$63,600
Total Project Costs	$265,550

Selection

Alternative 2 is recommended to extend the life of the trickling filter walls to 20 years and to improve operational and energy use efficiency.

4.4.5 Re-Aeration/Solids Contact Process

The building housing the blowers for the aeration process needs repair including replacement of louvers, doors, water proofing of masonry walls, removal of the non-functional air conditioner and roof repair.

Within the basins, the gates leak and need repair. One of the older blowers should be replaced with a newer more efficient one that can be speed controlled with a VFD. The other older blower should be replaced in 10 years.

Basic Alternatives

1. **No action, operate the re-aeration/solids contact process in its existing condition**. The blower building will continue to deteriorate and will require more extensive repair or replacement in the future. Operation with current pumps and blowers will forego an opportunity to provide better operational control and energy conservation. Taking no action is not recommended.

2. **Repair leaking masonry walls, remove air conditioning units** and repair leaking roof, replace doors and louvers, and replace one blower immediately. In ten years replace another blower.

   Cost Estimate
   Total capital costs for the immediate portion of this alternative are estimated at $119,320. The present worth capital costs of the second phase of this alternative in ten years is estimated at $68,838. A summary of the cost estimate is shown in Tables 4.4.5.1 and 4.4.5.2. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.5.1
COST ESTIMATE RE-AERATION SYSTEM REHABILITATION - IMMEDIATE

Item	Costs
Construction Costs	$90,820
Other Non-Construction Costs	$28,500
Total Project Costs	$119,320

TABLE 4.4.5.2
COST ESTIMATE RE-AERATION SYSTEM REHABILITATION - 10 YEAR

Item	Costs	PW Costs
Construction Costs	$61,480	$52,456
Other Non-Construction Costs	$19,200	$16,382
Total Project Costs	$80,680	$68,838

Selection

Alternative 2 is recommended to extend the life of the re-aeration/solids contact process to 20 years and to improve operational and energy use efficiency.

4.4.6 Secondary Clarifiers, Scum, RAS and WAS Pumping

Both concrete basins appear to be in good condition. The sludge scraper mechanism for the older of the two basins is in need of repair and the drive is showing signs of age. The FRP weirs and baffles are deteriorating and likely to need replacement before the end of the study period. The clarifier equipment

installed in 2001 is in good condition. The WAS pump is very old and the need for replacement should be expected within five years. The RAS pumps are two-speed pumps. This does not allow variable speed control which would allow energy savings and better control over the rate of sludge return.

Basic Alternatives

1. No action, operate the re-aeration/solids contact process in its existing condition. The blower building will continue to deteriorate and require more extensive repair or replacement in the future. Operation with current pumps and blowers will forego an opportunity to provide better operational control and energy conservation. Taking no action is not recommended.

2. Replace deteriorated FRP weirs and baffles. Overhaul or replace clarifier drive. Replace WAS pumps. Replace two-speed RAS pumps with pumps that can be controlled with VFD. Perform this project for the older clarifier in five years and for the newer clarifier in ten years.

   Cost Estimate
   The present worth of total capital costs for the recommended five-year portion of this alternative are estimated at $175,226. The ten year portion of present worth total capital costs is estimated at $161,857. A summary of the cost estimate is shown in Tables 4.4.6.1 and 4.4.6.2. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.6.1
COST ESTIMATE SECONDARY CLARIFIER, WAS, RAS AND SCUM PUMPS - 5-YEAR

Item	Costs	PW Costs
Construction Costs	$144,200	$133,198
Other Non-construction Costs	$45,500	$42,028
Total Project Costs	$189,700	$175,226

TABLE 4.4.6.2
COST ESTIMATE SECONDARY CLARIFIER, WAS, RAS AND SCUM PUMPS - 10-YEAR

Item	Costs	PW Costs
Construction Costs	$144,200	$123,035
Other Non-construction Costs	$45,500	$38,822
Total Project Costs	$189,700	$161,857

Selection

Alternative 2 is recommended to extend the life of the re-aeration/solids contact process to 20 years and to improve operational and energy use efficiency.

4.4.7 UV Disinfection System

The UV system is becoming antiquated. The medium intensity UV system is obsolete and not cost effective in comparison to modern high intensity systems. Parts and bulbs are becoming difficult and

expensive to obtain. The heat exchangers for the cooling system require significant repair due to corrosion. Communication with the plant's SCADA system is not provided but would be desirable to improve operation and energy efficiency.

Basic Alternatives

1. **No action, operate the UV in its existing condition**. This will become more difficult in the future as bulbs and components are no longer available for replacement. The heat exchangers currently require $50,000 to $80,000 in repairs. Taking no action is not recommended.

2. **Install new high intensity UV system**. Install flash mixer to break up particles and provide better UV exposure with resulting energy savings.

   Cost Estimate
   Total capital costs for this alternative are estimated at $239,600. A summary of the cost estimate is shown in Table 4.4.7.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.7.1
COST ESTIMATE - UV SYSTEM REPLACEMENT - IMMEDIATE

Item	Costs
Construction Costs	$182,300
Other Non-construction Costs	$57,300
Total Project Costs	$239,600

Selection of an Alternative

Alternative 2 is the recommended alternative. It would reduce maintenance costs and increase energy efficiency.

4.4.8 Replace Digester Gas Burner

This alternative provides for the replacement of the existing gas burner with a modern unit which is SCADA compatible. The existing unit is 15 years old and requires repairs. Replacement of these components is required for efficient use of methane gas for heating of the digesters.

Basic Alternatives

1. **No action, operate the digester gas burner in its existing condition**. The burner will continue to operate inefficiently, require frequent repair, and potentially leave the plant without a means to heat the digester. Taking no action is not recommended.

2. **Replace digester gas burner** with modern equipment. This will reduce the ongoing maintenance cost and sustain a useful 20-year life. It is essential to better utilize the methane produced in the digester for heating fuel. It is also necessary from a reliability standpoint.

Cost Estimate

Total capital costs for this alternative are estimated at $43,650. A summary of the cost estimate is shown in Table 4.4.8.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.8.1
COST ESTIMATE REPLACE DIGESTOR BURNER

Item	Costs
Construction Costs	$32,600
Other Non-construction Costs	$11,050
Total Project Costs	$43,650

Selection

Alternative 2 is recommended to provide for the necessary operational efficiency of the anaerobic digester system.

4.4.9 Modify Digester Liquid Operation Level

This alternative provides for lowering digester liquid operation height by four feet (98.00 feet to 94.00 feet) to provide additional headspace from its current value of 268 SCF to 6,300 SCF. It will be necessary to temporarily digest sludge in the facility's existing two smaller sludge storage tanks. These tanks were previously used as anaerobic digesters prior to the last major plant upgrade. This modification will require that an interior 10-inch DS/LSG line be installed at a lower and a new tank wall penetration and connection to the exterior 20-inch SS steel sludge withdrawal standpipe be made, with the existing 10-inch DS/LSG line valved off. This will also require addition of pipe and modification of the 12-inch overflow inlet pipe. These modifications will permit bi-level operation as required. The drop in liquid operation level would reduce the volume of the digester liquid to 87% of its current volume with a similar change in the mean residence time (MRT). The digester is currently under-loaded and averages well over one hundred (100) days of MRT. Fifteen (15) days is the minimum requirement.

The study titled "Methane Gas System Evaluation and Rehabilitation Recommendations for Anaerobic Digestion Operation", August 2014, by The Dyer Partnership concluded that about 22% of the heating is provided by diesel fuel even though estimated methane production (conservatively at the low production rate) averages 29% over requirements if the pressure/vacuum relief valve does not leak.

To provide alternative digestion during the period when the digester is out of service and operation level modifications are occurring (as well as other repairs required), Sludge Storage Tanks No. 1 and 2 with volumes of 89,800 gallons each may be pressed in service. The current average daily flow of combined primary and thickened WAS to the digester is 4,066 gpd. The MRT for both sludge storage tanks would be 44 days. By maintaining the temperature of the sludge at 75° F a detention time of 33.5 days would be required. Heating to 75° F would be achieved by temporary piping between the sludge pumps and heat exchanger and the temporary digesters. This would provide a safety factor of about 32 percent to maintain Class B treatment. Mixing and methane production would be poor. No attempt to burn methane would be made during this period. Rather it would all be vented and all heating would be with the use of diesel fuel. However, this would be of short duration, perhaps as little as three weeks.

During the anticipated 21-day period when the digester is "down" for service with the entire production of methane gas wasted, all heating would be by diesel. However, at the lower temperature required for

minimal digestion and the reduced efficiency of methane production it is assumed that both heat demand and methane production would be halved. Therefore, for the brief period of time during the modifications, 112,300 SCF of methane would be lost and 462 gallons of diesel fuel would be consumed as shown in Table 4.4.9.1.

TABLE 4.4.9.1
METHANE LOSS AND DIESEL USE

Digester Heat Demand	BTU/YR	1,669,214,928	BTU/day	4,573,192
Methane Produced	BTU/YR	2,147,894,361	BTU/day	5,884,642
Diesel Use Replaced by Proj.	BTU/YR	360,464,000	BTU/day	987,573
Methane Produced	SCF/yr.	3,905,262	SCF/day	10,699
W/out Methane Diesel Reg'd.	Gal/yr.	16,050	Gal/day	44
21 Day Methane Loss	SCF	224,686	½ SCF	112,343
21 Day Diesel Use	Gal.	923	½ Gal.	462

This is more than compensated for in that an annual savings occurs thereafter as a result of a reduction of the consumption of 3,366 gallons of diesel fuel per year. This is equivalent to the savings of 360,464,000 BTUs or 655,400 SCF of methane per year, which otherwise would have been wasted as flare gas.

Basic Alternatives

1. No action, operate the digester in its existing condition. With inadequate gas storage, the digester will continue to produce less methane than required to maintain heating without switching to diesel combustion. It is also the case that methane at times will be produced at a greater rate than can be utilized and, by necessity it will be flared, wasting potential digester heating fuel. Taking no action is not recommended.

2. Perform piping and overflow modifications to the piping in the digester which will allow operation at an elevation four feet lower than the current level. This project must be in conjunction with temporary modification of existing Sludge Storage Tanks No. 1 and 2, to allow sludge digestion while the single digester is out of service for modification.

   Cost Estimate
   This alternative requires both digester modification and temporary treatment of sludge during the digester modification. Total capital costs for the digester modification portion of this alternative are estimated at 39,540. The capital cost to provide temporary treatment allowing the digester modification is estimated as an additional $116,160. A summary of the cost estimates for both parts of this alternative are shown in Table 4.4.9.2 and Table 4.4.9.3. Appendix C contains the detailed cost estimate for both parts of this this alternative.

TABLE 4.4.9.2
COST ESTIMATE MODIFY OPERATING LEVEL OF DIGESTER

Item	Costs
Construction Costs	$65,900
Other Non-construction Costs	$25,100
Total Project Costs	$91,000

TABLE 4.4.9.3
COST ESTIMATE TEMPORARY SLUDGE TREATMENT ST 1 AND 2

Item	Costs
Construction Costs	$86,360
Other Non-construction Costs	$29,800
Total Project Costs	$116,160

Selection

Alternative 2 is recommended to provide for the operational efficiency of the anaerobic digester system and to gain significant energy savings.

4.4.10 Improved Mixing for Sludge Storage Tank No. 3

In order to pump and dewater sludge from Sludge Storage Tank No. 3, it is necessary to homogenize the contained sludge by mixing. The air injection blower in conjunction with the sludge recirculation pump must be used to achieve this. However the addition of air to the anaerobic sludge changes the pH so that dewatering becomes more difficult and more polymer is required to achieve desired solids content. Due to the fibrous content of the stored sludge, conventional propeller mixers are considered at risk of fouling. A liner reciprocating vertical motion type of mixer is considered instead. Due to the size and configuration of the tank with its roof supports, the supplier has replied that four mixers with motors of 7.5 HP each would be required. As an alternative, the replacement of the existing blower is also considered to at least provide for more cost effective mixing as air injection mixing is continued.

Basic Alternatives

1. **No action, operate sludge storage tank in its existing condition**. This requires that sludge dewatering operations only be conducted for a few hours at a time until the air injection mixing causes the pH to fall such that dewatering becomes inefficient. Dewatering operations can be conducted, but requires a greater expenditure of manpower and the 50 HP blower used for mixing consumes a significant amount of energy.

2. **Install Ovivo LM roof-mounted type mixers in Sludge Storage Tank No. 3**. This would permit mixing without the requirement for extensive air injection.

   Cost Estimate
   Total capital costs for this alternative are estimated at$866,700. A summary of the cost estimate is shown in Table 4.4.10.1. Appendix C contains the detailed cost estimate for this alternative.

TABLE 4.4.10.1
COST ESTIMATE: INSTALL MIXER SLUDGE TANK 3

Item	Costs
Construction Costs	$651,700
Other Non-construction Costs	$215,000
Total Project Costs	$866,700

3. **Install Energy Efficient, Speed controllable Blower Replacement**. This would permit continued mixing by air injection at a reduced O&M cost.

Cost Estimate
Total capital costs for the alternative are estimated at $98,550 for blower replacement. A summary of the cost estimates are shown in Table 4.4.10.2. Appendix C contains the detailed cost estimates for this alternative.

TABLE 4.4.10.2
COST ESTIMATE: INSTALL REPLACMEENT BLOWER SLUDGE TANK 3

Item	Costs
Construction Costs	$75,000
Other Non-construction Costs	$23,550
Total Project Costs	$98,550

Selection

Alternative 3 is recommended. Alternative 2 is not cost effective to make so large a capital improvement providing little labor and energy savings. The necessity to empty and clean the two million gallon tank and the difficulty of installing the four large plunger mixers in the existing covered tank are also considerations. A replacement for the current blower is instead recommended to reduce the energy costs of operation.

4.5 Cost Estimates

Construction Costs
Construction costs refer to specific activities or work to build a project. Costs are based on actual bidding results from similar work, published cost guides, equipment pricing from vendors and other construction cost experience. Reference was made to the drawings of the existing facilities to determine construction quantities, elevations of the major components, and treatment of wastewater during construction. As projects proceed and as site-specific information becomes available, the estimates may require updating.

Future changes in the costs of labor, equipment, and materials may justify comparable changes in the cost estimates presented herein. For this reason, common engineering practices usually tie the cost estimates to a particular index, which varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) Construction Cost Index is most commonly used. This index is based on the value of 100 for the year 1913. Average yearly values for the past ten years are summarized in Table 4.5.1. Estimates in this plan are based on Year 2015 costs. Future yearly ENR indices can be used

to calculate the cost of projects for a construction year based on annual growth in the ENR index.

TABLE 4.5.1
ENR INDEX – 2005 TO 2015

Year	Index	% Change
2005	7446	4.65%
2006	7751	4.10%
2007	7966	2.77%
2008	8310	4.32%
2009	8570	3.13%
2010	8799	2.67%
2011	9070	3.08%
2012	9308	2.62%
2013	9547	2.57%
2014	9806	2.71%
2015	10039	2.38%
	Ave. Annual	2.92%

Non-Construction Costs

Non-construction costs are those indirect costs that are not visibly associated with direct construction activities and are required for the implementation of the project. Non-construction costs are those costs that are typically allocated or spread across all construction activities on a predetermined basis. These costs include design, construction contingencies, environmental review permit support, specialty reports and administration.

Engineering services for major projects typically include special investigations, a predesign report, surveying, foundation exploration, preparation of contract drawings and specifications, bidding services, construction management, inspection, construction staking, startup services, and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 15 to 25% of the contract costs when all of the above services are provided. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small, complicated projects. The engineering cost for design and construction of this report is generally 20% of the construction costs.

A cost contingency is included in indirect expense. Cost estimates presented are based on conceptual design; consequently, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, changes in the scope of work during construction, unanticipated specialized investigations, designs or studies, and other difficulties which cannot be foreseen at this time, but may tend to increase final costs. Contingency factors may apply to direct and indirect expenses. A predesign contingency factor equal to 15% of the estimated construction cost has been added as an indirect expense.

In accordance with the National Environmental Policy Act (NEPA) and other applicable environmental statutes, regulations and Executive Orders, an agency is required to consider the potential environmental effects of a project; hence, an Environmental Review (or Environmental Assessment) is performed. NEPA and agency policies are to "use all practicable means" to restore and enhance the quality of the human environment and avoid or minimize adverse effects. This is accomplished by evaluating the environmental consequences of a project in a report. Depending on the complexity of a project location and its environmental characteristics, a report may range in cost from $10,000 to $25,000 (excluding permit support).

Depending on the findings of the environmental review, additional reports may be required to process permit applications. Permit and support documents may include but are not limited to: 1) a City Land Use Compatibility Statement (LUCS); 2) 1200-C Erosion Control Permit (1200-C); 3) Department of State Lands (DSL) Wetlands Removal and Fill Permit; 4) Army Corps of Engineers (ACE) Nationwide Permit (NWP); 5) planning Conditional Use Permit (CUP); 6) Flood Plain Analysis; 7) Geotechnical Investigations; 8) Archaeological Discovery Report; and 9) an Oregon Department of Fish and Wildlife (ODFW) Take Permit for in water work. Depending on the complexity of a project location, permit support and other specialty reports may range from $1,000 to $25,000 for each supporting document (excluding permit fees).

An allowance has been added for miscellaneous administrative costs such as regulatory review and administrative services. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim loan financing, legal services, regulatory review fees, legal advertising, labor standards monitoring and other related expenses associated with the project. Miscellaneous administrative fees may vary from $200 to $10,000 depending on the complexity of a project.

SECTION 5: **SELECTION OF ALTERNATIVES**

This section examines the alternatives for the collection system and wastewater treatment plant in terms of replacements, upgrades and repairs discussed in Section 4. The recommended repairs, line extensions and equipment replacements are compared only with the alternative of no action, there being no other viable alternatives. In most cases, no action is not a viable alternative for Brookings. Certain alternatives are prioritized so that the most important may be selected based on funding availability. The recommended improvements are examined based on life cycle cost, and non-monetary considerations such as necessity, reliability, facility flexibility, and ease of operation.

5.1 Cost Effectiveness and Benefit Analysis

As appropriate, the cost effectiveness of an alternative is determined from the monetary present worth analysis which is considered an important comparison parameter. The economic comparison includes estimated capital cost and annual Operation and Maintenance (O&M) costs. Cost analysis procedures follow *Preparing Wastewater Planning Documents and Environmental Reports for Public Utilities Financed by Infrastructure Finance Authority, Oregon Department of Environmental Quality, Rural Community Assistance Corporation, United States Department of Agriculture* guidelines.

5.1.1 Life Cycle Cost

Life-cycle cost is used to determine the true costs among alternatives for capital cost, operation, maintenance, and end of life salvage of an object or process. Because many of the alternatives will result in power or labor savings in comparison to the status quo, the anticipated savings are reflected in calculating deductions for the annual cost and its present worth.

For estimating capital costs for the alternatives presented in this section, prices of comparable work were obtained from many sources. Cost data were derived from actual suppliers of materials and equipment whenever possible. In addition, data was utilized from construction bids of similar projects. Total project capital costs included direct construction costs with allowances for mobilization, bonds, insurance and contingencies as well as non-construction costs for technical services (engineering, construction administration, grant administration, environmental review, specialty reports, permit support, etc.). Salvage value is estimated as a percentage of the original capital cost based upon the remaining value of reusable structures, piping, appurtenances, and equipment at the end of the study period.

The cost estimates presented have been prepared from information available at the time of the estimates for guidance in evaluation and implementation. The final cost of the project and resulting feasibility will depend on actual site conditions, final scope of work, and other variables. As a result, the final project cost will vary from the estimates presented herein. Because of these factors, project feasibility, benefit/cost ratios, risk, and funding needs must be carefully reviewed prior to making specific financial decisions or reestablishing project budgets.

Economic evaluations of the alternatives require consideration of annual O&M costs as well as capital costs. O&M expenses include labor, energy, chemicals, maintenance materials, supplies and equipment replacement and other cost that are chargeable to the various components. Labor estimates are based on staff hourly rates (including taxes, benefits and insurance). Energy costs for new facilities are based on

estimates of the average cost for each process unit. Equipment maintenance costs are based on a percentage of the initial equipment cost depending on the equipment type, its use or manufacturer's recommendations. Current unit prices for labor and energy specific to the area were used as a basis for estimating the annual cost.

5.1.2 Present Worth Analysis

In economics the present value is a future amount of money that has been discounted to reflect its current value, as if it existed today. The present value is always less than or equal to the future value because money has interest-earning potential, a characteristic referred to as the time value of money. The present worth analysis sums the capital improvements cost and the present value of 20 years of annual O&M cost.

Present worth analysis of the various alternatives are based on the following assumptions:

- Evaluation period of 20 years, coinciding with the planning and projected useful life.
- Interest rate is generally equivalent to the long term cost of money. This analysis uses a 1.6 % real interest rate for a 20-year system life listed in the 2014 OMB Circular A-94 Appendix C as required in above mentioned guidelines. The real interest rate is applied toward the present value of the annual O&M costs.

5.1.3 Matrix Evaluation

Alternatives have positive and negative impacts where economic value is difficult or is impracticable to assign a dollar value to. Public health, environmental impacts, social impacts, and future expandability are examples of benefits that are difficult to express in monetary value. A matrix rating system evaluation was employed to compare the benefit of alternatives. This rating system consists of a three point scale, three being the best and one, the worst. Two or more alternatives may have the same rating for a particular parameter. The ratings are a subjective matter of judgment and include input from stakeholders. The alternatives benefits will be compared based on the following criteria:

Flexibility Conveyance and treatment design should allow for flexibility in operation and maintenance. The treatment plant operator must have the ability to alter plant flows around the major process units without significantly degrading effluent quality. This goal can be achieved by providing redundant units and multiple interconnections between units when appropriate. Conveyance and treatment equipment design should also be such that maintenance, both routine and emergency, can be performed without excessively loading other components. Flexibility is also needed to ensure that discharge requirements can be met during changing influent conditions, while allowing construction and connection of new process units as needed.

Reliability is the ability of an alternative to consistently meet the established flow criteria and generally provide reliable collection, treatment and disposal of wastewater. Redundancy is also a key factor in reliability. This proposed facility will be designed to meet EPA Reliability standards because the facility discharges into a “public water supply, shellfish, or primary contact recreation waters, or as a result of its volume and/or character, could permanently or unacceptably damage or affect the receiving waters or public health if normal operations were interrupted”.

Operability and Safety of a wastewater system entails considerable responsibility and cost while providing public health benefits. For these reasons, personnel assigned to operate and maintain a treatment facility must be trained appropriately. The more sophisticated the process or equipment, the greater the level of expertise that is needed. Qualified individuals are usually available in metropolitan areas, as is financial support for their employment. However, small communities often have a problem in finding the personnel and the money with which to pay them. The facility should be easy to operate without constant supervision and recover from occasional process inattention. Consequently, the selection of a treatment process or equipment should reflect the regional and local level of training of operations and maintenance.

Ability to Construct is dependent on available land versus an alternative foot print, site conditions, availability of equipment and appurtenances, availability of skilled craftsman in the region, complexity of construction, length of construction time (working days) and construction period versus wet weather conditions.

Energy Use is dependent on efficiency of the improvement, the ability to reduce energy consumption when conditions permit, and the use of energy that would otherwise be lost, instead of electrical or fossil fuels.

Environmental Factors are considered for restoration and for maintaining the chemical, physical, and biological integrity of the Nation's surface waters, to protect groundwater resources, reduce the discharge of pollutants and protect water quality domestic use, fish, shellfish, wildlife and recreation use. Land use, archaeological, farmland, wetlands, floodplain, fish and wildlife, and regulatory issues are also environmental considerations.

Community Impacts, such as public perception, health and safety concerns, noise, odor, view corridors, residential buffers, hazardous materials transportation and other human related factors must be considered when assessing the conveyance and treatment alternatives.

Expandability considerations include the ability to expand to meet future capacity needs and associated footprints. Other factors include the ease of incorporating future processes of new technologies.

Regulatory Compliance considers the alternative in terms of successfully complying with the City's obligation to meet the conditions of its NPDES permit and other legal requirements for wastewater collection, pumping, treatment and disposal of both liquid streams and biosolids streams.

5.2 Alternatives Selection

Utilizing the monetary and non-monetary criteria presented above, an evaluation is completed for alternatives developed in Section 4. A present worth cost analysis and non-monetary comparison are introduced with a criterial discussion following. Each of the alternatives was assigned a benefit comparison ranking score of 1 to 5, with 5 being the most favorable and 1 being the least favorable.

Many projects are selected without an evaluation because they are the only technically feasible and viable option. These alternatives are primarily for the repair and maintenance of existing facilitates that have experienced significant degradation over time. Examples include the repair of collection system lines, pump stations and WWTP components. Among the evaluation alternatives utilized in Section 4 was Alternative 1 "No Action" which was utilized to frame impacts of the deficiencies. Therefore all evaluations begin with Alternative No. 2.

5.2.1 Collection System I/I Repair Projects

These projects are recommended without further subjective analysis. The collection system is old and will continue to degrade. If not maintained, I/I will continue to increase WWTP flows which results in an increase in treatment cost. The alternatives considered are rehabilitation of the existing system and/or replacement with in-kind improvements. Therefore the following I/I repair projects are recommended without further comparison. The projects are grouped by priority. Before undertaking projects, the lines should be video-inspected to further define the method and extent of repair. Operations and maintenance costs for the repairs are assumed to be included in the current collection system budget and these costs should be reduced following the repairs.

5.2.1.1 Priority One I/I Projects

Priority 1 projects include the following: 1) repair of two leaking catch basins; 2) repair of seventeen leaking manholes; 3) repair of approximately 3,000 lineal feet of line that measured a flow difference in excess of 26 gpm between manholes; and 4) elimination of sixty-seven open cleanouts. These projects should be completed in the next five-year period at a cost of $558,217 or about $112,000 per year.

5.2.1.2 Priority Two I/I Projects

Priority 2 projects include the following: 1.) repair of two plugged house vents; 2) repair of five bad roof drain connections; 3) repair of approximately 4,000 lineal feet of line that measured a flow difference between 16 and 25 gpm between manholes; and 4) repair of approximately 33 leaking service laterals. These projects should be completed in the next five-year period following the Priority One I/I projects at a cost of $512,839 or about $103,000 per year.

5.2.1.3 Collection System I/I Repair Costs

TABLE 5.2.1.3.1
PRESENT WORTH ANALYSIS FOR PRIORITY ONE I/I REPAIRS

Construction	$	363,217
Engineering - Design	$	54,000
Engineering and Construction Management	$	36,000
Contingency	$	54,000
Environmental Assessment	$	15,000
Permit Support and TV Inspection Report	$	15,000
Regulatory Review	$	4,000
Grant Administration	$	9,000
Labor Standards Monitoring	$	5,000
Legal	$	3,000
TOTAL PROJECT COST	$	558,217

TABLE 5.2.1.3.2
PRESENT WORTH ANALYSIS FOR PRIORITY TWO I/I REPAIRS

Construction	$ 328,839
Engineering - Design	$ 9,000
Engineering and Construction Management	$ 33,000
Contingency	$ 49,000
Environmental Assessment	$ 15,000
Permit Support and TV Inspection Report	$ 19,000
Regulatory Review	$ 3,000
Grant Administration	$ 8,000
Labor Standards Monitoring	$ 5,000
Legal	$ 3,000
TOTAL PROJECT COST	$ 512,839

5.2.1.4 Matrix Evaluation of Collection System I/I Repair Projects

TABLE 5.2.1.4.1
I/I REPAIRS

No.	Criteria	Priority 1	Priority 2
1	Flexibility	1	1
2	Reliability	5	5
3	Operability	5	5
4	Ability to Construct	4	4
5	Energy Use	4	4
6	Environmental Factors	5	5
7	Community Impact	3	3
8	Expandability	3	3
9	Regulatory Compliance	5	5
	Total	35	35

5.2.2 Collection System Expansion and Sewer Replacement

These projects provide for planned development to the north of Brookings, and provide line size increases within the City necessary for increased future flows. In addition, projects with this group replace lines that are deteriorated. The following projects are recommended without further comparison. The projects are grouped by priority. Operations and maintenance costs for the improvements are in comparison to the existing collection system budget. New lines will increase O&M while replacements of damaged or deteriorated lines will tend to reduce O&M costs. In particular, elimination of the Mill Beach pump station will significantly reduce O&M costs.

5.2.2.1 Priority One – New Improvements to Serve Lone Ranch Vicinity and Harbor Sanitary District

As described in Section 4, these improvements consist of provision for a relief gravity line from the current discharge location of the Harbor Sewer District into the Brookings collection system, and the completion of line extensions northward to the Lone Ranch Vicinity including a gravity line, a pump station and a segment of force main. The extension to this service area has been partially completed by the developer and, as per agreements with the City of Brookings; the remainder needs to be completed by

the City. In addition, existing pipe segments in Brookings require enlargement to convey this additional flow from the Lone Ranch Vicinity. O&M and periodic costs will be incurred and saved as shown.

5.2.2.2 Priority Two - Sewer Main Replacements

These improvements, as described in Section 4, consist of replacement or rehabilitation of defective or undersized pipe segments, generally in the older part of Brookings. Operations and maintenance and periodic costs are anticipated to be reduced due to the replacements as shown.

5.2.2.3 Collection System Expansion and Sewer Replacement Costs

TABLE 5.2.2.3.1
PRESENT WORTH ANALYSIS HARBOR/LONE RANCH PRIORITY ONE IMPROVMENTS

#	Const. Cost	Other Project Costs	Total Project Cost	Annual O&M	PW of Annual O&M	PW of Periodic Costs	Total PW Life Cycle Costs
1	$838,850	$264,000	$1,102,850	$280	$4,760	$427	$1,108,317
2	$554,810	$169,200	$724,010	$280	$4,760	$427	$729,477
3	$338,420	$103,400	$441,820	$105	$1,785	$256	$443,966
4	$471,810	$156,000	$627,810	$8,212	$139,609	$66,146	$841,777
5	$600,220	$103,400	$703,620	$280	$4,760	$427	$709,087
6	$378,750	$128,800	$507,550	-$19,880	-$337,972	$213	$149,912
Total	$3,182,860	$924,800	$4,107,660	-$10,723	-$182,297	$67,896	$3,982,535

TABLE 5.2.2.3.2
PRESENT WORTH ANALYSIS SEWER MAIN REPLACEMENTS – PRIORITY TWO

#	Const. Cost	Other Project Costs	Total Project Cost	Annual O&M	PW of Annual O&M	PW of Periodic Costs	Total PW Life Cycle Costs
9	$190,110	$58,000	$248,110	-$210	-$3,570	-$1,399	$ 243,140.40
10	$105,470	$32,200	$137,670	-$140	-$2,380	-$1,249	$ 134,041.29
11	$260,610	$79,600	$340,210	-$140	-$2,380	-$1,283	$ 336,547.39
12	$150,780	$46,000	$196,780	-$105	-$1,785	-$1,249	$ 193,746.31
13	$152,040	$46,400	$198,440	-$210	-$3,570	-$1,498	$ 193,371.52
14	$151,440	$46,200	$197,640	-$210	-$3,570	-$1,249	$ 192,821.25
15	$156,860	$47,900	$204,760	-$140	-$2,380	-$1,045	$ 201,334.83
16	$82,060	$25,000	$107,060	-$105	-$1,785	-$1,249	$ 104,026.31
17	$132,340	$40,300	$172,640	-$140	-$2,380	-$999	$ 169,261.01
18	$185,070	$56,500	$241,570	-$210	-$3,570	-$1,512	$ 236,487.96
19	$176,130	$53,700	$229,830	-$210	-$3,570	-$1,512	$ 224,747.96
20	$263,888	$80,500	$344,388	-$280	-$4,760	-$1,512	$ 338,115.92
21	$86,962	$26,600	$113,562	-$140	-$2,380	-$1,249	$ 109,933.29
22	$218,050	$66,600	$284,650	-$140	-$2,380	-$1,249	$ 281,021.29
23	$199,980	$61,000	$260,980	-$140	-$2,380	-$1,249	$ 257,351.29
24	$159,780	$34,400	$194,180	-$140	-$2,380	-$1,249	$ 190,551.29
25	$364,720	$111,200	$475,920	-$210	-$3,570	-$1,512	$ 470,837.96
Total	$3,036,290	$912,100	$3,948,390	-$2,870	-$48,792	-$22,261	$3,877,337.29

5.2.2.4 Matrix Evaluation of Collection System Expansion and Sewer Replacement

TABLE 5.2.2.4.1
EVALUATION OF COLLECTION SYSTEM EXPANSION AND SEWER REPLACEMENT

No.	Criteria	Priority 1	Priority 2
1	Flexibility	2	2
2	Reliability	5	5
3	Operability	5	5
4	Ability to Construct	4	4
5	Energy Use	4	4
6	Environmental Factors	4	4
7	Community Impact	3	3
8	Expandability	4	4
9	Regulatory Compliance	3	3
	Total	34	34

5.2.3 Pump Station Improvements

With the exception of the newer Riverview Pump Station, the numerous pump stations in Brookings are old and require upgrades and parts replacements. If not maintained, downtime, repair time and costs, and the potential for sewage overflows will increase. The alternatives considered are rehabilitation of the existing system and/or replacement with in-kind improvements. Therefore the following pump station repair or upgrade projects are recommended without further comparison. The projects are grouped by priority. Annual O&M costs affected by the repairs and upgrades are shown and result in a cost reduction compared to the City's current O&M expenses.

5.2.3.1 Priority One Pump Station Improvements

Four pump stations required replacement of the guide rails. Pumps cannot be lifted for maintenance at these locations. Rail replacements for these stations are a very high priority. In addition, two pump stations have underground fuel tanks which must be removed and replaced by new aboveground tanks. All pump stations in the City of Brookings experience a high amount of moisture resulting in corrosion in electrical power, instrumentation, and communication fittings, conduit, and windings. The most serious of these repairs is addressed in Priority One pump station improvements. Specific improvements are detailed in Section 4.

5.2.3.2 Priority Two - Pump Station Improvements

Many of the valves in the pump stations are currently leaking due to age and seal or seat damage. The control panels are showing signs of age and corrosion. These components will need replacement over the next 20 years. Four of the pump stations experience accumulations of grease and solids. A portable pressure cleaner is recommended to address this. Two pump stations have inlet leakage problems which required repair. Note that the Present Worth of the Priority Two periodic cost improvements is high in comparison to the initial capital costs. This is because pump and panel replacements are recommended to be phased in during the 20-year study period. Specific improvements are detailed in Section 4.

5.2.3.3 Priority Three - Pump Station Improvements

Priority three improvements consist of desirable improvements not related immediately to the primary function of reliable pumping of required volumes of waste water. Improved lighting systems outside and inside of the pump stations are addressed. Another issue addressed is the type of connections between the submersible pumps and their control panels. Currently an outside electrician is required when performing routine pump maintenance. Installing of Meltric plugs and receptacles instead of the hardwired connections would correct this inconvenience and expense.

Six pump stations do not have dedicated standby generators. One portable trailer-mounted engine generator is available to all pump stations if their primary power source were to discontinue working. It is recommended that another be provided as soon as possible, if funding allows, and then another five years after that. The generator power receptacles for each of the pump stations are currently in poor condition and should be replaced.

Finally, it recommended that all pump stations which do not currently have soft starts be provided with them. Specific improvements are detailed in Section 4.

5.2.3.4 Pump Station Improvements Cost

TABLE 5.2.3.4.1
PRESENT WORTH ANALYSIS PUMP STATION IMPROVEMENTS

Priority	Const. Cost	Other Project Costs	Total Project Cost	Annual O&M	PW of Annual O&M	PW of Periodic Costs	Total PW Life Cycle Costs
1	$118,680	$49,000	$167,680	$(2,040)	$(34,681)	$(15,661)	$ 117,337
2	$124,800	$51,000	$175,800	$(7,040)	$(119,683)	$1,316,327	$ 1,372,444
3	$167,680	$93,000	$370,000	$(1,606)	$(27,298)	$ 112,554	$ 455,256
Total	$411,160	$193,000	$713,480	$(10,686)	$(181,662)	$1,413,219	$1,945,037

5.2.3.5 Matrix Evaluation of Pump Station Improvements

TABLE 5.2.3.5.1
EVALUATION OF PUMP STATION IMPROVEMENTS

No.	Criteria	Priority 1	Priority 2	Priority 3
1	Flexibility	3	3	3
2	Reliability	5	5	5
3	Operability	5	5	5
4	Ability to Construct	4	4	4
5	Energy Use	5	5	5
6	Environmental Factors	4	4	4
7	Community Impact	4	4	4
8	Expandability	3	3	3
9	Regulatory Compliance	4	4	4
	Total	37	37	37

5.2.4 WWTP Upgrades

Multiple deficiencies exist throughout the WWTP which, if not addressed, will affect maintenance efforts and longevity of the plant. Corrosion protection, equipment upgrades and changes in process systems will reduce maintenance, improve performance and extend the useful life of the plant. In addition, recommended improvements provide an opportunity to reduce energy consumption. Taking no action will lead to higher maintenance and repair costs in the future. There are 14 specific projects considered. All but Project 15 are recommended. Projects 12 and 13 must be conducted together for Project 12 to be viable. While these projects provide an opportunity in many cases to reduce energy consumption, for the wastewater treatment plant to remain in service, aging equipment which has reached the end of its service life must be replaced.

5.2.4.1 Project 1 - Coatings and Corrosion Protection

The WWTP is located in a coastal area that is a highly corrosive atmosphere. As depicted throughout Section 2, the plant is exhibiting corrosion in all process areas. Stainless steel, aluminum and PVC materials are performing satisfactorily. Galvanized coatings and painted coatings on steel surfaces are showing significant rust. At multiple locations, pipes, brackets, electrical boxes, and panels are showing signs of severe rust.

5.2.4.2 Project 2 - Headworks – Replace Mechanical Bar Screen, Immediate

One of the mechanical bar screens is so deteriorated that it has been out of service. Recent repairs are temporary and parts are no longer available as the unit is obsolete. Replacement is required.

5.2.4.3 Project 3 - Headworks - Replace Mechanical Bar Screen, Classifier and Degritter, 10 Years

The currently functioning mechanical bar screen is anticipated to reach the end of its service life in ten years and should be replaced at that time. The grit classifier unit should be replaced within ten years. This project also provides for inspection and replacement of worn equipment for the degritters, including paddles.

5.2.4.4 Project 4 - Primary Clarifier Rehabilitation, Ten Years

Both rectangular clarifiers are currently operational but showing wear with regard to chains, gears and flights. In addition, many of the pipes in the primary pipe gallery are showing corrosion. Replacement of worn components would sustain these units for a 20-year life and is recommended. The project entails replacing chains, gears, idlers, flights and motors at ten years. Blast or mechanically surface prepare and recoat pipes and housings as possible. This will reduce the ongoing maintenance costs and sustain a useful 20-year life.

5.2.4.5 Project 5 - Trickling Filter Rehabilitation, Immediate

The concrete walls of the trickling filter are leaking and need repair. The seals associated with the distributor are also leaking and require replacement. In addition, the two-speed blowers associated with the odor control system at the trickling filters are antiquated and inefficient, with air flow controlled by throttling which wastes energy. Replacing the two older of the four pumps would allow more efficient use of energy and allow installation of a VFD for speed control. Replacing one of the two blowers with a

modern turbo blower which could be speed-controlled would allow more efficient use of energy. Installation of a new larger bypass line with a magnetic flow meter will improve operations. Making repairs and upgrades would sustain this operation for a 20-year life and is recommended.

5.2.4.6 Project 6 - Re-aeration System Rehabilitation, Immediate

The building housing the blowers for the aeration process needs repair, including replacement of louvers, doors, waterproofing of masonry walls, removal of the non-functional air conditioner and roof repair. Within the basins, the gates leak and need repair. One of the older oversized blowers should be replaced immediately with a newer, smaller, more efficient one that can be speed controlled with a VFD. In ten years, replace another blower.

5.2.4.7 Project 7 - Re-aeration System Rehabilitation, Ten Years

Another older oversized blower which will be reaching the end of its service life should be replaced in ten years with a newer, smaller, more efficient one that can be speed controlled with a VFD.

5.2.4.8 Project 8 - Secondary Clarifier, WAS, RAS, and Scum Pumps, Five Years

Both concrete basins appear to be in good condition; however, the sludge scraper mechanism for the older of the two basins is in need of repair or replacement, and the drive is showing signs of age. The FRP weirs and baffles are deteriorating. The WAS pump is very old and need for replacement is expected within five years. The RAS pumps are two-speed pumps. This does not allow variable speed control which would allow energy savings and better control over the rate of sludge return. Therefore the recommendation for the older clarifier is replacement of the deteriorated FRP weirs and baffles, repair of the scrapers, overhaul or replacement of its clarifier drive, and replacement of a WAS pump and two-speed RAS pumps with variable speed pump.

5.2.4.9 Project 9 - Secondary Clarifier, WAS, RAS, and Scum Pumps, Ten Years

It is anticipated that the same repairs recommended for the older secondary clarifier will be required for the newer clarifier in ten years.

5.2.4.10 Project 10 - UV System Replacement, Immediate

The UV system is obsolete and not cost effective to operate in comparison to modern high intensity systems. The heat exchangers for the cooling system are becoming problematic to repair. Communication with the plant's SCADA system is desirable to improve operation and energy efficiency. Therefore it is recommended that a new high intensity UV system and a flash mixer to break up particles and provide better UV exposure be installed.

5.2.4.11 Project 11 – Replace Digester Gas Burner

This replacement provides for a modern unit which is SCADA compatible. The existing unit is 15 years old and requires repairs. Replacement of this component is required for efficient use of methane gas for heating of the digesters.

5.2.4.12 Project 12 - Modification of Digest Operation Level, Immediate

Perform piping and overflow modifications to the piping in the digester, which will allow operation at an elevation four feet lower than the current level. This will provide a significant amount of methane gas storage which will reduce, and possibly eliminate, the need to burn diesel fuel for boiler heating. This project must be in conjunction with Project 13 following.

5.2.4.13 Project 13 - Sludge Storage Tanks 2 and 3 Temporary Conversion to Digester, Immediate

This project is to provide temporary modification of existing Sludge Storage Tanks No. 1 and 2, thereby allowing sludge digestion while the single digester is emptied and cleaned while out of service for piping and overflow modifications to be performed during Project 12 above. It entails running temporary piping or hoses to feed heated sludge to the two sludge storage tanks instead of to the digester (where it is normally delivered). Methane will be vented. Digested sludge will then be pumped to the two million gallon Sludge Storage Tank 3.

5.2.4.14 Project 14 - Sludge Storage Tank 3 Improved, Immediate

This project considered as Project 14a, installation of liner reciprocating vertical motion type of mixers to improve mixing in this large tank. However, the cost was determined to be very high, with marginal energy savings. It does not appear that this alternative is cost effective. As an alternative, Project 14.b, the replacement of the single existing blower with energy efficient and speed controllable blower one is recommended as an alternative to mechanical mixer installation. It is significantly more cost effective.

TABLE 5.2.4.14.1
PRESENT WORTH ANALYSIS – SST #3 ALTERANTIVE PROJECTS 14.A & 14.B

#	Const. Cost	Other Project Costs	Total Project Cost	Annual O&M	PW of Annual O&M	PW of Periodic Costs	Total PW Life Cycle Costs
14.a	$651,700	$215,000	$866,700	$ 2,750	$ 46,745	$18,722	$ 932,167
14.b	$75,000	$23,550	$98,550	$ (2,700)	$ (75,653)	$(12,417)	$ 10,480

5.2.4.15 WWTP Upgrades Costs

TABLE 5.2.4.15.1
PRESENT WORTH ANALYSIS FOR WWTP REHABILITATION AND RELACEMENT PROJECTS

#	Const. Cost	Other Project Costs	Total Project Cost	Annual O&M	PW of Annual O&M	PW of Periodic Costs	Total PW Life Cycle Costs
1	$91,500	$28,900	$120,400	$ 3,150	$ 53,552	$ 23,587	$197,539
2	$165,150	$52,000	$217,150	$ (1,400)	$ (23,801)	$ 8,312	$201,662
3	$278,194	$87,626	$365,820	$ (1,400)	$ (10,958)	$ (152,516)	$202,345
4	$147,424	$46,245	$193,669	$ (420)	$ (3,287)	$ (80,257)	$110,125
5	$201,950	$63,600	$265,550	$ (3,879)	$ (65,943)	$ 5,062	$204,669
6	$90,820	$28,500	$119,320	$ (2,866)	$ (48,728)	$ 8,312	$78,904
7	$52,456	$16,382	$68,838	$ (2,866)	$ (22,434)	$ (28,185)	$18,219
8	$133,198	$42,028	$175,226	$ (420)	$ (5,137)	$ (30,487)	$139,602
9	$123,035	$38,822	$161,857	$ (420)	$ (3,287)	$ (67,868)	$90,701
10	$182,300	$57,300	$239,600	$ (3,157)	$ (53,676)	$ 18,899	$204,823
11	$32,600	$11,050	$43,650	$ (925)	$ (15,726)	$ 2,391	$30,316
12	$91,000	$25,100	$116,100	$ (7,212)	$ (122,608)	$ -	$ (6,508)
13	$86,360	$29,800	$116,160	$ -	$ -	$ -	$ 116,160
14	$75,000	$23,550	$98,550	$ (2,700)	$ (75,653)	$ (12,417)	$ 10,480
Total	$1,750,987	$550,903	$2,301,889	($24,516)	($397,687)	($305,166)	$1,599,037

5.2.4.16 Matrix Evaluation of WWTP Upgrades

TABLE 5.2.4.16.1
EVALUATION OF WWTP PROJECTS

No	Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Flexibility	2	4	4	3	3	5	5	4	4	3	4	5	4	3
2	Reliability	4	5	5	5	5	5	5	5	5	5	5	5	3	2
3	Operability	3	5	5	5	5	5	5	5	5	5	5	5	2	2
4	Ability to Construct	4	4	4	4	4	3	3	4	4	3	5	2	2	1
5	Energy Use	1	4	4	3	5	5	5	4	4	5	5	5	1	2
6	Environmental Factors	4	3	3	3	4	3	3	3	3	4	5	4	2	3
7	Community Impact	4	4	4	3	5	3	3	4	4	3	4	4	2	2
8	Expandability	1	1	1	1	1	3	3	1	1	1	1	3	3	1
9	Regulatory Compliance	3	3	3	3	3	3	3	3	3	3	4	4	3	2
	Total	**26**	**33**	**33**	**30**	**35**	**35**	**35**	**33**	**33**	**32**	**38**	**37**	**22**	**18**

SECTION 6: **RECOMMENDED PLAN**

This section summarizes the selected wastewater collection system, pump station, and treatment alternatives and steps that should be taken to implement the selected projects. These projects correct current deficiencies and extend the useful life of the collection system, pump stations and WWTP by reducing peak flows, improving reliability, providing durable systems, and reducing ongoing operations and maintenance costs. Ultimately implementation of these projects facilitates the ongoing compliance with the NPDES permit.

6.1 Collection System

It is recommended that additional inflow and infiltration (I/I) investigation and construction projects be pursued in order to decrease the peak I/I flowing into the collection system. This will allow for capacity management and a more efficient operation of the WWTP improvements. The recommended plan is in two parts: 1) continue collection system evaluation; and 2) complete I/I repair projects. Annual operation and maintenance costs are anticipated to be absorbed into the City's existing enterprise budget and will potentially reduce this cost.

Continue to identify and correct inflow and infiltration in the existing system as follows:

1. The City should institute a video inspection program for the entire collection system over a five-year period (20% per year) and continue to repeat the program in five-year periods.

2. Serious maintenance and repair issues should be identified in the I/I inspection program and should be corrected as funding sources become available.

6.1.1 Priority 1 - I/I Repairs

The Priority One I/I projects were identified in Section 4. This alternative includes repair of two catch basins, repair of 17 leaking manholes, further investigation and performance of appropriate point repairs within 3,000 specific feet of pipeline (leaking greater than 26 gpm between manholes), repair of 67 identified leaking cleanouts. Annual operation and maintenance costs are anticipated to be absorbed into the City's existing sewer enterprise budget. The total estimated project cost is $558,217.

6.1.2 Priority 2 - City I/I Repairs

Following completion of Priority One repairs, it is recommended that Priority Two I/I repairs commence. These repairs include repair of two plugged house vents, and removal of five roof drain connections, further investigation and performance of appropriate point repairs within 4,000 specific feet of pipeline (leaking greater than 16 gpm between manholes), and repair of 33 leaking laterals. Annual operation and maintenance costs are anticipated to be absorbed into the City's existing sewer enterprise budget. The total estimated project cost for this project is $512,839.

6.1.3 Priority 1 - Lone Ranch and Harbor Sanitary District Improvements

The highest priority is Project 1 consisting of one 18-inch relief interceptor beginning at the intersection of Oak Street and Highway 101 and ending at the wastewater treatment plant. Due to pump station upsizing by the Harbor Sewer District, the existing line is nearly at full capacity whenever their pump station discharges. The remaining five out of six projects provide conveyance capacity for development to occur in the northern portion of Brooking's service area. These include segments of new gravity sewer and new force main as well as upsized gravity sewer line replacements to provide adequate capacity. The improvements also include provision for a new pump station at Taylor Creek. Completion of gravity sewer replacing force main under Project 6 will permit the decommissioning of the very old Mill Beach Lift Station. Total project costs are estimated to be $4,107,660 with the annual O&M cost decrease of $10,723 per year.

6.1.4 Priority 2 - Sewer Main Replacements or Rehabilitation

These projects include replacement of defective and undersized sewer pipelines which are generally in the older portion of Brookings. These 17 projects listed in Section 4, address I/I reduction, potential pipeline failure, and capacity issues. Total project costs are estimated to be $3,948,390 with annual O&M cost decreased by $2,870 per year. These projects were listed in the previous facility plan and have not yet been addressed. The City should pursue completing rehabilitation work where applicable, for older concrete sewer line before they completely fail causing more expensive conventional replacement.

6.2 Pump Station Recommendations

Pump Station repairs and improvements are prioritized within three groups.

6.2.1 Priority 1 - Pump Station Repairs

These repairs are considered most urgent. The repairs consist primarily of replacement of those deteriorated guide rail systems, elimination of underground fuel storage tanks and replacement with above ground tanks to comply with current regulations, and electrical repairs, improvements, and monitoring associated with corrosion and water damage. These repairs address six pump stations. The estimated project costs are estimated to be $167,680 Operations and maintenance costs are estimated to be decreased annually by $2,040.

6.2.2 Priority 2 - Pump Station Repairs

These repairs are considered less urgent, but will inevitably need to be addressed. They consist in large part of provision for replacement over the next 20 years of critical pump station equipment which is reaching the end of its service life, and will otherwise fail. The projects also address improved energy efficiency. In other cases, the recommended repairs include restoration of influent pipeline integrity into the wet well which will contribute to I/I reduction. The estimated project costs are estimated to be $175,800. Operations and maintenance costs are estimated to be decreased annually by $7,040.

6.2.3 Priority 3 - Pump Station Repairs

These repairs are considered less urgent than Priority One or Two. They consist in large part of further replacement of pump station equipment which is approaching the end of its service life and, if not replaced, would increase maintenance costs in the next 20 years. Included are portable generators and washing equipment to improve operations. The projects also address improved energy efficiency. The project costs are estimated to be $370,000. Operations and maintenance costs are estimated to decrease annually by $1,606.

6.3 WWTP Recommendations

Multiple deficiencies existing throughout the wastewater treatment plant which, if not addressed, will affect maintenance efforts and longevity of the treatment plant. Corrosion protection, equipment upgrades and changes in process systems will reduce maintenance, improve performance and extend the useful life of the plant.

6.3.1 Project 1 - Coating and Corrosion Control Project

Establish a program to repair all corrosion issues over a five-year period. This work would include: cleaning and coating accessible appurtenances**;** replacing accessible appurtenances (support brackets, electrical boxes) with PVC or stainless steel; and coating surfaces and bolts in treatment process tanks. Total initial project costs for this alternative are estimated at $120,400. It is anticipated that during the 20-year planning period, additional contracted painting and coating project costs would have present worth of $23,587. Annual estimated O&M costs to properly maintain the coatings is $3,150.

6.3.2 Project 2 - Headworks – Replace Mechanical Bar Screen, Immediate

One of the two mechanical bar screens is so deteriorated that it has been difficult to keep in operation. Parts are also becoming difficult to obtain due to obsolesce. The non-functioning bar screen would be replaced with a new unit. Total capital costs for this alternative are estimated at $217,150. Annual O&M is estimated to be reduced by $1,400.

6.3.3 Project 3 - Headworks – Replace Mechanical Bar Screen, Classifier and Degritter, Ten Years

The other existing mechanical bar screen is anticipated to require replacement in ten years as are the classifier and degritter. Total capital costs for this alternative are estimated at $365,820 (present worth). Annual O&M costs are estimated to be reduced by $1,400 beginning with the replacement.

6.3.4 Project 4 - Primary Clarifier Rehabilitation, Ten Years

The chains, gears, motors and flights are reaching or have reached the end of their estimated service lives. This alternative provides for replacement or overhaul of these items at Year 10 of the planning period. The estimated project cost is $193,669 (present worth). Annual O&M is estimated to be reduced by $420 beginning with the replacements.

6.3.5 Project 5 - Trickling Filter Rehabilitation, Immediate

The concrete walls of the trickling filter need repair. The distributor seal requires replacement. One of the odor control blowers should be replaced with a modern speed controllable blower. In addition, a new bypass line with a magnetic flow meter should be installed. Total capital costs for this alternative are estimated at $265,550. Annual O&M is estimated to be reduced by $3.879.

6.3.6 Project 6 - Re-aeration System Rehabilitation, Immediate

The blower building should be repaired; repairs include replacement of louvers, doors, waterproofing of masonry walls, removal of the non-functional air conditioner and roof repair. The leaking basin gates should be repaired. One of the older blowers should also be replaced with a newer, more efficient VFD speed-controllable one. Total capital costs for this alternative are estimated at $119,320. Annual O&M is estimated to be reduced by $2,866.

6.3.7 Project 7 - Re-aeration System Rehabilitation, Ten Years

Another older oversized blower should be replaced with a newer, smaller, more efficient VFD speed-controlled type in ten years. Total capital costs for this alternative are estimated at $68,838 (present worth). Annual O&M is estimated to be reduced by $2,866 beginning with the replacement.

6.3.8 Project 8 - Secondary Clarifier, WAS, RAS, and Scum Pumps, Five Years

Repair the sludge scraper mechanism for the older basin. Repair or replace the drive and replace the FRP weirs and baffles. Replace a WAS pump and an existing two-speed RAS pump with variable speed pump. Total capital costs for this alternative are estimated at $175,226 (present worth). Annual O&M is estimated to be reduced by $420 beginning with the replacement.

6.3.9 Project 9 - Secondary Clarifier, WAS, RAS, and Scum Pumps, Ten Years

It is anticipated that the same repairs recommended for the older secondary clarifier under Project 8 will be required for the newer clarifier in ten years. Total capital costs for this alternative are estimated at $161,857 (present worth). Annual O&M is estimated to be reduced by $420 beginning with the replacement.

6.3.10 Project 10 - UV System Replacement, Immediate

Replace existing UV disinfection unit with a new high intensity UV system, and add a flash mixer to break up particles and provide better UV exposure. Total capital costs for this alternative are estimated at $239,600. Annual O&M is estimated to be reduced by $3,157.

6.3.11 Project 11 - Replace Digester Burner

Replacement of this assembly is required to maintain reliable and efficient operation. The replacement will allow tie-in with the plants future SCADA improvements. Total capital costs for this alternative are estimated at 43,650. Annual O&M is estimated to be reduced by $925.

6.3.12 Project 12 - Modify Digest Operation Level, Immediate

Perform piping and overflow modifications to the piping in the digester to operate four feet lower than the current level. This will provide a significant amount of methane gas storage which will reduce and possibly eliminate the need to burn diesel fuel for boiler heating. This project must be in conjunction with Project 13 following. Total capital costs for this alternative are estimated at $39,540. Annual O&M is estimated to be reduced by $7,212.

6.3.13 Project 13 - Sludge Storage Tanks 2 and 3 Temporary Conversion to Digesters, Immediate

Temporarily modify existing Sludge Storage Tanks No. 1 and 2 to provide digestion while the digester is emptied, cleaned and modified as per Project 12 above. Total capital costs for this alternative are estimated at $116,160. There is no annual O&M, this alternative being temporary.

6.3.14 Project 14 - Sludge Storage Tank 3 Improvements, Immediate

The existing blower used to mix and aerate the sludge in this storage tank is not energy efficient and is old. Replacement of this unit with a speed controllable and more efficient blower will reduce O&M costs.

6.4 Project Cost Summary

The estimated total project costs (direct and indirect construction costs) are summarized in Table 6.4.1. Each line item includes design, permitting, bidding, direct construction cost, contingencies, funding administration, contract administration, and other miscellaneous cost.

TABLE 6.4.1
SUMMARY OF RECOMMENDED PROJECTS

PROJECT NAMES	PROJECT COSTS
Infiltration/Inflow Repairs	
Priority One I/I Repairs	$558,217
Priority Two I/I Repairs	$512,839
Total I/I Repairs	$1,071,056
Harbor/Lone Ranch Priority One Improvements	
Oak, Hemlock, Railroad, & Wharf, 18" Sewer - Project 1	$1,102,850
Rowland Lane to Mill Beach Road, 24" Sewer - Project 2	$724,010
Crissy Circle to Moore Street, 21" Sewer - Project 3	$441,820
Taylor Creek Pump Station - Project 4	$627,810
Hwy 101 Carpenterville Rd to Park View Dr., 8" FM - Project 5	$703,620
Mill Beach Road to WWTP, 24" Sewer - Project 6	$507,550
Total Collection System Priority One Improvements	$4,107,660
Sewer Main Replacements/Rehabilitation Priority Two	
Moore Street, 8" Sewer - Project 9	$248,110
Collins Street, 8" Sewer - Project 10	$137,670
Fifield Street to Mill Beach Road, 8" Sewer - Project 11	$340,210
Chetco Lane, 8" Sewer - Project 12	$196,780
Fern Avenue, 10" Sewer - Project 13	$198,440
Pioneer Road, 8" Sewer - Project 14	$197,640
Old County Rd., Pacific Ave. to Mendy St., 8" Sewer - Project 15	$204,760
Art Street, 8" Sewer - Project 16	$107,060
Pacific Avenue, Art ST. to Pioneer Rd., 8" Sewer - Project17	$172,640
Fir Street to Azalea park Road, 8" Sewer - Project18	$241,570
Fir Street, 8" Sewer - Project 19	$229,830
Oak St. & Pacific Ave. to Pioneer Rd, 15" Sewer - Project 20	$344,388
Spruce Street Near Linden Lane, 8" Sewer - Project 21	$113,562
Spruce Street to Woodland Court, 8" Sewer - Project 22	$284,650
Alder Street, 8" Sewer - Project 23	$260,980
Del Norte Lane, 8" Sewer - Project 24	$194,180
Hwy 101 5th & Elk to 12" Sew., 10" & 15" Sewer - Project 25	$475,920
Total Collection System Priority Two Replacements	$3,948,390

TABLE 6.4.1 – Cont.
SUMMARY OF RECOMMENDED PROJECTS

PROJECT NAMES	PROJECT COSTS
Pump Station Improvements	
Priority One Pump Station Repairs	$167,680
Priority Two Pump Station Repairs	$175,800
Priority Three Pump Station Repairs	$370,000
Total Pump Station Improvements	$713,480
WWTP Rehabilitation	
Plant Coatings	$120,400
Replace Mechanical Bar Screen, Immediate	$217,150
Replace Mechanical Bar Screen, Degritter & Classifier, 10 Yr.	$365,820
Primary Clarifier Rehab., 10 Yr.	$193,669
Trickling Filter Rehab., Immediate	$265,550
Reaeration System Rehab., Immediate	$119,320
Reaeration System Rehab., 10 Yr.	$68,838
Secondary Clarifier, WAS, RAS, Scum, 5 Yr.	$175,226
Secondary Clarifier, WAS, RAS, Scum, 10 Yr.	$161,857
UV System Replacement, Immediate	$239,600
Replace Digester Burner	$43,650
Modify Digest Operation Level	$116,100
Sludge Storage Tank 2 & 3 Temp Convert to Digest	$116,160
SST#3 Blower Replacement	$98,550
Total WWTP Rehabilitation	$2,301,889
All Categories Total	$12,142,475

6.5 Permits

Environmentally related permits (biological, wetlands or floodplain) will most likely not be required. Oregon DEQ approval is required for construction, installation, or modification of projects involving disposal systems, treatment works, and sewerage systems. An erosion and sediment control permit may also be required. Notify the State Historic Preservation Office (SHPO) of any potential for disturbing native soils.

6.6 Project Schedule

The following is a project schedule identifying the key activities and approximate implementation dates for the pump station projects.

Project Schedule

- Facilities Plan completed — November 2015
- Facilities Plan approved by Council — December 2015
- DEQ approval of facilities plan (required if CWSRF utilized) — March 2016
- Secure Funding for improvements (Including: Predesign Report, WWTP Environmental Report, WWTP Geotechnical Report) — July 2016
- Start Project Development (Kick-off Meeting) — September 2016
  - Site Surveys and Locates — November 2016
  - Predesign Report submittal — January 2017
  - DEQ approval of Predesign Report — March 2016
  - Attend One-Stop Meeting and secure construction funding — April 2017
  - DEQ approval of Environmental Report (if required) — June 2017
  - Design of project — July 2017
  - DEQ approval of plans — December 2017
  - Advertise for bids — January 2018
  - Improvement construction — March 2017 – December 2018
  - Facility commissioning — December 2018
  - Performance Evaluation — December 2018 – December 2019

6.7 Annual Operating Budget.

Yearly operational and maintenance costs for the collection system and WWTP will remain largely unchanged. Refer to Section 2.4 for the financial status and budget information.

SECTION 7: **FINANCING**

Most communities are unable to finance major infrastructure improvements without some form of governmental funding assistance such as low-interest loans or grants. In this section, a number of major federal and state funding programs and local funding mechanisms appropriate for the recommended improvements are discussed.

7.1 Grant and Loan Programs

Some level of outside funding assistance in the form of grants or low-interest loans may be necessary to make the proposed improvement projects affordable for the City of Brookings and its citizens. The amount and types of outside funding will dictate the amount of local funding that the City must secure. In evaluating grant and local programs, the major objective is to select a program, or a combination of programs, which are most applicable and available for the intended project.

A brief description of the major federal and state funding programs that are typically utilized to assist qualifying communities in the financing of infrastructure improvement programs is given below. Each of the government assistance programs has particular prerequisites and requirements. These assistance programs promote such goals as aiding economic development, benefiting areas of low to moderate income families, and providing for specific community improvement projects. With each program having its specific requirements, not all communities or projects may qualify for each of these programs.

Economic Development Administration (EDA) Public Works Grant Program

The EDA Public Works Grant Program, administered by the U.S. Department of Commerce, is aimed at projects which directly create permanent jobs or remove impediments to job creation in the project area. Thus, to be eligible for this grant, a community must be able to demonstrate the potential to create jobs from the project. Potential job creation is assessed with a survey of businesses to demonstrate the prospective number of jobs that might be created if the proposed project were completed.

Proposed projects must be located within an EDA-designated Economic Development District. Priority consideration is given to projects that improve opportunities for the establishment or expansion of industry and create or retain private sector jobs in both the near-term and the long-term. Communities that can demonstrate that the existing system is at capacity (i.e. moratorium on new connections) have a greater chance of being awarded this type of grant. EDA grants are usually in the range of 50 to 80 percent of the project cost; therefore some type of local funding is also required. Grants typically do not exceed one million dollars.

Water and Waste Disposal Loans and Grants (Rural Development)

The Rural Development Administration (Rural Development) manages the loans and grants for wastewater programs that used to be overseen by the Farmers Home Administration. The Rural Utilities Service (RUS) is one of three entities that comprise the USDA's Rural Development mission area. The RUS supports various programs that provide financial and technical assistance for development and operation of safe and affordable water supply systems and sewer and other forms of waste disposal facilities.

Rural Development has the authority to make loans to public bodies and non-profit corporations to construct or improve essential community facilities. Grants are also available to applicants who meet the Median Household Income (MHI) requirements. Eligible applicants must have a population of less than 10,000. Priority is given to public entities in areas smaller than 5,500 people to restore a deteriorating water supply, or to improve, enlarge, or modify a water facility and/or inadequate waste facility. Preference is given to requests that involve the merging of small facilities and those serving low-income communities.

In addition, borrowers must meet the following stipulations:

- Be unable to obtain needed funds from other sources at reasonable rates and terms.
- Have legal capacity to borrow and repay loans, to pledge security for loans, and to operate and maintain the facilities or services.
- Be financially sound and able to manage the facility effectively.
- Have financially sound facility based on taxes, assessments, revenues, fees, or other satisfactory sources of income to pay all facility costs including operation and maintenance, and ability to retire the indebtedness and to maintain a reserve.
- Water and waste disposal systems must be consistent with any development plans of state, multi-jurisdictional area, county, or municipality in which the proposed project is located. All facilities must comply with federal, state, and local laws including those concerned with zoning regulations, health and sanitation standards, and the control of water pollution.

Loan and grant funds may be used for the following types of improvements:

- Construct, repair, improve, expand, or otherwise modify waste collection, pumping, treatment, or other disposal facilities. Facilities to be financed may include such items as sewer lines, treatment plants (including stabilization ponds), storm sewer facilities, sanitary landfills, incinerators, and necessary equipment.
- Legal and engineering costs connected with the development of facilities.
- Other costs related to the development of the facility, including the acquisition of rights-of-way and easements, and the relocation of roads and utilities.
- Finance facilities in conjunction with funds from other agencies or those provided by the applicant.

Interim commercial financing will normally be used during construction and Rural Development funds will be available when the project is completed. If interim financing is not available or if the project cost is less than $50,000, multiple advances of Rural Development funds may be made as construction progresses.

The maximum term on all loans is 40 years. However, no repayment period will exceed any statutory limitation on the organization's borrowing authority, nor the useful life of the improvement of the facility to be financed. Interest rates are set quarterly and are based on current market yields for municipal obligations. Current interest rates may be obtained from any Rural Development office.

The following rates currently apply for the Rural Development program:

Market rate. Those applicants whose Median Household Income (MHI) in the service area is more than the $41,230 (Oregon non-metropolitan MHI) pay the market rate. The market rate is currently 3.375%.

Intermediate rate. The intermediate rate is paid by those applicants whose MHI of the service area is less than $41,230 but greater than $32,984. The intermediate rate is currently 2.75%.

Poverty line rate. Those applicants whose MHI of the service area is below $32,984 (80% of the non-metropolitan MHI) pay the lowest rate. Improvements must also be to correct a regulatory violation or health risk issue to qualify for this lowest rate. The current poverty line rate is 2.0%.

Maximum grant amounts, based on MHI, are provided in Table 7.1.1. The grants are calculated on the basis of eligible costs that do not include the costs attributable to reserve capacity or interim financing. In addition, grant funds cannot be used to reduce total user costs below that of comparable communities funded by RUS. Currently, RUS will not provide grant funding if the total of operation, maintenance costs, and debt servicing for a community is under the threshold of $43 per EDU per month.

TABLE 7.1.1
MAXIMUM RURAL DEVELOPMENT GRANT FUNDS
BASED ON MEDIAN HOUSEHOLD INCOME

Median Household Income (MHI)	Maximum Grant [(a)]	Interest Rate [(b)]
<$32,984	75%	2.0%
$32,984 - $41,230	45%	2.627%
>$41,230	0%	3.375%

[(a)] MHI<32,984 may be considered for a grant up to 75% of eligible project cost if the project is needed to alleviate a health or sanitary problem.
[(b)] Rates are current as of this quarter.

The 2009-2013 American Community Survey lists Brookings as having an MHI of $43,389. At this MHI, the City is not eligible for a grant. The City may be eligible for a RUS loan at a loan rate of 3.375%. However, this rate is dependent on the existence of a documented regulatory violation or health risk.

There are other restrictions and requirements associated with these loans and grants. If the City becomes eligible for grant assistance, the grant will apply only to eligible project costs. Additionally, grant funds are only available after the City has incurred long-term debt resulting in an annual debt service obligation equal to 0.5% of the MHI. In addition, an annual funding allocation limits the Rural Development funds. To receive a Rural Development loan, the City must secure bonding authority, usually in the form of general obligation or revenue bonds.

Applications for financial assistance are made at area offices of Rural Development. For additional information on Rural Development loans and grant programs, call 541-673-0136 or visit the RUS website at http://www.rurdev.usda.gov/UWEP_HomePage.hmtl. The Oregon Rural Development website is http://www.rurdev.usda.gov/OR_Home.html.

Technical Assistance and Training Grants (TAT)

Available through the USDA Rural Utilities Service (RUS) as part of water and waste disposal programs, TAT grants are intended to provide technical assistance and training to associations on a wide range of issues relating to the delivery of water and waste disposal services.

Rural communities with populations of less than 10,000 persons are eligible, along with private, nonprofit organizations that have been granted tax-exempt status by the IRS.

TAT funds may be used for the following activities:

- Identify and evaluate solutions to water and/or waste-related problems of associations in rural areas.
- Assist entities with preparation of applications for water and waste disposal loans and grants.
- Provide training to association personnel in order to improve the management, operation and maintenance of water and/or waste disposal facilities.
- Pay expenses related to providing the technical assistance and/or training.

Grants may be made for up to 100% of the eligible project costs. Applications are filed with any USDA Rural Development office. For additional information on Rural Development loans and grant programs, call 541-673-0136 or visit the RUS website at http://www.rurdev.usda.gov/UWP-wwtat.htm.

(Oregon) Community Development Block Grant (CDBG) Program

The Community Development Block Grant Program section of the Infrastructure Finance Authority (IFA) administers the CDBG Program. Grants and technical assistance are available to develop livable urban communities for persons of low and moderate incomes by expanding economic opportunities and providing housing and suitable living environments.

Non-metropolitan cities and counties in rural Oregon can apply for and receive grants. Oregon tribes, urban cities (Ashland, Bend, Corvallis, Eugene, Gresham, Hillsboro, Medford, Portland, Salem and Springfield) and counties (Clackamas, Multnomah, Washington) receive funds directly from HUD.

All projects must meet one of three national objectives:

1. The proposed activities must benefit low and moderate income individuals.
2. The activities must aid in the prevention or elimination of slums or blight.
3. There must be an urgent need that poses a serious and immediate threat to the health or welfare of the community.

Funding amounts are based on:

- The applicant's need
- The availability of funds
- Other restrictions defined in the program's guidelines

The following are the maximum grants possible for any individual project, by category:

- Economic Development: $750,000
- Microenterprise: $100,000
- Public Works
  - Water and Wastewater Improvements: $3,000,000 except preliminary/engineering planning grants: $150,000
  - Downtown Revitalization: $400,000
  - Off-site Infrastructure: $225,000
- Community/Public Facilities: $1,500,000
- Community Capacity/Technical Assistance: no specific per-award-limit but limited overall funds
- Emergency Grants: $500,000
- Regional Housing Rehabilitation: $400,000
- Emergency Projects: $500,000

For additional information on the CDBG programs, call 866-467-3466 or visit the IFA website at http://www.orinfrastructure.org/Learn-About-Infrastructure-Programs/Interested-in-a-Community-Development-Project/Community-Development-Block-Grant/.

Oregon Special Public Works Fund

The Special Public Works Fund (SPWF) provides funds for publically owned facilities that support economic and community development in Oregon. Special Public Works Funds provide funding for construction and/or improvement of infrastructure needed to support industrial, manufacturing and certain types of commercial development. Funds are available to public entities for:

- Planning
- Designing
- Purchasing
- Improving and constructing publically owned facilities
- Replacing publically owned essential community facilities
- Emergency projects as a result of a disaster

Public agencies that are eligible to apply for funding are:

- Cities
- Counties
- County service districts (organized under ORS Chapter 451)
- Tribal councils
- Ports
- Districts as defined in ORS 198.010
- Airport districts (ORS 838)

Facilities and infrastructure projects that are eligible for funding are:

- Airport facilities
- Buildings and associated equipment
- Restoration of environmental conditions on publically owned industrial lands
- Port facilities, wharves and docks
- The purchase of land, rights-of-way and easements necessary for a public facility

- Telecommunications facilities
- Railroads
- Roadways and bridges
- Solid waste disposal sites
- Storm drainage systems
- Wastewater systems
- Water systems

Loans
Loans for development (construction) projects range from less than $100,000 to $10 million. The Infrastructure Finance Authority offers very attractive interest rates that reflect tax-exempt market rates for highly qualified borrowers. Initial loan terms can be up to 25 years or the useful life of the project, whichever is less.

Grants
Grants are available for construction projects that create or retain trade-sector jobs. They are limited to $500,000 or 85 percent of the project cost, whichever is less, and are based on up to $5,000 per eligible job created or retained.

Limited grants are available to plan industrial site development for publically-owned sites and for feasibility studies.

For additional information on IFA programs, call 1-503-986-0123 or visit the IFA website at http://www.orinfrastructure.org/Learn-About-Infrastructure-Programs/Interested-in-a-Community-Development-Project/Special-Public-Works-Fund/.

Water/Wastewater Financing Program

Water/wastewater financing is available for construction and/or improvement of water and wastewater systems to meet state and federal standards. This loan program funds the design and construction of public infrastructure needed to ensure compliance with the Clean Water Act.

The public entities that are eligible to apply for the program are:

- Cities
- Counties
- County service districts (organized under ORS Chapter 451)
- Tribal councils
- Ports
- Special districts as defined in ORS 198.010

The proposed project must be owned and operated by a public entity as listed above. Allowable funded project activities may include:

- Reasonable costs for construction improvement or expansion of drinking water system, wastewater system or storm water system
- Water source, treatment, storage and distribution
- Wastewater collection, treatment and disposal facilities, storm water system
- Purchase of rights-of-way and easements necessary for construction
- Design and construction engineering

- Planning/technical assistance for small communities

To be eligible for funding:

- A system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency or is for a facility plan or study required by a regulatory agency.

- A registered Professional Engineer will be responsible for the design and construction of the project.

Funding and Uses
Loan and grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources and other factors).

Loans
Program guidelines, project administration, loan terms and interest rates are similar to the Special Public Works Fund program. The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. The maximum loan amount is $10 million per project through a combination of direct and/or bond funded loans. Recently IFA is offering lower, reduced interest rates for municipalities whose household income is less than the statewide median income. The current terms of this loan are for 25 years at 1.94 percent interest.

Loans are generally repaid with utility revenues or voter-approved bond issues. A limited tax general obligation pledge also may be required. "Creditworthy" borrowers may be funded through the sale of state revenue bonds.

Grants
Grant awards up to $750,000 may be awarded based on a financial review.

An applicant is not eligible for grant funds if the applicant's annual median household income is equal or greater than 100 percent of the state average median household income for the same year.

Funding for Technical Assistance
The Infrastructure Finance Authority offers technical assistance with financing for municipalities with populations of less than 15,000. The funds may be used to finance preliminary planning, engineering studies and economic investigations.

Technical assistance projects must be in preparation for a construction project that is eligible and meets the established criteria.

- Grants up to $20,000 may be awarded per project.
- Loans up to $50,000 may be awarded per project.

Interested applicants should contact the Oregon Business Development Department (OBDD) prior to submitting an application. Applications are accepted year-round. For additional information on this IFA program, call 503-986-0123 or visit the IFA website at http://www.orinfrastructure.org/Learn-About-Infrastructure-Programs/Interested-in-a-Water-or-Wastewater-Improvement-Project/water-wastewater-financing/.

Department of Environmental Quality, Clean Water State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund loan program is administered by DEQ and provides low-cost loans for the planning, design or construction of various projects that prevent or mitigate water pollution. The Oregon Department of Environmental Quality administers the program. Eligible agencies include Indian tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities.

Six different types of loans are available within the program, including loans for planning, design, construction, emergencies, urgent repairs and local community projects. A portion of the fund is reserved for small communities, planning or green projects.

Interest rates for the loan program change quarterly based on a percentage of the national municipal bond rate. Those percentages vary from 25 percent to 65 percent of the bond rate. For example, with a quarterly bond rate of 4.1 percent, CWSRF interest rates range from 1.0 percent to 2.7 percent depending on the length of the loan repayment period.

Current CWSRF interest rates range from just over 1% to 2.63%, depending on the terms of the loans. Different interest rates and other financial requirements apply to different loans. Rates are adjusted quarterly, based on the average Bond Buyer Rates of the previous quarter as published by the Federal Reserve. When a loan is signed, the interest rate is fixed for the life of the loan. Below are 2013 first-quarter interest rates for small communities with less than statewide MHI.

TABLE 7.1.2
CWSRF INTEREST RATES

Loan Type	Repayment Term	Annual Interest Rate
Planning	5 years	0.94%
Design/Construction	5 years	0.94%
Design/Construction	10 years	2.06%
Design/Construction	15 years	2.25%
Design/Construction	30 years	2.39%

All eligible proposed projects are ranked based on their application information. Points are assigned based on specific ranking criteria, which include: 1) the anticipated benefit for water quality or public health; 2) potential water quality or public health consequences of not funding the project; and 3) other considerations such as education and outreach. The DEQ website lists detailed ranking criteria.

The Intended Use Plan is one part of Oregon's annual SRF capitalization grant application. This plan includes lists of eligible projects ranked in priority order. Projects which are allocated funds are placed on the Funded List. Unfunded projects are placed on the Planning List to receive funds if any of the Funded List projects do not complete the loan process. Projects identified on the Funded List from prior years which have not been initiated are placed on a Supplemental List.

Obtaining SRF funding requires the submission of an application, preparation of an environmental report on the project, a land use compatibility statement from a county planning official, and a copy of the user charge system. There are additional requirements depending on the nature of the project. An applicant needs to contact a DEQ Project Officer to discuss the project and find out what is required.

For additional information on this and other DEQ programs, call 800-452-4011 or visit the DEQ website at http://www.deq.state.or.us/wq/loans/loans.htm.

Oregon Department of Energy, Small Scale Energy Loan Program (SELP)

The SELP program offers loans to projects whose purpose is to promote energy conservation and renewable energy resource development. Eligible applicants include cities, counties, special districts, individuals, and non-profit groups. Loans will cover up to 100% of construction costs, including engineering, fees, and studies. The finished project must at least break even in power costs.

The program offers low-interest loans for projects that:

- Conserve natural gas, electricity, oil, or other source of energy
- Produce energy from renewable resources such as water, wind, geothermal, solar, biomass, waste materials or waste heat
- Use recycled materials to create products

Interested parties should contact the Oregon Office of Energy for details. For additional information on the Office of Energy programs, call 503-378-4040 or visit the Office of Energy website at http://oregon.gov/ENERGY/.

7.2 Local Funding Sources

The amount and type of local funding obligations for infrastructure improvements will depend, in part, on the amount of grant funding anticipated and the requirements of potential loan funding. Local revenue sources for capital expenditures include *ad valorem* taxes, various types of bonds, wastewater service charges, connection fees, and system development charges. Local revenue sources for operating costs include *ad valorem* taxes and wastewater service charges. The following sections identify those local funding sources and financing mechanisms that are most common and appropriate for the improvements identified in this study.

General Obligation Bonds

A General Obligation (G.O.) bond is backed by the full faith and credit of the issuer. For payment of the principal and interest on the bond, the issuer may levy *ad valorem* general property taxes. Such taxes are not needed if revenue from assessments, user charges or other sources are sufficient to cover debt service. Oregon Revised Statutes limit the maximum term to 40 years for cities. Except in the event that Rural Development Administration will purchase the bonds, the realistic term for which general obligation bonds should be issued is 15 to 20 years. Under the present economic climate, the lower interest rates will be associated with the shorter terms.

Financing of wastewater system improvements by general obligation bonds is usually accomplished by the following procedure:

- Determination of the capital costs required for the improvement
- An election authorizing the sale of general obligation bonds
- Following voter approval, the bonds are offered for sale
- The revenue from the bond sale is used to pay the capital costs associated with the projects

From a fundraising viewpoint, general obligation bonds are preferable to revenue bonds in matters of simplicity and cost of issuance. Since the bonds are secured by the power to tax, these bonds usually command a lower interest rate than other types of bonds. General obligation bonds lend themselves readily to competitive public sale at a reasonable interest rate because of their high degree of security, their tax-exempt status, and their general acceptance.

These bonds can be revenue-supported, wherein a portion of the user fee is pledged toward payment of the debt service. Using this method, the need to collect additional property taxes to retire the obligated bonds is eliminated. Such revenue-supported general obligation bonds have most of the advantages of revenue bonds, but also maintain the lower interest rate and ready marketability of general obligation bonds. Because the users of the water system pay their share of the debt load based on their water usage rates, the share of that debt is distributed in a fair and equitable manner.

Advantages of general obligation bonds over other types of bonds include:

- The laws authorizing general obligation bonds are less restrictive than those governing other types of bonds.
- By the levying of taxes, the debt is repaid by all property benefited and not just the system users.
- Taxes paid in the retirement of these bonds are IRS-deductible.
- General obligation bonds offer flexibility to retire the bonds by tax levy and/or user charge revenue.

The disadvantage of general obligation bond debt is that it is often added to the debt ratios of the underlying municipality, thereby restricting the flexibility of the municipality to issue debt for other purposes. Furthermore, general obligation bonds are normally associated with the financing of facilities that benefit an entire community and must be approved by a majority vote, and often necessitate extensive public information programs. A majority vote often requires waiting for a general election in order to obtain an adequate voter turnout. Waiting for a general election may take years, and too often a project needs to be undertaken in a much shorter amount of time.

Revenue Bonds

Revenue bonds offer some advantages over general obligation bonds and are becoming a more frequently used option. Revenue bonds are payable solely from charges made for the services provided. These bonds cannot be paid from tax levies or special assessments; their only security is the borrower's promise to operate the system in a way that will provide sufficient net revenue to meet the debt service and other obligations of the bond issue.

Many communities prefer revenue bonding, as opposed to general obligation bonding, because it insures that no tax will be levied. In addition, debt obligation will be limited to system users since repayment is derived from user fees. Another advantage of revenue bonds is that they do not count against a municipality's direct debt, but instead are considered "overlapping debt." This feature can be a crucial advantage for a municipality near its debt limit or for the rating agencies, which consider very closely the amount of direct debt when assigning credit ratings. Revenue bonds also may be used in financing projects extending beyond normal municipal boundaries. These bonds may be supported by a pledge of revenues received in any legitimate and ongoing area of operation, within or outside the geographical boundaries of the issuer.

Successful issuance of revenue bonds depends on the bond market evaluation of the revenue pledged. Revenue bonds are most commonly retired with revenue from user fees. Recent legislation has eliminated the requirement that the revenues pledged to bond payment have a direct relationship to the services financed by revenue bonds. Revenue bonds may be paid with all or any portion of revenues derived by a public body or any other legally available monies. In addition, if additional security to finance revenue bonds is needed, a public body may mortgage grant security and interests in facilities, projects, utilities or systems owned or operated by a public body.

Normally, there are no legal limitations on the amount of revenue bonds to be issued, but excessive issue amounts are generally unattractive to bond buyers because they represent high investment risks. In rating revenue bonds, buyers consider the economic justification for the project, reputation of the borrower, methods and effectiveness for billing and collecting, rate structures, provision for rate increases as needed to meet debt service requirements, track record in obtaining rate increases historically, adequacy of reserve funds provided in the bond documents, supporting covenants to protect projected revenues, and the degree to which forecasts of net revenues are considered sound and economical.

Municipalities may elect to issue revenue bonds for revenue-producing facilities without a vote of the electorate (ORS 288.805-288.945). In this case, certain notice and posting requirements must be met and a 60-day waiting period is mandatory. A petition signed by five percent of the municipality's registered voters may cause the issue to be referred to an election.

Capital Construction (Sinking) Fund

Sinking funds are often established by budgeting for a particular construction purpose. Budgeted amounts from each annual budget are carried in a sinking fund until sufficient revenues are available for the needed project. Such funds can also be developed with revenue derived from system development charges or serial levies.

The disadvantage of a sinking fund is that it is usually too small to undertake any significant projects. Also, setting aside money generated from user fees without a designated and specified need is not generally accepted in a municipal budgeting process.

System Development Charges

A system development charge (SDC) is essentially a fee collected as each piece of property is developed, and is used to finance the necessary capital improvements and municipal services required by the development. Such a fee can only be used to recover the capital costs of infrastructure. Operating, maintenance, and replacement costs cannot be financed through system development charges.

Two types of charges are permitted under the Oregon Systems Development Charges Act, improvement fees and reimbursement fees. SDCs charged before construction are considered improvement fees and are used to finance capital improvements to be constructed. After construction, SDCs are considered reimbursement fees and are collected to recapture the costs associated with capital improvements already constructed or under construction. A reimbursement fee represents a charge for utilizing excess capacity in an existing facility paid for by others. The revenue generated by this fee is typically used to pay back existing loans for improvements.

Under the Oregon SDC Act, methodologies for deriving improvement and reimbursement fees must be documented and available for review by the public. A capital improvement plan must also be prepared which lists the capital improvements that may be funded with improvement fee revenues, and the estimated cost and

timing of each improvement. Thus, revenue from the collection of SDCs can only be used to finance specific items listed in a capital improvement plan. In addition, SDCs cannot be assessed on portions of the project paid for with grant funding.

Ad Valorem Taxes

Ad valorem property taxes are often used as a revenue source for utility improvements. Property taxes may be levied on real estate, personal property or both. Historically, *ad valorem* taxes were the traditional means of obtaining revenue to support all local governmental functions.

A marked advantage of these taxes is the simplicity of the system; it requires no monitoring program for developing charges, additional accounting and billing work is minimal, and default on payments is rare. In addition, *ad valorem* taxation provides a means of financing that reaches all property owners that benefit from a water system, whether a property is developed or not. The construction costs for the project are shared proportionally among all property owners based on the assessed value of each property.

Ad valorem taxation, however, is less likely to result in individual users paying their proportionate share of the costs as compared to their benefits. Public hearings an election with voter approval would be required to implement *ad valorem* taxation.

User Fees

User fees can be used to retire general obligation bonds, and are commonly the sole source of revenue to retire revenue bonds and to finance operation and maintenance. User fees represent monthly charges of all residences, businesses, and other users that are connected to the wastewater system. These fees are established by resolution and may be modified, as needed, to account for increased or decreased operating and maintenance costs. User fees may be based on a metered volume of water consumption and/or on the type of user (e.g. residential, commercial, schools etc.).

Assessments

Under special circumstances, the beneficiary of a public works improvement may be assessed for the cost of a project. For example, the City may provide some improvements or services that directly benefit a particular development. The City may choose to assess the industrial or commercial developer to provide up-front capital to pay for the administered improvements.

7.3 Financing Strategy

A financing strategy or plan must provide a mechanism to generate capital funds in sufficient amounts to pay for the proposed improvements over the relatively short duration in design and construction, generally two years. The financing strategy must also identify the manner in which annual revenue will be generated to cover the expense for long-term debt repayment and the on-going operation and maintenance of the system.

The objectives of a financial strategy include the following:

- Identify the capital improvement cost for the project and the estimated expense for operation and maintenance.
- Evaluate the potential funding sources and select the most viable program.

- Determine the availability of outside funding sources and identify the local cost share.
- Determine the cost to system users to finance the local share and the annual cost for operation and maintenance.

Project Expenses

Identified in Section 6 were a total of $1,071,056 for Infiltration/Inflow repairs; $4,107,660 for Harbor/Lone Ranch sewer improvements; $3,948,390 for needed sewer main replacements or rehabilitations; $713,480 for the pump station projects; and $2,301,889 for the WWTP upgrades capital improvement project costs identified in Section 6. These projects together total $12,142,475. The identified projects replace or repair existing equipment and facilities, and are expected to reduce the annual operations and maintenance costs to the City.

Funding Sources

With any of the proposed funding sources within the financial strategy, the City is advised to confirm specific funding amounts with the appropriate funding agencies prior to making local financing arrangements.

The City is currently not under a Mutual Agreement and Order (MAO) with DEQ and has no current violations. While a documented health hazard may make the City eligible for grant funding from the standpoint of addressing current violations, the current median household income makes it unlikely to qualify for Rural Development grants. It is recommended that the City attend a One-Stop Meeting after regulatory approval of the final WWFP in order to assess the funding environment at that time.

Most of the grant programs require that the project address a DEQ issued violation, potential violation or order before the project is eligible for funding.

Total charge per EDU is based on the sum of the following:

- Sewer Base Rate: $58.88
- Asset Replace Rate: $3.76

Table 7.3.1 is a potential funding scenario. This scenario shows the various terms associated assuming an IFA Grant and a DEQ low-interest loan. Other funding scenarios may be proposed in a One-Stop Meeting.

TABLE 7.3.1
POTENTIAL FUNDING SCENARIOS

Project Description	Cost	Gap
Infiltration/Inflow Repairs	$1,071,056	
Harbor/Lone Ranch Sewer Improve.	$4,107,660	
Sewer Main Replacements/Rehab.	$3,948,390	
Pump Station Improvements	$713,480	
WWTP Rehabilitation	$2,301,889	
Total	$12,142,475	$4,296,475

	Loan Amount	Grant or Principal Forgiveness	Years	Interest Rate %
Grant & Loan				
IFA – CDBG/WW	$4,975,000	$2,871,000	25	1.54
DEQ - CWSRF	$7,346,000	$500,000	30	1.97
USDA / IFA – RUS/WW	$5,906,000	$1,940,000	40/25	2.875/1.540
IFA - WW	$7,196,000	$650,000	25	1.540
ALL	$3,767,000	$4,079,000	25/30/40	1.540/1.970/2.875

User Rates

This discussion will consider the least costly potential alternative. Once the City has determined what funding is available, the current rate structure should be revised to determine the actual impact to ratepayers. All grants, loans, existing debts and reserves, and surpluses should be taken into account when calculating the final impact to ratepayers. Table 7.3.2 below lists potential funding scenarios.

TABLE 7.3.2
WWTP EXPANSION FUNDING SOURCE USER RATES

Source of Funding	Current O&M and Debt. Cost/EDU per Month	New Loan Cost/EDU per Month	Required Min. Rate per Month
IFA	$67.77	$3.69	$71.46
DEQ	$67.77	$5.00	$72.77
USDA IFA	$67.77	$3.90	$71.67
IFA	$67.77	$5.35	$73.11
ALL	$67.77	$2.52	$70.29

User Rates

This discussion will consider the least costly potential alternative. Once the City has determined what funding is available, the current rate structure should be revised to determine the actual impact to ratepayers. All grants, loans, existing debts and reserves, and surpluses should be taken into account when calculating the final impact to ratepayers.

With any of the proposed funding sources within the financial strategy, the City is advised to confirm specific funding amounts with the appropriate funding agencies prior to making local financing arrangements. A One-Stop Meeting with funding agencies is recommended as soon as the City has made a firm commitment as to schedule and the extent of capital improvements. The total anticipated sewer cost per EDU is dependent on the amount of grant funding available. User rates may vary from $70.29 per EDU per month to $73.11 per EDU per month.

Volume 2

CITY OF BROOKINGS

WASTEWATER FACILITIES PLAN

Prepared By:

The Dyer Partnership

Engineers & Planners, Inc.

Engineers, Planners, Surveyors,

Water, Wastewater, Transportation

Project 145.49 November 2015

City of Brookings

Curry County, Oregon

WASTEWATER FACILITIES PLAN

November 2015

Project No. 145.49

The Dyer Partnership
Engineers & Planners, Inc.

1330 Teakwood Avenue
Coos Bay, OR 97420
(541) 269-0732 Fax (541) 269-2044
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Table of Contents

VOLUME 2

SECTION 1: PROJECT PLANNING

1.1 Introduction and Location 1-1
Figure 1.1.1 Planning Area 1-3
Figure 1.1.2 Terrain Map 1-4

1.2 Environmental Resources 1-5
Figure 1.2.1 Monthly Temperature Data 1-5
Figure 1.2.2 Monthly Precipitation Data 1-6
Figure 1.2.3 Wetlands Inventory 1-8
Figure 1.2.4 100-Year Flood Plain 1-9
Figure 1.2.5 Seismic Map 1-10
Figure 1.2.6 Earthquake Hazard Map 1-10
Figure 1.2.7 Tsunami Risk Area 1-11
Figure 1.2.8 Landslide Risk Area 1-12

1.3 Population Trends 1-13
Figure 1.3.1 Population Forecast 1-14
Table 1.3.1 Population Forecast Table 1-14

1.4 Community Engagement 1-15

SECTION 2: EXISTING FACILITIES

2.1 Location Map 2-1

2.2 History 2-1

2.2.1 General 2-1
2.2.2 Wastewater Pump Stations and Harbor Sanitary District Contribution 2-1
2.2.3 Wastewater Treatment Plant Liquid Stream 2-1
2.2.4 Wastewater Treatment Plant Solids Handling 2-2

2.3 Condition of Existing Facilities 2-2

2.3.1 Existing Collection System 2-2

2.3.1.1 Inventory of Collection System 2-2
Table 2.3.1.1.1 Wastewater Collection System Inventory 2-11
Figure 2.1.1 Existing Collection System 2-3
Figure 2.1.2 Existing Collection System 2-4
Figure 2.1.3 Existing Collection System 2-5
Figure 2.1.4 Existing Collection System 2-6
Figure 2.1.5 Existing Collection System 2-7
Figure 2.1.6 Existing WWTP Site 2-8
Figure 2.1.7 Flow Schematic – Liquid Stream 2-9
Figure 2.1.8 Flow Schematic – Solid Stream 2-10

2.3.1.2 Infiltration and Inflow 2-11
2.3.1.3 Smoke Testing 2-11
Table 2.3.1.3.1 Smoke Testing Number and Type of Deficiencies 2-12
Figure 2.3.1.3.5 Smoke Testing Results Summary, Number of Violations by Type 2-12
Table 2.3.1.3.2 Report Numbers According to Deficiency Type 2-13
2.3.1.4 Flow Mapping 2-14
2.3.1.5 Collection Sewer Summary 2-14
2.3.1.6 Pump Stations 2-14
2.3.1.7 Miscellaneous Pump Station Items 2-16

2.3.2 Existing Treatment Facilities 2-17
2.3.2.1 Headworks 2-17
Table 2.3.2.1.1 Bar Screens and Grit Removal Chamber Capacities 2-17
2.3.2.2 Primary Sedimentation 2-17
Table 2.3.2.2.1 Primary Sludge Clarifiers Capacity 2-18
2.3.2.3 Primary Sludge and Scum Pumping 2-18
Table 2.3.2.3.1 Primary Sludge and Scum Pump Capacities 2-19
2.3.2.4 Trickling Filter 2-19
Table 2.3.2.4.1 Trickling Filter Capacities 2-19
2.3.2.5 Snail Removal 2-19
Table 2.3.2.5.1 Snail Removal and Pump Capacities 2-20
2.3.2.6 Solids Contact/Sludge Re-aeration Basins 2-20
Table 2.3.2.6.1 Basin and Aeration Blower Capacities 2-20
2.3.2.7 Secondary Clarifiers 2-21
Table 2.3.2.7.1 Secondary Clarifier Capacities 2-21
2.3.2.8 Return Activated Sludge (RAS) and Clarifier Drain Pumps 2-21
Table 2.3.2.8.1 RAS and Clarifier Drain Pump Capacities 2-21
2.3.2.9 Disinfection 2-21
Table 2.3.2.9.1 2-22
2.3.2.10 Sludge Thickener 2-22
Table 2.3.2.10.1 Sludge Thickener Capacities 2-22
2.3.2.11 Digester 2-22
Table 2.3.2.11.1 Digester Capacities 2-23
2.3.2.12 Sludge Storage 2-23
Table 2.3.2.12.1 Sludge Capacities 2-24
2.3.2.13 Sludge (Biosolids) Dewatering 2-24
Table 2.3.2.13.1 Sludge Dewatering System Capacity 2-24
2.3.2.14 SCADA System 2-24
2.3.2.15 Electrical System Including Generator 2-24
2.3.2.16 Plant Water Pumps 2-25
Table 2.3.2.16.1 Plant Water Pressure 2-25

2.4 Financial Status 2-25

2.4.1 Financial Statement 2-25
Table 2.4.1.1 Wastewater Revenue and Resources 2-25
Table 2.4.1.2 Wastewater Expenditures 2-26
Table 2.4.1.3 SRF Revenue and Resources 2-26
Table 2.4.1.4 SRF Expenses 2-26
Table 2.4.1.5 SDC Revenue and Resources 2-27
Table 2.4.1.6 SDC Expenses 2-27
2.4.2 Current Rate Schedule 2-27
Table 2.4.2.1 Monthly Sewer Rates 2-27
2.4.3 Annual O&M Costs 2-28
Table 2.4.3.1 Wastewater Collection System O&M 2-28
Table 2.4.3.2 Wastewater Treatment O&M 2-29
2.4.4 Capital Improvement Program 2-29

Table 2.4.4.1 Wastewater Collection System Capital Improvements 2-29
Table 2.4.4.2 Wastewater Treatment Capital Improvements 2-30
2.4.5 Debts and Reserve Accounts 2-30
Table 2.4.5.1 Wastewater Loan Fund Revenue and Resources 2-30
Table 2.4.5.2 Wastewater Loan Fund Expenses 2-30
2.4.6 Tabulation of Users by Category 2-30
Table 2.4.6.1 User Types and Equivalent Dwelling Units (EDUs) 2-31

2.5 Water/Energy/Waste Audits 2-31
2.5.1 General WWTP 2-31

SECTION 3: NEED FOR PROJECT
3.1 Health, Sanitation and Security 3-1
3.1.1 Current NPDES Permit Requirements 3-1
3.1.2 Potential Future Regulatory Issues 3-3

3.2 Design Criteria and Considerations 3-3
3.2.1 Design Period 3-3
3.2.2 Collection System 3-3
3.2.3 Wastewater Treatment Facility 3-4

3.3 Aging Infrastructure 3-7
3.3.1 Infiltration and Inflow 3-7
Figure 3.3.1.1 WWTP Plant Flow Trends 2010-2013 3-8
Table 3.3.1.1 I/I Analysis Summary 3-9

3.4 Reasonable Growth 3-9
Table 3.4.1 City of Brookings Storm Events 3-10
3.4.1 Dry Weather Flow 3-11
Figure 3.4.1.1 Average Plant Flow vs. Winter Rainfall 3-11
3.4.2 Wet Weather Flow 3-12
Figure 3.4.2.1 Rainfall Storm Event vs. Plant Inflow 3-13
Figure 3.4.2.2 Brookings WWTP (2013) Existing Inflow Rates 3-14
Table 3.4.2.1 Brookings WWTP (2013) Existing Influent Flow Rates 3-14

3.5 Wastewater Composition 3-15
Table 3.5.1 WWTP Influent Concentrations and Loads 3-15
Table 3.5.2 Wastewater Design Compostion Values 3-16

3.6 Projected Wastewater Characteristics 3-16
Figure 3.6.1 Future Peak Flows and Existing Flows 3-17
Table 3.6.1 Wastewater Flows 3-17
Table 3.6.2 Wastewater Treatment Design Values 3-18

SECTION 4: ALTERNATIVES CONSIDERED
4.1 Gravity Collection System 4-1
4.1.1 Inflow/Infiltration Reduction 4-1
Table 4.1.1.1 Priority 1 I/I Projects 4-4
Table 4.1.1.2 Priority 2 I/I Projects 4-4
Figure 4.1.1.1 I/I Reduction Projects 4-5
Figure 4.1.1.2 I/I Reduction Projects 4-6
Figure 4.1.1.3 I/I Reduction Projects 4-7
Figure 4.1.1.4 I/I Reduction Projects 4-8
Figure 4.1.1.5 I/I Reduction Projects 4-9
4.1.2 Priority 1-New Sewer Improvements to Service Lone Ranch Vicinity & Harbor Sanitary District 4-10

Figure 4.1.2.1 New Sewer Replacement/Rehabilitation 4-13
Figure 4.1.2.2 New Sewer Replacement/Rehabilitation 4-14
Figure 4.1.2.3 New Sewer Replacement/Rehabilitation 4-15
Figure 4.1.2.4 New Sewer Replacement/Rehabilitation 4-16
Figure 4.1.2.5 New Sewer Replacement/Rehabilitation 4-17
Table 4.1.2.1 Priority 1-Project Costs to Serve Lone Ranch & Vicinity 4-18
4.1.3 Priority 2-Sewer Main Replacements/Rehabilitation 4-18
Table 4.1.3.1 Priority 2-Costs for Sewer Main Replacement/Rehabilitation 4-21

4.2 Pump Stations 4-22
4.2.1 Priority 1-Pump Station Improvements 4-22
Table 4.2.1.1 Pump Station Improvements Priority 1 4-24
4.2.2 Priority 2-Pump Station Improvements 4-24
Table 4.2.2.1 Pump Station Improvements Priority 2 – Immediate 4-26
Table 4.2.2.2 Pump Station Improvements Priority 2 – Future 4-26
4.2.3 Priority 3-Pump Station Improvement Items 4-26
Table 4.2.3.1 Pump Station Improvements Priority 3 4-28
Table 4.2.3.2 Pump Station Improvements Priority 3 – Future 4-29

4.3 WWTP Upgrades 4-29
4.3.1 Alternatives Considered But Found Non-Viable 4-29
4.3.1.1 High Pressure Gas Storage Tank 4-29
4.3.1.2 Low Pressure Gas Storage Tank 4-30
4.3.1.3 Gas Dome Addition for Gas Storage 4-30
4.3.1.4 Outside pipe Insulation to Conserve Heat 4-31
4.3.1.5 Digester Roof Insulation to Conserve Heat 4-31
4.3.1.6 Replace Existing Boiler with New Co-Burn Boiler 4-32
4.3.1.7 Improved Digester Mixing 4-32
4.3.1.8 Feeding of F.O.G. to Digester 4-32
4.3.1.9 Electrical Generation from Excess Methane 4-33

4.4 Viable WWTP Upgrades 4-33
4.4.1 Coatings and Corrosion Protection 4-34
Table 4.4.1.1 Corrosion Protection 4-35
4.4.2 Headworks 4-35
Table 4.4.2.1 Replace Mechanical Bar Screen - Immediate 4-35
Table 4.4.2.2 Replace Mechanical Bar Screen, Degritter and Classifier Rehabilitation - 10-year Future 4-36
4.4.3 Primary Clarifiers 4-36
Table 4.4.3.1 Primary Clarifier Rehabilitation – 10 Year Future 4-36
4.4.4 Trickling Filter 4-37
Table 4.4.4.1 Cost Estimate – Trickling Filter Rehabilitation 4-37
4.4.5 Re-eration/Solids Contact Process 4-37
Table 4.4.5.1 Cost Estimate Re-aeration System Rehabilitation-Immediate 4-38
Table 4.4.5.2 Cost Estimate Re-aeration System Rehabilitation-10-Year 4-38
4.4.6 Secondary Clarifiers, Scum, RAS and WAS Pumping 4-38
Table 4.4.6.1 Cost Estimate Secondary Clarifier, WAS, RAS and Scum Pumps - 5-year 4-39
Table 4.4.6.2 Cost Estimate Secondary Clarifier, WAS, RAS and Scum Pumps - 10-year 4-39
4.4.7 UV Disinfection System 4-39
Table 4.4.7.1 Cost Estimate - UV System Replacement - Immediate 4-40
4.4.8 Replace Digester Gas Pressure 4-40
Table 4.4.8.1 Cost Estimate Replace Digester Burner 4-41
4.4.9 Modify Digester Liquid Operation Level 4-41
Table 4.4.9.1 Methane Loss and Diesel Use 4-42
Table 4.4.9.2 Cost Estimate Modify Operating Level of Digester 4-43
Table 4.4.9.3 Cost Estimate Temporary Sludge Treatment St 1 and 2 4-43

4.4.10 Improved Mixing for Sludge Storage Tank 3 4-44
Table 4.4.10.1 Cost Estimate: Install Mixer Sludge Tank 3 4-44
Table 4.4.10.2 Cost Estimate: Install Replacement Blower Sludge Tank 3 4-44

4.5 Cost Estimates 4-44
Table 4.5.1 ENR Index - 2005 to 2015 4-45

SECTION 5: SELECTION OF ALTERNATIVE 5-1
5.1 Cost-effectiveness and Benefit Analysis 5-1
5.1.1 Life Cycle Cost 5-1
5.1.2 Present Worth Analysis 5-2
5.1.3 Matrix Evaluation 5-2

5.2 Alternatives Selection 5-3
5.2.1 Collection System I/I Repair Projects 5-4
5.2.1.1 Priority One I/I Projects 5-4
5.2.1.2 Priority TwoI/I Projects 5-4
5.2.1.3 Collection System I/I Repair Costs 5-4
Table 5.2.1.3.1 Present Worth Analysis for Priority One I/I Repairs 5-4
Table 5.2.1.3.2 Present Worth Analysis for Priority Two I/I Repairs 5-5
5.2.1.4 Matrix Evaluation of Collection System I/I Repair Projects 5-5
Table 5.2.1.4.1 I/I Repairs 5-5
5.2.2 Collection System Expansion and Sewer Replacement 5-5
5.2.2.1 Priority One-New Improvements to Serve Lone Ranch Vicinity And Harbor Sanitary District 5-5
5.2.2.2 Priority Two - Sewer Main Replacements 5-6
5.2.2.3 Collection System Expansion and Sewer Replacement Costs 5-6
Table 5.2.2.3.1 Present Worth Analysis Harbor/Lone Ranch Priority One Improvements 5-6
Table 5.2.2.3.2 Present Worth Analysis Sewer Main Replacements Priority Two 5-6
5.2.2.4 Matrix Evaluation of Collection System Expansion and Sewer Replacement 5-7
Table 5.2.2.4.1 Evaluation of Collection System Expansion and Sewer Replacement 5-7
5.2.3 Pump Station Improvements 5-7
5.2.3.1 Priority One Pump Station Improvements 5-7
5.2.3.2 Priority Two Pump Station Improvements 5-7
5.2.3.3 Priority Three Pump Station Improvements 5-8
5.2.3.4 Pump Station Improvements Cost 5-8
Table 5.2.3.4.1 Present Worth Analysis Pump Station Improvements 5-8
5.2.3.5 Matrix Evaluation of Pump Station Improvements 5-8
Table 5.2.3.5.1 Evaluation of Pump Station Improvements 5-8
5.2.4 WWTP Upgrades 5-9
5.2.4.1 Project 1-Coatings and Corrosion Protection 5-9
5.2.4.2 Project 2-Headworks, Replace Mechanical Bar Screen, Immediate 5-9
5.2.4.3 Project 3-Headworks, Replace Mechanical Bar Screen, Classifier and Degritter, 10 Years 5-9
5.2.4.4 Project 4-Primary Clarifier Rehabilitation, 10 Years 5-9
5.2.4.5 Project 5-Trickling Filter Rehabilitation, Immediate 5-9
5.2.4.6 Project 6-Re-aeration System Rehabilitation, Immedate 5-10
5.2.4.7 Project 7-Re-aeration System Rehabilitation, 10 years 5-10
5.2.4.8 Project 8-Secondary Clarifier, WAS, RAS, and Scum Pumps, 5 Years 5-10
5.2.4.9 Project 9-Secondary Clarifier, WAS, RAS, and Scum Pumps, 10 years 5-10
5.2.4.10 Project 10-UV System Replacement, Immediate 5-10
5.2.4.11 Project 11-Replace Digester Gas Burner 5-10
5.2.4.12 Project 12-Modification of Digest Operation Level, Immediate 5-11

5.2.4.13 Project 13-Sludge Storage Tanks 2 and 3 Temporary Conversion To Digester, Immediate 5-11
5.2.4.14 Project 14-Sludge Storage Tank 3 Improved, Immediate 5-11
Table 5.2.4.14.1 Present Worth Analysis – SST #3 Alternative Projects 14.A & 14B 5-11
5.2.4.15 Project 15-WWTP Upgrades Costs 5-12
Table 5.2.4.15.1 Present Worth Analysis for WWTP Rehabilitation and Replacement Projects 5-12
5.2.4.16 Matrix Evaluation of WWTP Upgrades 5-12
Table 5.2.5.16.1 Evaluation of WWTP Projects 5-12

SECTION 6: RECOMMENDED PLAN

6.1 Collection System 6-1
6.1.1 Priority 1 - I/I Repairs 6-1
6.1.2 Priority 2 - City I/I Repairs 6-1
6.1.3 Priority 1 - Lone Ranch and Harbor Sanitary District Improvements 6-2
6.1.4 Priority 2 - Sewer Main Replacements or Rehabilitation 6-2

6.2 Pump Station Recommendations 6-2
6.2.1 Priority 1 - Pump Station Repairs 6-2
6.2.2 Priority 2 - Pump Station Repairs 6-2
6.2.3 Priority 3 - Pump Station Repairs 6-3

6.3 WWTP Recommendations 6-3
6.3.1 Project 1 - Coating and Corrosion Control Project 6-3
6.3.2 Project 2 - Headworks - Replace Mechanical Bar Screen, Immediate 6-3
6.3.3 Project 3 - Headworks - Replace Mechanical Bar Screen, Classifier and Degritter, 10 Years 6-3
6.3.4 Project 4 - Primary Clarifier Rehabilitation, 10 Years 6-3
6.3.5 Project 5 - Trickling Filter Rehabilitation, Immediate 6-4
6.3.6 Project 6 - Re-aeration System Rehabilitation, Immediate 6-4
6.3.7 Project 7 - Re-aeration System Rehabilitation, 10 Years 6-4
6.3.8 Project 8 - Secondary Clarifier, WAS, RAS, and Scum Pumps, 5 Years 6-4
6.3.9 Project 9 - Secondary Clarifier, WAS, RAS, and Scum Pumps, 10 Years 6-4
6.3.10 Project 10 - UV System Replacement, Immediate 6-4
6.3.11 Project 11 – Replace Digester Burner 6-4
6.3.12 Project 12 - Modify Digest Operation Level, Immediate 6-5
6.3.13 Project 13 - Sludge Storage Tanks 2 and 3 Temporary Conversion to Digesters, Immediate 6-5
6.3.14 Project 14 - Sludge Storage Tank 3 Improvements, Immediate 6-5

6.4 Project Cost Summary 6-5
Table 6.4.1 Summary of Recommended Projects 6-6

6.5 Permits 6-7

6.6 Project Schedule 6-7

6.7 Annual Operating Budget 6-8

SECTION 7: FINANCING

7.1 Grant and Loan Programs 7-1
Table 7.1.1 Maximum Rural Development Grant Funds Based on Median Household Income 7-3
Table 7.1.2 CWSRF Interest Rates 7-8

7.2 Local Funding Sources 7-9

7.3 Financing Strategy 7-12
Table 7.3.1 Potential Funding Scenarios 7-14
Table 7.3.2 WWTP Expansion Funding Source User Rates 7-14

VOLUME 2

APPENDICES

Appendix A DEQ Documents
Appendix B Figures and Mapping
Appendix C Cost Estimates and Funding
Appendix D Miscellaneous Reports and Studies
Appendix E Photos

APPENDIX A: **DEQ DOCUMENTS**

NPDES Permit

NPDES Permit Modification No. 1

NPDES Permit Evaluation and Fact Sheet

NPDES Amendments to Evaluation Report

DEQ Tables 30, 31, 40

Table 300A Designated Beneficial Uses South Coast Basin

Figure 300A

Correspondence

Expiration Date: 2-28-2005
Permit Number: 101773
File Number: 11297
Page 1 of 21 Pages

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT

Department of Environmental Quality
Western Region - Salem Office
750 Front St. NE., Suite 120, Salem, OR 97301
Telephone: (503) 378-8240

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

City of Brookings
898 Elk Drive
Brookings, OR 97415

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	Pacific Ocean R.M. 422.41
Emergency Overflow:		
Pump Station #1, Buena Vista	002	Pacific Ocean R.M. 422.91
P.S. #2, Mill Beach	003	Pacific Ocean, R.M. 422.41
P.S. #3, Sea Cliff Drive	004	Chetco River, R.M. 0.2
.S. #4, Macklyn Cove Drive	005	Pacific Ocean, R.M. 420.61
P.S. #5, Dawson Tract #1	006	Harris Creek, R.M. 420.61
P.S. #6, Dawson Tract #2	007	Pacific Ocean, R.M. 420.61
P.S. #7, Dawson Tract #3	008	Pacific Ocean, R.M.420.41
P.S. #8, Dawson Tract #4	009	Sly Creek, R.M. 420.41
P.S. #9, Dawson Tract #5	010	Sly Creek, R.M. 420.11
P.S. #10, Beach Avenue	011	Pacific Ocean, R.M. 421.41

FACILITY TYPE AND LOCATION:

Trickling Filter/Solids Contact STP
901 Wharf Street on Chetco Point
Brookings, Oregon

Treatment System Class: III
Collection System Class: III

RECEIVING STREAM INFORMATION:

Basin: South Coast
Sub-Basin: Chetco
Receiving Stream: Pacific Ocean
Hydro Code: 10=PACI 422.41
County: Curry

EPA REFERENCE NO: OR 002035-4

Issued in response to Application No. 992804 received 11/13/96.

This permit is issued based on the land use findings in the permit record.

Gary Messer, Western Region Water Quality Manager

MAY 1 2000
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
Schedule A - Waste Discharge Limitations not to be Exceeded	3
Schedule B - Minimum Monitoring and Reporting Requirements	6
Schedule C - Compliance Conditions and Schedules	9
Schedule D - Special Conditions	10
Schedule E - Pretreatment Activities	12
Schedule F - General Conditions	13

Unless authorized by another NPDES permit, each other direct and indirect discharge to public waters is prohibited.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Outfall Number 001 (Wastewater Treatment Plant Discharge)

(1) Year-round

	Average Effluent Concentrations		Monthly	Weekly	Daily*
Parameter	Monthly	Weekly	Average lb/day	Average lb/day	Maximum Lbs
BOD_5	30 mg/l	45 mg/l	440	650	870
TSS	30mg/l	45 mg/l	440	650	870

(2) From November 1 through April 30, when the monthly average flow exceeds 3.0 MGD, the BOD_5 and TSS monthly average and weekly average mass load limits shall be 750 and 1100 pounds respectively. When on any day, the total daily flow exceeds 7.5 MGD, the daily maximum BOD_5 and TSS limits shall be 1900 pounds for that day.

* Note: Average dry weather design flow to the facility equals 1.74 MGD.

(3)

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*
Total Chlorine Residual	Shall not exceed a monthly average concentration of 0.4 mg/l and a daily maximum concentration of 1.0 mg/l.

* Note: The permit may be modified to set a removal efficiency of 70% when influent BOD and TSS concentrations are less than 100 mg/L pursuant to 40 CFR 133.103 (d). Schedule C, condition 1, requires the City to demonstrate that dilute influent wastewater is not the result of excessive I&I and performs a cost-effectiveness analysis. Upon review and approval, this permit will be modified to include the 70 % removal efficiency.

(4) Except as provided for in OAR 340-45-080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-41-325 except in the following defined mixing zone:

The allowable mixing zone shall not extent beyond a radius of 300 feet from the point of discharge.

b. Outfall 003 (Emergency Overflow)

(1) No wastes shall be discharged from these outfalls and no activities shall be conducted which violate water quality standards as adopted in OAR 340-41-325, unless the cause of the discharge is due to storm events as allowed under OAR 340-41-41-120 (13) and (14) as follows:

(2) Raw sewage discharges are prohibited to waters of the State from May 22 through October 31, except during a storm event greater than the one-in-ten-year, 24-hour duration storm.

(3) If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

2. **WASTE DISCHARGE LIMITATIONS NOT TO BE EXCEEDED AFTER COMPLETION OF PLANT UPGRADE PURSUANT TO MUTUAL AGREEMENT AND ORDER, WQMW-WR-96-142.**

(a) Outfall Number 001 (Wastewater Treatment Plant Discharge)

(1) Nov.1 – April 30

	Average Effluent		Monthly	Weekly	Daily*
	Concentrations				
Parameter	Monthly	Weekly	Average lb/day	Average lb/day	Maximum Lbs
BOD_5	25 mg/l	30 mg/l	730	1,100	2,000
TSS	25mg/l	30 mg/l	730	1,100	2,000

(2) May 1 – Oct. 30

	Average Effluent		Monthly	Weekly	Daily*
	Concentrations				
Parameter	Monthly	Weekly	Average lb/day	Average lb/day	Maximum Lbs
BOD_5	15 mg/l	25 mg/l	260	400	570
TSS	15mg/l	25 mg/l	260	400	570

* Note: Based on average dry weather flow (ADWF) to the facility of 2.1 MGD and average wet weather flow (AWWF) of 3.5 MGD. This mass load increase was approved by the Environmental Quality Commission on August 22, 1997.

(3)

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*
Total Chlorine Residual	No chlorine or chlorine products shall be allowed

(4) Except as provided for in OAR 340-45-080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-41-325 except in the following defined mixing zone:

The allowable mixing zone shall not extent beyond a radius of 300 feet from the point of discharge.

(5) Raw sewage discharges are prohibited to waters of the State from November 1 through May 21, except during a storm event greater than the one-in-five-year, 24-hour duration storm, and from May 22 through October 31, except during a storm event greater than the one-in-ten-year, 24-hour duration storm.

If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

(6) No chlorine or chlorine compounds shall be used for disinfection purposes and no chlorine residual shall be allowed in the effluent due to chlorine used for maintenance purposes.

b. Outfall 003 (Emergency Overflow)

(1) No wastes shall be discharged from these outfalls and no activities shall be conducted which violate water quality standards as adopted in OAR 340-41-325, unless the cause of the discharge is due to storm events as allowed under OAR 340-41-120 (13) and (14) as follows:

(2) Raw sewage discharges are prohibited to waters of the State from May 22 through October 31, except during a storm event greater than the one-in-ten-year, 24-hour duration storm.

(3) If an overflow occurs between May 22 and June 1, and if the permittee demonstrates to the Department's satisfaction that no increase in risk to beneficial uses occurred because of the overflow, no violation shall be triggered if the storm associated with the overflow was greater than the one-in-five-year, 24-hour duration storm.

NOTES:

#1. If a single sample exceeds 406 organisms per 100 ml, then five consecutive re-samples may be taken at four hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 ml, a violation shall not be triggered.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements to be met after permit issuance** (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

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab

b. Outfall Number 001 (Sewage Treatment Plant Discharge)

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	Composite
TSS	2/Week	Composite
pH	3/Week	Grab
Fecal coliform, E. coli after upgrade	2/week	Grab (See Note #1)
Quantity of Chlorine used	Daily until after upgrade*	Measurement
Total Chlorine Residual	Daily until after upgrade*	Grab
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
Average Percent removed (BOD and TSS)	Monthly	Calculation
U-V Radiation Intensity	Daily after upgrade	Reading (See Note 2)
Bioassay	Semi-annually	Acute and Chronic Bioassay (See note #3)

- Note: Quantity of Chlorine used and Total Chlorine Residual will not be required after new UV facilities are on-line.

c. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Sludge analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units) Sludge metals content for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Annually	Composite sample to be representative of the product to be land applied from the Sludge Storage tank(See Note 4/)
Record of % volatile solids reduction accomplished through digestion	Monthly when land applying sludge from the sludge storage tank	Calculation (See note #4)
Record of locations where biosolids are applied on each DEQ approved site. (Site location maps to be maintained at treatment facility for review upon request by DEQ)	Each Occurrence	Date, volume & locations where sludges were applied recorded on site location map.

d. Outfall 003 (Emergency Overflow)

Item or Parameter	Minimum Frequency	Type of Sample
Flow	Daily (during each occurrence)	Estimate duration and volume

2. Reporting Procedures

a. Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the Department's Western Region – Coos Bay 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 the quantity and method of use of all biosolids removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.

3. Report Submittals

a. The permittee shall have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by June 1 each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report shall state those activities that have been done in the previous year and those activities planned for the following year.

b. For any year in which biosolids are land applied, a report shall be submitted to the Department by February 19 of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-50-035(6)(a)-(e).

NOTES:

1/ *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
Chromogenic Substrate, MPN	Standard Methods, 19th Edition	9-65	9223 B
Colilert QT	Idexx Laboratories, Inc.		

2/ The intensity of UV radiation passing through the water column will affect the systems ability to kill organisms. To track the reduction in intensity, the UV disinfection system must include a UV intensity meter with a sensor located in the water column at a specified distance from the UV bulbs. This meter will measure the intensity of UV radiation in mWatts/cm^2. The daily UV radiation intensity shall be determined by reading the meter each day. If more than one meter is used, the daily recording will be an average of all meter readings each day.

3/ Beginning no later than January, 2000, the permittee shall conduct bioassay testing for a period of one (1) year in accordance with the frequency specified above. If the bioassay tests show that the effluent samples are not toxic at the dilutions determined to occur at the Zone of Immediate Dilution and the Mixing Zone, no further bioassay testing will be required during this permit cycle. Note that bioassay test results will be required along with the next NPDES permit renewal application.

4/ Composite samples from the Sludge Storage Tank shall be taken from reference areas in the lagoon pursuant to **Test Methods for Evaluating Solid Waste, Volume 2; Field Manual, Physical/Chemical Methods, November, 1986, Third Edition, Chapter 9.**

Inorganic pollutant monitoring must 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.

SCHEDULE C

Compliance Schedules and Conditions

1. Within 180 days of permit issuance, the permittee shall submit an emergency overflow and bypass response plan to the Department for review and approval. Within 60 days of receiving written comments from the Department, permittee shall submit final response plan and upon written approval by the Department, the permittee shall implement this plan immediately.

2. Six (6) months prior to the removal of accumulated solids from the Sludge Storage Tank, the permittee shall submit to the Department a revised biosolids management plan developed in accordance with Oregon Administrative Rule 340, Division 50, "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.

3. By no later than ninety (90) days after permit issuance, the permittee shall submit to the Department a report which either identifies known sewage bypass locations and a plan for estimating the frequency, duration and quantity of sewage bypassing treatment, or confirms that there are no bypass points. The report shall also provide a schedule to eliminate the bypass(es), if any.

4. Within 90 days of permit issuance, the permittee shall submit to the Department for review and approval a report that describes procedures for handling, transporting, and disposal of rags, grit, scum and screenings generated at the treatment facility. Upon written approval from the Department, the permittee shall conform with the approved procedures. Modified procedures may be followed upon prior approval in writing by the Department.

5. 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 determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. The permittee shall comply with OAR 340, Division 52 which requires that all proposed piping, treatment process, instrument, and equipment modifications other than repairs be submitted and approved by the Department

2. 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 inplant control and quick and proper action in the event of a spill or accident.

3. All biosolids or septage shall be managed in accordance with the current biosolids or septage management plan approved by the Department and the site authorization letters issued by the Department. The biosolids or septage management plan shall be kept current and remain on file with the permit. 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 sewage sludge use of disposal promulgated under section 405(d) of the Clean Water Act, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

4. Bioassay

   a. The permittee shall conduct chronic whole effluent toxicity bioassay tests of outfall 001 in accordance with the frequency specified in Schedule B with an echinoderm species, a bivalve species and Menidia beryllina (Inland Silverside). The echinoderm species may be either Stronglyocentrotus purpuratus (Purple Urchin) or Dendraster variegatus (Sand Dollar). The bivalve species may be either Crassostrea gigas (Pacific Oyster) or Mytilus edulis (Blue Mussel).

   b. Bioassay tests may be dual end-point tests in which both acute and chronic end-points can be determined from the results of a single chronic test (the acute end-point shall be based upon a 48-hour time period).

   c. Bioassay shall be conducted in accordance with Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms, EPA/600/4-87/028 and Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fourth Edition, EPA/600/4-90/027F, August, 1993. Quality assurance criteria, statistical analyses and data reporting for the bioassays shall be in accordance with the EPA document and Department requirements for chronic testing referenced above.

   d. The permittee shall make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the bioassays, are using for all toxicity tests required by the Department.

   e. An acute bioassay test shall be considered to show toxicity if there is significant difference in survival between the control and 100 percent effluent, unless the permit specifically provides for a Zone of Immediate Dilution (ZID) for biotoxicity. If the permit specifies such a ZID, acute toxicity shall be indicated when a significant difference in survival occurs at dilutions greater than that which is found to occur at the edge of the ZID.

   f. A chronic bioassay test shall be considered to show toxicity if a significant difference in survival occurs at dilutions greater than that which is known to occur at the edge of the mixing zone, or if there is no dilution data for the edge of the mixing zone and any chronic bioassay test shows a statistically significant effect in 100 percent effluent as compared to the control, another toxicity test using the same species and the same methodology shall be conducted within two weeks. If the

second test also indicates toxicity, the permittee shall follow the procedure described in section (h) of this permit condition.

g. If toxicity is shown by either an acute or a chronic test at the established criteria, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department. If the second test also indicates toxicity, the permittee shall follow the procedure described in section (h) of this permit condition.

h. If, after following the procedure as described in sections (e) or (f) of this permit condition, two consecutive bioassay test results indicate acute and/or chronic toxicity, the permittee shall evaluate the source of the toxicity and submit a plan and time schedule for demonstrating compliance with water quality standards. Upon approval by the Department, the permittee shall implement the plan until compliance has been achieved. Evaluations shall be completed and plans submitted to the Department within 6 months unless otherwise approved in writing by the Department.

i. If bioassay testing indicates acute and/or chronic toxicity, the Department may reopen and modify this permit to include new limitations and/or conditions as determined by the Department to be appropriate.

5. 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 5a. 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 at no less than one grade lower then the system classification.

c. If the wastewater system has more than one daily shift, the permittee shall have the shift supervisor, if any, certified at no less than one grade lower than the system classification.

d. 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.

e. 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, 811 SW 6th Ave, Portland, OR 97204. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

f. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 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 5.b. above.

6. The permittee shall notify the DEQ Western Region – Coos Bay Office (phone: (541) 269-2721) in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department.

SCHEDULE E

Pretreatment Activities

The permittee shall implement the following pretreatment activities:

1. The permittee shall update its inventory of industrial users at a frequency and diligence adequate to ensure proper identification of industrial users subject to pretreatment standards, but no less than once per year. The permittee shall notify these industrial users of applicable pretreatment standards in accordance with 40 CFR Part 403.8(f)(2)(iii).

2. The permittee shall issue individual discharge permits to all Significant Industrial Users in a timely manner. The permittee shall also reissue and/or modify permits, where necessary, in a timely manner. Discharge permits must contain, at a minimum, the conditions identified in 40 CFR Part 403.8(f)(1)(iii). Unless a more stringent definition has been adopted by the permittee, the definition of Significant Industrial User shall be as stated in 40 CFR Part 403.3(t).

3. The permittee shall review reports submitted by industrial users and identify all violations of the user's permit or the permittee's local ordinance.

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 judgment 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

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;

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 g/L);

(2) *Two hundred micrograms per liter (200 g/L) for acrolein and acrylonitrile; five hundred* micrograms per liter (500 g/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 g/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.

Basin-Specific Criteria (South Coast)

340-041-0300

Beneficial Uses to Be Protected in the South Coast Basin

(1) Water quality in the South Coast Basin (see Figure 1) must be managed to protect the designated beneficial uses shown in Table 300A (November 2003).

(2) Designated fish uses to be protected in the South Coast Basin are shown in Figures 300A (August 2005) and 300B (November 2003).

[ED. NOTE: Tables referenced are available from the agency.]

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 2-2007, f. & cert. ef. 3-15-07

340-041-0304

Approved TMDLs in the Basin

The following TMDLs have been approved by EPA, and appear on the Department's web site:

Coquille -- BOD -- July 3, 1996

Upper South Fork of the Coquille -- Temperature -- March 23, 2001

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03

340-041-0305

Water Quality Standards and Policies for this Basin

(1) pH (Hydrogen ion concentration) pH values may not fall outside the following ranges:

(a) Estuarine and fresh waters: 6.5-8.5.

(b) Marine waters: 7.0-8.5.

(2) Total Dissolved Solids. Guide concentrations listed below may not be exceeded unless otherwise specifically authorized by DEQ upon such conditions as it may deem necessary to carry out the general intent of this plan and to protect the beneficial uses set forth in OAR 340-04l-0300: 100.0 mg/l.

(3) Minimum Design Criteria for Treatment and Control of Sewage Wastes:

(a) During periods of low stream flows (approximately May 1 to October 31): Treatment resulting in monthly average effluent concentrations not to exceed 20 mg/l of BOD and 20 mg/l of SS or equivalent control;

(b) During the period of high stream flows (approximately November 1 to April 30) and for direct ocean discharges: A minimum of secondary treatment or equivalent control and unless otherwise specifically authorized by the Department, operation of all waste treatment and control facilities at maximum practicable efficiency and effectiveness so as to minimize waste discharges to public waters.

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Western Region – Salem Office
750 Front Street NE, Suite 120, Salem, OR 97301-1039
Telephone: (503) 378-8240

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:
City of Brookings
898 Elk Drive
Brookings, OR 97415

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 999

FACILITY TYPE AND LOCATION:
Trickling Filter/Solids Contact
905 Wharf Street
Brookings, OR

RECEIVING STREAM INFORMATION:
Basin: South Coast
Sub-Basin: Chetco
Receiving Stream: Pacific Ocean

Treatment System Class: Level III
Collection System Class: Level III

LLID: 124431142271 - 999 - D
County: Curry

EPA REFERENCE NO: OR002035-4
Issued in response to Application No. 982829 received September 1st, 2004. This permit is issued based on the land use findings in the permit record.

Steve Schnurbusch, Acting Water Quality Manager
Western Region

November 7, 2011
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorised 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 authorised 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
Schedule A - Waste Discharge Limitations not to be Exceeded 2
Schedule B - Minimum Monitoring and Reporting Requirements 3
Schedule D - Special Conditions 9
Schedule F - General Conditions 14

Unless specifically authorised by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge of waste is prohibited, including discharge to waters of the state or an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Outfall 001 – *Treated Effluent*

(1) November 1st – April 30th:

Parameter	Average Effluent Concentrations		Monthly Average lb/day	Weekly Average lb/day	Daily Maximum lbs
	Monthly	Weekly			
BOD_5	25 mg/l	30 mg/l	730	1,100	2,000
TSS	25 mg/l	30 mg/l	730	1,100	2,000

(2) May 1st – October 31st:

Parameter	Average Effluent Concentrations		Monthly Average lb/day	Weekly Average lb/day	Daily Maximum lbs
	Monthly	Weekly			
BOD_5	15 mg/l	25 mg/l	260	400	570
TSS	15 mg/l	25 mg/l	260	400	570

(3) Year-round

Other parameters	Limitations
Enterococci Bacteria	Must not exceed a monthly geometric mean of 35 organisms per 100 mL.
Fecal Coliform Bacteria	Must not exceed a monthly median of 14 organisms per 100 mL. Not more than 10 percent of the samples per month may exceed 43 organisms per 100 mL.
pH	Must be within the range of 6.0 to 9.0.
BOD_5 and TSS Removal Efficiency	Must not be less than 85% monthly average for BOD_5 and 85% monthly for TSS.

(4) No wastes may be discharged or activities conducted that cause or contribute to a violation of water quality standards in OAR 340-041 applicable to the Oregon South Coast Basin except as provided for in OAR 340-045-0080 and the following regulatory mixing zone:

The allowable mixing zone is that portion of the Pacific Ocean contained within a 300-foot radius of the point of discharge. The Zone of Immediate Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within thirty (30) feet of the point of discharge.

(5) Chlorine and chlorine compounds must not be used as a disinfecting agent of the treated effluent and no chlorine residual due to chlorine used for maintenance purposes is allowed in the discharged effluent.

b. Groundwater

(1) No activities may be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

SCHEDULE B

REPORTING SUMMARY			
Item	**Frequency**	**Due date**	**See Schedule B, Section(s)**
Discharge Monitoring Report	Monthly	By 15th of following month	1.a, 1.b
Metals, cyanide, phenols and hardness	Twice per year for 2 years, September and February	Within 45 days of test completion	1.b
Volatile, Acid-extractable and Base/Neutral compounds	Twice per year for 2 years, September and February	Within 45 days of test completion	1.b
Whole Effluent Toxicity	4 tests	Within 45 days of test completion	1.b and *Schedule D-Section 3*
Inflow and Infiltration (I&I) reduction report	Yearly	February 1st of following year	3.a
Bio-solids report	Yearly	February 19th of following year	3.b

1. Minimum Monitoring and Reporting Requirements

The Permittee must monitor the parameters as specified below at the locations indicated and report all required monitoring results as specified in *Schedule B, Condition 2*. The laboratory used by the Permittee to analyse samples must have a quality assurance/quality control (QA/QC) programme to verify the accuracy of the sample analysis. If QA/QC requirements are not met for any analysis, the results must be included in the report, but not used for calculations required by this permit. When possible, the Permittee shall re-sample in a timely manner for parameters failing QA/QC requirements, analyse the samples, and report the results.

a. *Influent*

The facility influent sampling location is in the influent channel at the headwords structure.

Item or Parameter	Minimum Monitoring Frequency	Type of Sample
BOD_5	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
pH	3/Week	Grab

b. *Treated Effluent Outfall 001*

The facility effluent sampling location is in the effluent channel just after the UV system.

Item or Parameter	Minimum Monitoring Frequency	Type of Sample
Total Flow (MGD)	Daily	Continuous
Flow Meter Calibration	Semi-Annual	Verification
BOD_5	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
pH	3/Week	Grab
Temperature	3/Week	Grab
Enterococci bacteria	2/Week	Grab

Item or Parameter	Minimum Monitoring Frequency	Type of Sample
Fecal coliform bacteria	2/Week	Grab
UV Radiation Intensity	Daily	Reading (See Note B.6)
Average Percent Removed (BOD_5 and TSS)	Monthly	Calculation
Toxics and related parameters:		
Metals, cyanide, phenols and hardness (See Note B.3)	Twice per year for 2 years, September and February (See Note B.2)	24-hour daily composite (See Note B.4)
Volatile, Acid-extractable and Base/Neutral compounds (See Note B.3)	Twice per year for 2 years, September and February (See Note B.2)	24-hour Composite (See Note B.5)
Whole Effluent Toxicity	1/year (See Note B.1)	Composite (24-hour)

c. *Biosolids Management*

Item or Parameter	Minimum Monitoring Frequency	Type of Sample
For all biosolids:		
Sludge analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units)	Quarterly	Composite sample to be representative of the product to be land applied or from anaerobic digester (See Note B.7)
Sludge metals content for: Ag, As, Cd, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Quarterly	Composite sample to be representative of the product to be land applied or from the anaerobic digester (See Note B.7)
For all anaerobically digested Class B biosolids land applied:		
Record of locations where bio-solids are applied on each DEQ approved site. (Site location maps to be maintained at treatment facility for review upon request by DEQ)	Each Occurrence	Date, volume & locations where sludges were applied recorded on site location map.
Record of % volatile solids reduction accomplished through stabilisation	Monthly	Calculation (See Note B.8)
Record of digestion days (mean cell residence time)	Monthly	Calculation
Daily Minimum Sludge Temperature	Daily	Record
For all sludge disposed of in a landfill:		
Record of percent total solids and volume of all sludge disposed	Each Occurrence	Record of Date and volume.

2. Reporting Procedures

a. Monitoring results must be reported on Department-approved forms. The reporting period is the calendar month. Reports must be submitted to a Department's Western Region office by the 15th day of the following month and as indicated below.

b. State monitoring reports must identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports must also identify each system classification as found on Page One of this permit.

c. Monitoring reports must also include a record of the quantity of all sludge removed from the treatment system and how it was used or disposed and a record of all applicable equipment breakdowns and bypassing.

d. Do not report sample results or mass loads as estimated values on the DMR, except as described below. Report sample results and mass loads as follows:

i. Sample result at or below detection level

If a sample result is at or below the detection level, report the result as less than the specified detection level. For example, if the detection level is 1.0 ug/L and the result is non-detect, report "<1.0 ug/L" on the DMR. To calculate the mass load from this result, use the detection level. Report the mass load as less than the calculated mass load. For example, if flow is 2 MGD and the reported sample result is <1.0 ug/L, report "<0.017 lb/day" for mass load on the DMR (1.0 ug/L x 2 MGD x conversion factor = 0.017 lb/day).

ii. Sample result above detection level but below quantitation level

If a sample result is above the detection level but below the quantitation level, report the result as the detection level preceded by the Department's data code "e". This code identifies the result as being between the detection level and quantitation level. For example, if the detection level is 1 ug/l and the quantitation level is 5 ug/L and the sample result is 4 ug/L, report "e1 ug/l" on the DMR. To calculate the mass load from this result, use the detection level. Report the mass load as less than the calculated mass load preceded by "e". For example, if flow is 2 MGD and the reported sample result is e1.0 ug/L, report "e0.017 lb/day" for mass load on the DMR (1.0 ug/L x 2 MGD x conversion factor = 0.017 lb/day).

3. Report Submittals

a. The permittee must have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report must be submitted to the Department by **February 1st** of each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report must state those activities that have been done in the previous year and those activities planned for the following year. The report must include information that demonstrates compliance with the DEQ approved inflow removal plan required by Schedule D, Condition 9.

b. For any year in which bio-solids are land applied or composted, a report must be submitted to the Department by **February 19** of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-50-035(6)(a)-(e).

NOTES:

B.1 Whole Effluent Toxicity Testing: Testing must be conducted as described in Schedule D. Whole effluent toxicity testing must be conducted according to the following schedule:

March 2012
June 2013
September 2014
December 2015

Whole effluent toxicity testing may be eliminated after completing the above schedule unless otherwise notified in writing by the Department.

B.2 Toxic Pollutant Testing Frequency: Four scans (for total and dissolved metals, hardness, phenols, cyanide, and organic priority pollutants) are required during the two years after permit issuance. Scans must be performed in February and September each year. After four scans, effluent monitoring may be eliminated unless otherwise notified in writing by the Department. The Department will review the data and may require additional monitoring of the effluent and/or receiving stream for specific pollutants of concern or reopen the permit to incorporate permit limits or other requirements.

B.3 Whenever possible, a permittee should use a test method, as indicated in 40 CFR 136.3, with a Quantitation Limit (QL) that is lower than the permitted effluent limit or water quality criteria for priority pollutant scans. A list of the analytic methods and the acceptable QLs, established by the Department, are located in the document **RPA IMD, Appendix C: Analytic Methods, Limits and Implementation Guidance, June 2011.** The permittee must ensure that all monitoring analysis reports contain both the QL and the detection level as defined below:

a. Detection Level: Same as the "Method Detection Limit" (MDL) derived using 40 CFR 136 Appendix B.

b. Quantitation Limit: Same as the Method Reporting Limit (MRL). It is the lowest level at which the entire analytic system must give a recognisable signal and acceptable calibration for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

Metals[1], Cyanide, Phenols and Hardness					
Pollutant	CAS Number	QL[2] (µg/L)	Pollutant	CAS Number	QL (µg/L)
Antimony	7440360	0.1	Arsenic (total)	7440382	0.5
Arsenic (inorganic)	na	na	Arsenic (III)	22541544	50
Beryllium	7440417	0.1	Cadmium	7440439	0.1
Chromium	7440473	0.4	Chromium (III)	16065831	10
Chromium (IV)	18540299	10	Copper	7440508	10
Iron (dissolved)	7439896	100	Lead	7439921	5
Mercury	7439976	0.01	Nickel	7440020	10
Selenium	7782492	2	Silver	7440224	1
Thallium	7440280	0.1	Zinc	7440666	5
Cyanide (total)	57125	5	Cyanide (free)	57125	5
Total Phenolic Compounds	na	na	Hardness	na	na
[1]All metals must be analysed for total and dissolved [2]QL = Quantitation Limit					

Base-Neutral Compounds					
Pollutant	CAS Number	QL (µg/L)	Pollutant	CAS Number	QL (µg/L)
Acenapthene	83329	1	Acenapthylene	208968	1
Anthracene	120127	1	Benzidine	92875	10
Benzo(a)Anthracene	56553	1	Benzo(a)Pyrene	50328	1
3,4-Benzoflouranthene	205992	1	Benzo(ghi)Perylene	191242	1
Benzo(k)flouranthene	207089	1	Bis(2-Chloroethoxy) Methane	111911	2
Bis(2-Chloroethyl)-Ether	111444	1	Bis(2-Chloroiso-Propyl) Ether	108601	2
Bis(2-Ethylhexyl) Phthalate	117817	1	4-Bromophenyl Phenyl Ether	101553	1
Butyl Benzyl Phthalate	85687	1	2-Chloronaphthalene	91587	1
4-Chlorophenyl Phenyl Ether	7005723	1	Chrysene	218019	1
Dibenzo(a,h) Anthracene	53703	1	1,2-Dichlorobenzene	95501	0.5
1,3-Dichlorobenzene	541731	0.5	1,4-Dichlorobenzene	106467	0.5
Dichlorobenzenes	na	0.5	3,3-Dichlorobenzidene	91941	1
Diethyl Phthalate	84662	1	Dimethyl Phthalate	131113	1
Di-n-Butyl Phthalate	84742	1	2,4-Dinitrotoluene	121142	1
2,6-Dinitrotoluene	606202	1	Dinitrotoluenes	na	1
Di-n-Octyl Phthalate	117840	1	1,2-Diphenyl-hydrazine	122667	5
Diphenyl-hydrazine	na	5	Flouranthene	206440	2
Flourene	86737	1	Hexachlorobenzene	118741	1
Hexachlorobutadiene	87683	2	Hexachlorocyclo-pentadiene	77474	2
Hexachloroethane	67721	2	Indeno(1,2,3-cd) Pyrene	193395	1
Isophorone	78591	10	Naphthalene	91203	1
Nitrobenzene	98953	1	N-Nitrosodi-Methylamine	62759	1
N-Nitrosodi-N-Propylamine	621647	2	N-Nitrosodi-Phenylamine	86306	1
Pentachlorobenzene	608935	10	Phenanthrene	85018	1
Pyrene	129000	1	1,2,4-Trichlorobenzene	120821	0.5
1,2,4,5-Tetrachlorobenzene	95943	1			

Volatile Organic Compounds					
Pollutant	CAS Number	QL (µg/L)	Pollutant	CAS Number	QL (µg/L)
Acrolein	107028	5	Acrylonitrile	107131	5
Benzene	71432	0.5	Bromoform	75252	0.5
Carbon Tetrachloride	56235	0.5	Chlorobenzene	108907	0.5
Chlorodibromomethane	124481	0.5	Chloroethane	75003	0.5
2-Chloro-Ethylvinylether	110758	5	Chloroform	67663	0.5
Dichlorobromomethane	75274	0.5	1,1-Dichloroethane	75343	0.5
1,2-Dichloroethane	107062	0.5	1,1-Dichloroethylene	75354	0.5
1,2-Dichloropropane	78875	0.5	1,3-Dichloropropylene	542756	0.5
Ethylbenzene	100414	0.5	Halomethanes		
Methyl Bromide	74839	0.5	Methyl Chloride	74873	0.5
Methylene Chloride	75092	0.5	Polynuclear Aromatic Hydrocarbons		
1,1,2,2-Tetrachloro-ethane	79345	0.5	Tetrachloro-ethylene	127184	0.5
Toluene	108883	0.5	1,2-Trans-Dichloroethylene	156605	0.5
1,1,1-Trichloroethane	71556	0.5	1,1,2-Trichloroethane	79005	0.5
Trichloroethylene	79016	0.5	Vinyl Chloride	75014	0.5

Acid-Extractable Compounds					
Pollutant	CAS Number	QL (µg/L)	Pollutant	CAS Number	QL (µg/L)
2-Chlorophenol	95578	1	2,4-Dichlorophenol	120832	1
2,4-Dimethylphenol	105679	5	4,6-Dinitro-O-Cresol	534521	2
2,4-Dinitrophenol	51285	5	2-Nitrophenol	88755	2
4-Nitrophenol	100027	5	P-Chloro-M-Cresol	59507	1
Pentachlorophenol	87865	2	Phenol	108952	1
2,4,5-Trichlorophenol	95954	2	2,4,6-Trichlorophenol	88062	1

B.4 For effluent cyanide samples, at least six discrete grab samples must be collected over the operating day. Each aliquot must not be less than 100 mL and must be collected and composited into a larger container which has been preserved with sodium hydroxide for cyanide samples to insure sample integrity.

B.5 The effluent samples must be 24-hour daily composites, except where sampling volatile compounds. When sampling volatile compounds, six discrete samples (not less than 40 mL) collected over the operating day are acceptable. The permittee must take special precautions in compositing the individual grab samples for the volatile organics to insure sample integrity (i.e. no exposure to the outside air). Alternately, the discrete samples collected for volatiles may be analysed separately and averaged.

B.6 The intensity of UV radiation passing through the water column will affect the system's ability to kill organisms. To track the reduction in intensity, the UV disinfection system must include a UV intensity meter with a sensor located in the water column at a specified distance from the UV bulbs. This meter will measure the intensity of UV radiation in mWatts-seconds/cm2. The daily UV radiation intensity shall be determined by reading the meter each day. If more than one meter is used, the daily recording will be an average of all meter readings each day.

B.7 Inorganic pollutant monitoring must 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.

B.8 Calculation of the % volatile solids reduction is to be based on comparison of a representative grab sample of total and volatile solids entering each digester (a weighted blend of the primary and secondary clarifier solids) and a representative composite sample of solids exiting each digester withdrawal line (as defined in Note B.8 above).

SCHEDULE D

Special Conditions

1. All biosolids must be managed in accordance with the current, DEQ approved biosolids management plan, and the site authorisation letters issued by the DEQ. Any changes in solids management activities that significantly differ from operations specified under the approved plan require the prior written approval of the DEQ.

   All new biosolids application sites must meet the site selection criteria set forth in OAR 340-050-0070 and must be located within Curry County. All currently approved sites are located in Curry County. No new public notice is required for the continued use of these currently approved sites. Property owners adjacent to any newly approved application sites shall be notified, in writing or by any method approved by DEQ, of the proposed activity prior to the start of application. For proposed new application sites that are deemed by the DEQ to be sensitive with respect to residential housing, runoff potential or threat to groundwater, an opportunity for public comment must be provided in accordance with OAR 340-050-0030.

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

3. Whole Effluent Toxicity Testing

   a. The permittee shall conduct whole effluent toxicity (WET) tests as specified in *Schedule B* of this permit.

   b. The facility is required to sample once per year over the first four years of the permit. The sampling events and toxicity tests should take place in a different quarter each year (i.e. Year 1-Qtr 1; Year 2-Qtr. 2; etc.).

   c. Acute Toxicity Testing - Organisms and Protocols

      (1) The permittee shall conduct 48-hour static renewal tests with *Holmesimysis costata* (mysid shrimp) and 96-hour static renewal tests with *Menidia beryllina* (inland silverside). *Americamysis (Mysidopsis) bahia* may be substituted if *H. costata* is not available.

      (2) All test methods and procedures must be in accordance with **Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, Fifth Edition, EPA-821-R-02-012, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to the Department for review and approval prior to use.

      (3) Tests must be conducted on final effluent sample collected as a composite sample. No treatments to the final effluent (i.e. de-chlorination, etc), except those included as part of the methodology, shall be performed by the laboratory unless approved by the Department prior to analysis.

      (4) Acute tests must be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 1%, 2%, 6%, 20%, and 40%.

      (5) An acute WET test will be considered to show toxicity if there is a statistically significant difference in survival between the control and 6 percent effluent.

d. Chronic Toxicity Testing - Organisms and Protocols

(1) The permittee shall conduct tests with: *Mytilus spp.* (mussel) for embryo larval development endpoint, *Menidia beryllina* (inland silverside) for growth and survival test endpoint, and *Macrocystis pyrifera* (giant kelp) for growth test endpoint.

(2) All test methods and procedures must be in accordance with **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms**, Third Edition, EPA-821-R-02-014, October 2002, or **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms,** First Edition, EPA/600/R-95-136, August 1995, based on species selection in item d(1). Any deviation of the bioassay procedures outlined in the applicable method must be submitted in writing to the Department for review and approval prior to use.

(3) Tests must be conducted on final effluent samples collected as 24-hour composite samples. No treatments to the final effluent (i.e. de-chlorination, etc), except those included as part of the methodology, shall be performed by the laboratory unless approved by the Department prior to analysis.

(4) Chronic tests must be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 1%, 2%, 6%, 20%, and 40%.

(5) A chronic WET test will be considered to show toxicity if the IC_{25} (25% inhibition concentration) occurs at dilutions equal to or less than the dilution that is known to occur at the edge of the mixing zone, i.e. $IC_{25} \leq 2.3\%$.

e. Dual End-Point Tests – Organisms and Protocols

(1) WET tests may be dual end-point tests in which both acute and chronic end-points can be determined from the results of a single chronic test. For this permit, the only eligible species for dual endpoint is *M. beryllina.* The acute end-point is determinate at 96-hours for the *Menidia beryllina* (inland silverside).

(2) All test methods and procedures must be in accordance with **Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms,** Third Edition, EPA-821-R-02-014, October 2002. Any deviation of the bioassay procedures outlined in this method must be submitted in writing to the Department for review and approval prior to use.

(3) Tests must be conducted on final effluent samples collected as described in item d.(3).

(4) Tests run as dual end-point tests shall be conducted on a control and the following dilution series, unless otherwise approved by the Department in writing: 1%, 2%, 6%, 20%, and 40%.

(5) Toxicity determinations for dual end-point tests must correspond to the acute, c.(5), and chronic, d.(5), described above.

f. Additional Sampling Requirements

(1) At the time of WET sampling, effluent samples should also be collected and analysed for metals, hardness, and ammonia.

g. Evaluation of Causes and Exceedances

(1) If any test exhibits toxicity, as defined in sections c.(5) or d.(5) of this permit condition, another toxicity test using the same species and Department approved methodology must be conducted within two weeks, unless otherwise approved by the Department.

(2) If two consecutive WET test results indicate acute and/or chronic toxicity, as defined in sections c.(5) or d.(5) of this permit condition, the permittee shall immediately notify the Department of the results. The Department will work with the permittee to determine the appropriate course of action to evaluate and address the toxicity.

h. Quality Assurance / Reporting

(1) Quality assurance criteria, statistical analyses, and data reporting for the WET tests must be in accordance with the EPA documents stated in this condition.

(2) A bioassay laboratory report for each test must be prepared according to the EPA method documents referenced in this Schedule. This will include all QA/QC documentation, statistical analysis for each test performed, standard reference toxicant test (SRT) conducted on each species required for the toxicity tests, and completed Chain of Custody forms for the samples including time of sample collection and receipt. Reports must be submitted to the Department within 45 days of test completion.

(3) The report should include all endpoints measured in the test, i.e. NOEC, LOEC, and IC_{25}.

(4) The permittee shall make available to the Department, on request, the written standard operating procedures they, or the laboratory performing the WET tests, are using for all toxicity tests required by the Department.

i. Reopener

(1) The Department may reopen and modify this permit to include new limitations, monitoring requirements, and/or conditions as determined by the Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45, if:

- WET testing data indicate acute and/or chronic toxicity.
- The facility undergoes any process changes.
- Discharge monitoring data indicate a change in the reasonable potential to exhibit toxicity.

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 at no less than one grade lower than the system classification.

c. If the wastewater system has more than one daily shift, the permittee shall have the shift supervisor, if any, certified at no less than one grade lower than the system classification.

d. There must be a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

e. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or re-designation of certified operators responsible for supervising wastewater system operation. The notice must be filed with the Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Portland, OR 97201. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

f. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 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 appropriate DEQ Western Region Office in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department. Incidents of noncompliance/spills should be reported to the Oregon Emergency Response System (Telephone Number 1-800-452-0311).

6. An adequate contingency plan for prevention and handling of spills and unplanned discharges must be in force at all times. A continuing programme of employee orientation and education must 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.

7. The permittee is not required to perform a formal hydrogeologic characterisation or preliminary 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. All recycled water used at the treatment plant site (or satellite facility operating under the same permit) for landscape irrigation or in plant processes is exempt from Division 55 rules if:

   a. The recycled water is an oxidised and disinfected wastewater;

   b. The recycled water is used at the site where is it generated or at an auxiliary wastewater or sludge treatment facility that is subject to the same NPDES or WPCF permit as the wastewater treatment system. Contiguous property to the parcel of land upon which the treatment system is located is considered the wastewater treatment system site if under the same ownership;

c. Spray or drift or both from the use does not occur off the site; and,

d. Public access to the site is restricted.

9. Within 180 days of permit issuance, the permittee shall submit to the Department for review and approval an updated program and time schedule for identifying and reducing inflow. Within 60 days of receiving written Department comments, the permittee shall submit a final approvable programme and time schedule. The programme shall consist of the following:

   a. Identification of all overflow points and verification that sewer system overflows are not occurring up to a 24-hour, 5-year storm event or equivalent;

   b. Monitoring of all pump station overflow points;

   c. A program for identifying and removing all inflow sources into the permittee's sewer system over which the permittee has legal control; and

   d. If the permittee does not have the necessary legal authority for all portions of the sewer system or treatment facility, a programme and schedule for gaining legal authority to require inflow reduction and a programme and schedule for removing inflow sources.

10. Industrial Waste Survey/Pre-treatment Program

   a. As soon as practicable, but by no later than six (6) months from permit issuance date, the permittee shall submit to the Department an industrial waste survey as described in 40 CFR 403.8(f)(2)(i-iii) suitable to make a determination as to the need for development of a pre-treatment program.

   b. Should the Department determine that a pre-treatment program is required, the permit will be reopened and modified in accordance with 40 CFR 403.8(e)(1) to incorporate a compliance schedule to require development of a pre-treatment program. The compliance schedule requiring program development will be developed in accordance with the provisions of 40 CFR 403.12(k), and will not exceed twelve (12) months.

SCHEDULE F

NPDES GENERAL CONDITIONS – DOMESTIC FACILITIES

SECTION A. STANDARD CONDITIONS

1. Duty to Comply with Permit
The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and the federal Clean Water Act and is grounds for an enforcement action. Failure to comply is also grounds for the Department to terminate, modify and reissue, revoke, or deny renewal of a permit.

2. Penalties for Water Pollution and Permit Condition Violations
The permit is enforceable by DEQ or EPA, and in some circumstances also by third-parties under the citizen suit provisions 33 USC §1365. DEQ enforcement is generally based on provisions of state statutes and EQC rules, and EPA enforcement is generally based on provisions of federal statutes and EPA regulations.

ORS 468.140 allows the Department to impose civil penalties up to $25,000 per day for violation of a term, condition, or requirement of a permit. The federal Clean Water Act provides for civil penalties not to exceed $32,500 and administrative penalties not to exceed $11,000 per day for each violation of any condition or limitation of this permit.

Under ORS 468.943, unlawful water pollution, if committed by a person with criminal negligence, is punishable by a fine of up to $25,000, imprisonment for not more than one year, or both. Each day on which a violation occurs or continues is a separately punishable offense. The federal Clean Water Act provides for criminal penalties of not more than $50,000 per day of violation, or imprisonment of not more than 2 years, or both for second or subsequent negligent violations of this permit.

Under ORS 468.946, a person who knowingly discharges, places, or causes to be placed any waste into the waters of the state or in a location where the waste is likely to escape into the waters of the state is subject to a Class B felony punishable by a fine not to exceed $200,000 and up to 10 years in prison. The federal Clean Water Act provides for criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment of not more than 3 years, or both for knowing violations of the permit. In the case of a second or subsequent conviction for knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

3. Duty to Mitigate
The permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee must 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 must be submitted at least 180 days before the expiration date of this permit.

The Department 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, 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
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge
d. The permittee is identified as a Designated Management Agency or allocated a wasteload under a Total Maximum Daily Load (TMDL)
e. New information or regulations
f. Modification of compliance schedules
g. Requirements of permit reopener conditions
h. Correction of technical mistakes made in determining permit conditions
i. Determination that the permitted activity endangers human health or the environment
j. Other causes as specified in 40 CFR 122.62, 122.64, and 124.5
k. For communities with combined sewer overflows (CSOs):
   (1) To comply with any state or federal law regulation that addresses CSOs that is adopted or promulgated subsequent to the effective date of this permit
   (2) If new information, not available at the time of permit issuance, indicates that CSO controls imposed under this permit have failed to ensure attainment of water quality standards, including protection of designated uses
   (3) Resulting from implementation of the Permittee's Long-Term Control Plan and/or permit conditions related to CSOs.

The filing of a request by the permittee for a permit modification, revocation or reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee must comply with any applicable effluent standards or prohibitions established under Oregon Administrative Rules (OAR) 340-041-0033 and 307(a) of the federal Clean Water Act for toxic pollutants, and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, 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 and Other Legal Requirements

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other private rights, or any infringement of federal, tribal, state, or local laws or regulations.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the federal Clean Water Act and OAR 340-041-0033 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.

9. Permit Fees

The permittee must pay the fees required by Oregon Administrative Rules.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that 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 that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Activity Not a Defense
For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee must, 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 is not 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 permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b. and c. of this section.
      (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources that 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 and the Department may take enforcement action against a permittee for bypass unless:
         i. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         ii. 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 judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventative maintenance; and
         iii. The permittee submitted notices and requests as required under General Condition B.3.c.
      (2) The Department may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Department 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, a written notice must be submitted to the Department at least ten days before the date of the bypass.
      (2) Unanticipated bypass. The permittee must 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 must 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 Upset
For purposes of this permit, A Single Operational Upset that leads to simultaneous violations of more than one pollutant parameter will be treated as a single violation. A single operational upset is an exceptional incident that 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 upset 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 upset is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations
a. Definitions
   (1) "Overflow" means any spill, release or diversion of sewage including:
      i. An overflow that results in a discharge to waters of the United States; and
      ii. An overflow of wastewater, including a wastewater backup into a building (other than a back-up caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.
b. Prohibition of overflows. Overflows are prohibited. The Department may exercise enforcement discretion regarding overflow events. In exercising its enforcement discretion, the Department may consider various factors, including the adequacy of the conveyance system's capacity and the magnitude, duration and return frequency of storm events.
c. Reporting required. All 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 that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (e.g., public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B.8. 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. Emergency Response and Public Notification Plan
The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses or upsets that may endanger public health. At a minimum the plan must include mechanisms to:
a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;

e. Provide emergency operations; and
f. Ensure that DEQ is notified of the public notification steps taken.

9. Removed Substances
Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must be disposed of in such a manner as to prevent any pollutant from such materials from entering waters of the state, 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 must 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 may not be changed without notification to and the approval of the Department.

2. Flow Measurements
Appropriate flow measurement devices and methods consistent with accepted scientific practices must be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices must 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 must 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, or in the case of sludge use and disposal, under 40 CFR part 503, 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 may, upon conviction, be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years, or 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 must be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports must 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 part 136, or in the case of sludge use and disposal, under 40 CFR part 503, or as specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency must 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 must be recorded unless otherwise specified in this permit.

7. Averaging of Measurements
Calculations for all limitations that require averaging of measurements must utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records
Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR part 503). Records of all monitoring information including all calibration and maintenance records, 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 shall be retained 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 Department at any time.

9. Records Contents
Records of monitoring information must 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 must allow the Department or EPA 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.

11. Confidentiality of Information
Any information relating to this permit that is submitted to or obtained by DEQ is available to the public unless classified as confidential by the Director of DEQ under ORS 468.095. The Permittee may request that information be classified as confidential if it is a trade secret as defined by that statute. The name and address of the permittee, permit applications, permits, effluent data, and information required by NPDES application forms under 40 CFR 122.21 will not be classified as confidential. 40 CFR 122.7(b).

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes
The permittee must comply with OAR chapter 340, division 52, "Review of Plans and Specifications" and 40 CFR Section 122.41(l) (1). Except where exempted under OAR chapter 340, division 52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers may be commenced until the plans and specifications are submitted to and approved by the Department. The permittee must 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 must give advance notice to the Department of any planned changes in the permitted facility or activity that 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 may be transferred to a third party without prior written approval from the Department. The Department may require modification, revocation, and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under 40 CFR Section 122.61. The permittee must 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 must be submitted no later than 14 days following each schedule date. Any reports of noncompliance must 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 must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to DEQ or to the Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.

(1) Oral Reporting within 24 hours.
i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to DEQ.
a) The location of the overflow;
b) The receiving water (if there is one);
c) An estimate of the volume of the overflow;
d) A description of the sewer system component from which the release occurred (e.g., manhole, constructed overflow pipe, crack in pipe); and
e) The estimated date and time when the overflow began and stopped or will be stopped.
ii. The following information must be reported to the Department's Regional office within 24 hours, or during normal business hours, whichever is first:
a) The OERS incident number (if applicable) along with a brief description of the event.

(2) Written reporting within 5 days.
i. The following information must be provided in writing to the Department's Regional office within 5 days of the time the permittee becomes aware of the overflow:
a) The OERS incident number (if applicable);
b) The cause or suspected cause of the overflow;
c) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
d) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
e) (for storm-related overflows) The rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

b. Other instances of noncompliance.
(1) The following instances of noncompliance must be reported:
i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
ii. Any upset that exceeds any effluent limitation in this permit;

iii. Violation of maximum daily discharge limitation for any of the pollutants listed by the Department in this permit; and
iv. Any noncompliance that may endanger human health or the environment.

(2) During normal business hours, the Department's Regional office must be called. Outside of normal business hours, the Department must be contacted at 1-800-452-0311 (Oregon Emergency Response System).

(3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:
i. A description of the noncompliance and its cause;
ii. The period of noncompliance, including exact dates and times;
iii. The estimated time noncompliance is expected to continue if it has not been corrected;
iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
v. Public notification steps taken, pursuant to General Condition B.7

(4) 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 must report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports must 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 must furnish to the Department within a reasonable time any information that the Department may request to determine compliance with the permit or to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit. The permittee must 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 has failed to submit any relevant facts or has submitted incorrect information in a permit application or any report to the Department, it must promptly submit such facts or information.

8. Signatory Requirements
All applications, reports or information submitted to the Department must be signed and certified in accordance with 40 CFR Section 122.22.

9. Falsification of Information
Under ORS 468.953, any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, is subject to a Class C felony punishable by a fine not to exceed $100,000 per violation and up to 5 years in prison. Additionally, according to 40 CFR 122.41(k)(2), any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a federal civil penalty not to exceed $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

10. Changes to Indirect Dischargers
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.

SECTION E. DEFINITIONS

1. *BOD* means five-day biochemical oxygen demand.
2. *CBOD* means five day carbonaceous biochemical oxygen demand
3. *TSS* means total suspended solids.
4. "*Bacteria*" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.
5. *FC* means fecal coliform bacteria.
6. *Total residual chlorine* means combined chlorine forms plus free residual chlorine
7. *Technology based permit effluent limitations* means technology-based treatment requirements as defined in 40 CFR Section 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR Chapter 340, Division 41.
8. *mg/l* means milligrams per liter.
9. *kg* means kilograms.
10. m^3/d means cubic meters per day.
11. *MGD* means million gallons per day.
12. 24-hour *Composite sample* means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow. The sample must be collected and stored in accordance with 40 CFR part 136.
13. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
14. *Quarter* means January through March, April through June, July through September, or October through December.
15. *Month* means calendar month.
16. *Week* means a calendar week of Sunday through Saturday.
17. *POTW* means a publicly owned treatment works

MODIFICATION #1
This modification is attached to and a part of Permit # 101733

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT
Department of Environmental Quality
Western Region – Salem Office
750 Front Street NE, Suite 120, Salem, OR 97301-1039
Telephone: (503) 378-8240
Issued pursuant to ORS 468B.050 and the federal Clean Water Act

ISSUED TO:
City of Brookings
898 Elk Drive
Brookings, OR 97415

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Treated Wastewater	001	R.M. 999

FACILITY TYPE AND LOCATION:
Trickling Filter/Solids Contact
905 Wharf Street
Brookings, OR

RECEIVING STREAM INFORMATION:
Basin: South Coast
Sub-Basin: Chetco
Receiving Stream: Pacific Ocean

Treatment System Class: Level III
Collection System Class: Level III

LLID: 124431142271 - 999 - D
County: Curry

EPA REFERENCE NO: OR002035-4

This is a Department initiated modification in accordance with Oregon Administrative Rules 340-045-0055. The permit was issued in response to Application No. 982829 received on September 1st, 2004 and based on the land use findings in the permit record.

Steve Schnurbusch, Acting Water Quality Manager
Western Region

Date 5/14/12

Modification #1 – Schedule B, the table *Reporting Summary* is replaced with the following:

REPORTING SUMMARY			
Item	**Frequency**	**Due date**	**Section(s)**
Discharge Monitoring Report	Monthly	By 15th of following month	1.a, 1.b
Inflow and Infiltration (I&I) reduction report	Yearly	February 1st of following year	3.a
Biosolids report	Yearly	February 19th of following year	3.b
Whole Effluent Toxicity tests	Minimum 4 tests	Within 45 days of test completion	1.b and *Schedule D-Section 3*
Effluent toxics characterisation	Summary report	January 1st, 2014	1.b and Note B.3

Modification #2 – Schedule B, Note B.2 is replaced with the following:

Toxic Pollutant Testing Frequency: Four scans (for total recoverable metals, hardness, phenols, cyanide, and organic priority pollutants) are required during the two years after permit issuance. Scans must be performed in February and September each year. After four scans, effluent monitoring may be eliminated unless otherwise notified in writing by the Department. The Department will review the data and may require additional monitoring of the effluent and/or receiving stream for specific pollutants of concern or reopen the permit to incorporate permit limits or other requirements.

Monitoring for Inorganic Arsenic, Arsenic III, Chromium III, Chromium IV or Free Cyanide will be required when the "total recoverable" variant of the pollutant parameter is identified as having the reasonable potential to exceed the water quality criterion at the point of discharge.

Modification #3 – Schedule B, Note B.3, the tables are replaced with the following:

Metals[1], Cyanide, Total Phenols, Nitrates, Ammonia and Hardness (ug/l unless otherwise specified)					
Pollutant	CAS[3]	QL	Pollutant	CAS	QL
Antimony	7440360	0.10	Mercury	7439976	0.010
Arsenic	7440382	0.50	Nickel	7440020	10
Arsenic (Inorganic)[4]	7440382	1.0	Selenium	7782492	2.0
Aresenic III[4]	22541544	50	Silver	7440224	1.0
Beryllium	7440417	0.10	Thallium	7440280	0.10
Cadmium	7440439	0.10	Zinc	7440666	5.0
Chromium	7440473	0.40	Cyanide (Free)[2]	57125	TBD
Chromium III[5]	16065831	10	Cyanide (Total)[2]	57125	5.0
Chromium VI	18540299	10	Total Phenolic Compounds		na
Copper	7440508	10	Nitrates-Nitrite	14797558	100
Iron	7439896	100	Ammonia	7664417	1000
Lead	7439921	5	Hardness (Total as $CaCO_3$)		

[1] All metals must be analysed for total recoverable concentration unless otherwise specified.
[2] For effluent cyanide samples, at least six discrete grab samples must be collected over the operating day. The aliquot must not be less than 100 mL and must be collected and composited into a larger container which has been preserved with sodium hydroxide to insure sample integrity. For Free Cyanide use method SM 4500 CN I (Weak Acid Dissociable Cyanide). When Total cyanide is < DL, Free cyanide is considered to be < DL of the Total cyanide.
[3] Chemical Abstract Service
[4] Arsenic Methods: Measurement of Total Arsenic meets the requirement of inorganic and Arsenic III as long as the Total Arsenic result is < 1.0 ug/L and < 50 ug/L respectively. Method EPA 1632A is used to monitor Arsenic III and Arsenic (Inorganic).
[5] Chromium Methods: Measurement of Total Chromium meets the requirement for Chromium III and Chromium VI as long as the Total Chromium result is < 10 ug/L.

Volatile Organic Compounds (ug/l unless otherwise specified)					
Pollutant	CAS	QL	Pollutant	CAS	QL
acrolein	107028	5.0	1,1-dichloroethylene	75354	0.50
acrylonitrile	107131	5.0	1,2-dichloropropane	78875	0.50
benzene	71432	0.50	1,3-dichloropropylene	542756	0.50
bromoform	75252	0.50	ethylbenzene	100414	0.50
carbon tetrachloride	56235	0.50	methyl bromide	74839	0.50
chlorobenzene	108907	0.50	methyl chloride	74873	0.50
chlorodibromomethane	124481	0.50	methylene chloride	75092	0.50
chloroethane	75003	0.50	1,1,2,2-tetrachloroethane	79345	0.50
2-chloroethylvinyl ether	110758	5.0	tetrachloroethylene	127184	0.50
chloroform	67663	0.50	toluene	108883	0.50
dichlorobromomethane	75274	0.50	1,1,1-trichloroethane	71556	0.50

Volatile Organic Compounds (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
1,1-dichloroethane	75343	0.50	1,1,2-trichloroethane	79005	0.50
1,2-dichloroethane	107062	0.50	trichloroethylene	79016	0.50
1,2-trans-dichloroethylene	156605	0.50	vinyl chloride	75014	0.50
The permittee must collect six discrete samples (not less than 40 mL) over the operating day with the results averaged for reporting purposes.					

Acid-extractable Compounds[1] (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
p-chloro-m-cresol	59507	1.0	2-nitrophenol	88755	2.0
2-chlorophenol	95578	1.0	4-nitrophenol	100027	5.0
2,4-dichlorophenol	120832	1.0	pentachlorophenol	87865	2.0
2,4-dimethylphenol	105679	5.0	phenol	108952	1.0
2,4-dinitro-o-cresol	534521	2.0	2,4,5-trichlorophenol[1]	95954	2.0
2,4-dinitrophenol[2]	51285	5.0	2,4,6-trichlorophenol	88062	1.0

[1] Some QL's will may need methods with modification allowed by EPA's **Solutions for Analytical chemistry Problems w/Clean Water Methods, March 2007.**
[2] If necessary, monitoring results from this parameter will also be used to characterize for dinitrophenols

Base-Neutral Compounds[1] (ug/l unless otherwise specified)					
Pollutant	**CAS**	**QL**	**Pollutant**	**CAS**	**QL**
acenaphthene	83329	1.0	3,3-Dichlorobenzidine	91941	1.0
acenaphthylene	208968	1.0	diethyl phthalate	84662	1.0
anthracene	120127	1.0	dimethyl phthalate	131113	1.0
benzidine	92875	10	2,4-dinitrotoluene	121142	1.0
benzo(a)anthracene	56553	1.0	2,6-dinitrotoluene	606202	1.0
benzo(a)pyrene	50328	1.0	1,2-diphenylhydrazine	122667	5.0
3,4-benzofluoranthene	205992	1.0	fluroranthene	206440	2.0
benzo(ghi)perylene	191242	1.0	fluorene	86737	1.0
benzo(k)fluoranthene	207089	1.0	hexachlorobenzene	118741	1.0
bis(2-chloroethoxy)methane	111911	2.0	hexachlorobutadiene	87683	2.0
bis(2-chloroethyl)ether	111444	1.0	hexachlorocyclopentadiene	77474	2.0
bis(2-chloroisopropyl)ether	108601	2.0	hexachloroethane	67721	2.0
bis (2-ethylhexyl)phthalate	117817	1.0	indeno(1,2,3-cd)pyrene	193395	1.0
4-bromophenyl phenyl ether	101553	1.0	isophorone	78591	10
butylbenzyl phthalate	85687	1.0	napthalene	91203	1.0
2-chloronaphthalene	91587	1.0	nitrobenzene	98953	1.0
4-chlorophenyl phenyl ether	7005723	1.0	N-nitrosodimethylamine	62759	1.0
chrysene	218019	1.0	N-nitrosodi-n-propylamine	621647	2.0
di-n-butyl phthalate	84742	1.0	N-nitrosodiphenylamine	86306	1.0
di-n-octyl phthalate	117817	1.0	Pentachlorobenzene[2]	608935	10
dibenzo(a,h)anthracene	53703	1.0	phenanthrene	85018	1.0
1,2-Dichlorobenzene (o)	95501	0.50	pyrene	129000	1.0
1,3-Dichlorobenzene (m)	541731	0.50	1,2,4-trichlorobenzene	128821	5.0
1,4-Dichlorobenzene (p)	106467	0.50	Tetrachlorobenzene,1,2,4,5[2]	95943	1.0

[1] Some QL's will may need methods with modification allowed by EPA's **Solutions for Analytical chemistry Problems w/Clean Water Methods, March 2007.**
[2] Analytic Methods: Pentachlorobenzene and Tetrachlorobenzene 1,2,4,5 use EPA 625

State of Oregon
Department of
Environmental
Quality

City of Brookings Wastewater Treatment Plant
Proposed NPDES Permit Modifications
Amendments to Evaluation Report

Oregon Department of Environmental Quality
Western Region Medford Office
221 Stewart Avenue
Medford OR 97501

Contact: Andy Ullrich
Date: February 7th, 2012

Background

DEQ reissued a National Pollutant Discharge Elimination System (NPDES) permit to the City of Brookings Wastewater Treatment Plant on November 7th, 2011. The reissued permit contains intensive monitoring requirements that are based on DEQ's Interim Management Directive (IMD) *Reasonable Potential Analysis Process for Toxic Pollutants, Version 3.0* (August, 2011) and the Oregon Administrative Rules, Chapter 340, Division 41, Table 40 (*Human Health Water Quality Criteria for Toxic Pollutants, October, 2011*). The IMD requires four monitoring events during the first two years of the permit. This is known as "Tier 1 Monitoring". The first event is scheduled to occur in February 2012.

Upon consultation with contract laboratories regarding these requirements, the City found that the language in the Schedule B of the reissued permit was confusing and contains unnecessary analytical methods. Also, some typographical errors were noted. This modification is intended to provide clarity on the monitoring requirements and to correct the errors.

Modification #1: Monitoring Summary table in *Schedule B*

The *Monitoring Summary* table specified that results for each effluent toxics characterisation test was to be submitted to the Department within 45 days of each test completion. This table has been corrected to specify a summary report of all four tests is due by July 1st, 2014.

Modification #2: Note B.2 – Toxic Pollutant Testing Frequency

This modification clarifies metals testing is for total recoverable only. It further clarifies that testing for the species of arsenic, chromium, and/or cyanide will only be required if the results for total recoverable variant of the parameter shows a reasonable potential to exceed the water quality criterion at the point of discharge.

Modification #3: Metals, Cyanide, Total Phenols and Hardness testing

This modification clarifies that metals are to be analysed for total recoverable. It also references Note B.2 for testing of the species of arsenic, chromium and cyanide.

Modification #4: Note B.9 – Free cyanide test method (Added note)

Schedule F, Condition C3 states: "Monitoring must be conducted according to test procedures approved under 40 CFR part 136 or, in the case of sludge use and disposal, approved under 40 CFR part 503 unless other test procedures have been specified in this permit." However, there is no approved test procedure for free cyanide in 40 CFR part 136. This modification specifies a test method for free cyanide.

State of Oregon
Department of
Environmental
Quality

National Pollutant Discharge Elimination System
PERMIT EVALUATION AND FACT SHEET

Oregon Department of Environmental Quality
Western Region
750 Front St NE, Suite 120
Salem OR 97301
(503) 378-8240

Permittee:	*City of Brookings* *898 Elk Drive* *Brookings, OR 97415*
Existing Permit Information:	File Number: *11297* Permit Number: *101773* Expiration Date: *February 28th, 2005* EPA Reference Number: *OR002035-4*
Source Contact:	*Raymond Page – (541) 412-0424* *Utilities Superintendent*
Source Location:	*901 Wharf Street* *Brookings, OR*
LLID	*1244311424271 RM 999 D*
Receiving Stream	*Pacific Ocean*
Proposed Action:	*Renew Permit* Application Number: *982829* Date Received: *September 1st, 2004*
Source Category	*NPDES Major – Domestic*
Permit Writer:	*Andy Ullrich* *Compliance Engineer – WR* *(541) – 776-6189*

Table Of Contents

1.0 Introduction 4
2.0 Facility description 4
2.1 General 4
2.2 Wastewater Treatment 5
2.3 Changes in Operation 6
2.4 Groundwater Issues 6
2.5 Storm Water 6
2.6 Outfalls 6
Outfall 001 (Treated wastewater) 6
2.7 Industrial Pre-treatment 6
2.8 Biosolids 6
2.9 Inflow and Infiltration (I/I) 7
3.0 Receiving Water 8
3.1 Designated Beneficial Uses 8
3.2 Receiving Stream Water Quality 8
3.3 Mixing Zone Analysis 9
3.4 Environmental Mapping 11
4.0 Permit & Compliance History 11
4.1 Previous Permit Actions 11
4.2 Current Permit Limits 11
4.3 Mixing zone 12
4.4 Inspection history 12
4.5 Compliance history 12
5.0 Permit limitations 12
5.1 Technology-Based Effluent Limits 12
5.2 Water Quality-Based Effluent Limits 13
5.3 Whole Effluent Toxicity 13
5.4 Anti-degradation/Anti-backsliding 14
6.0 Permit Draft Discussion 14
6.1 Face Page 14
6.2 Schedule A, Waste Discharge Limitations 15
Outfall 001 – Treated effluent to the Pacific Ocean 15

BOD_5 and TSS concentration and mass limits 15
BOD_5 and TSS Percent Removal Efficiency 15
pH 16
Enterococci and Fecal Coliform bacteria 16
Groundwater 17
6.3 Schedule B – Minimum Monitoring and Reporting Requirements 17
Influent Monitoring 18
Effluent Monitoring – Outfall 001 18
Biosolids 19
Reporting 19
6.4 Schedule D - Special Conditions 19
6.5 Schedule E, Pre-Treatment Activities 20
6.6 Schedule F, NPDES General Conditions 20
6.6 Permit Processing/Public Comment/Appeal Process 21
Appendix B: Treatment and Collection System Classification 24
Appendix C: pH Reasonable Potential Analysis Worksheet 28
Appendix D: Effluent Reasonable Potential Analysis Worksheets 29
Ammonia 29
Zinc 30
Phthalate 30
Appendix E: Compliance History 31

1.0 Introduction

The existing National Pollutant Discharge Elimination System (NPDES) Permit 101773, issued to the City of Brookings, expired on February 28th, 2005. The Department received renewal application number 982829 from the City on September 1st, 2004. As this renewal application was submitted to the Department in a timely manner prior to the expiration date of the permit, the permit shall not be deemed to expire until final action has been taken on the renewal application as per OAR 340-045-0040. The Department proposes to renew the permit.

This permit evaluation report describes the basis and methodology used in developing the permit. The permit is divided into several sections:

Schedule A – *Waste discharge limitations*
Schedule B – *Minimum monitoring and report requirements*
Schedule D – *Special conditions*
Schedule F – *General conditions*

The Federal Water Pollution Control Act of 1972 and subsequent amendments require a NPDES permit for the discharge of wastewater to surface waters. Furthermore, Oregon Revised Statutes (ORS 468B.050) also require a discharger be granted a permit for the discharge of wastewater to surface waters. This proposed permit action by the Department complies with both federal and state requirements.

2.0 Facility description

2.1 General

The Brookings sewage treatment system serves the City of Brookings, located in Curry County in southwest Oregon. The system was originally constructed in 1950's, and has been periodically expanded and upgraded. The City completed the latest upgrade in 2000, and is currently in the planning stages to upgrade the solids-handling portion of the plant.

Harbor Sanitary District also discharges to the treatment plant. The combined flow is reported on the monthly discharge monitoring reports. No other communities or sanitary districts discharge to the plant.

The combined service population of the Brookings-Harbor area is approximately 10,380, as reported on the monthly monitoring reports. During the summer of 2009, average daily flow to the plant was in the range of 0.75 to 0.85 million gallons per day (MGD) Wintertime flows are considerably higher, with daily flows often over 2 MGD, with peak flows over 4.6 MGD.

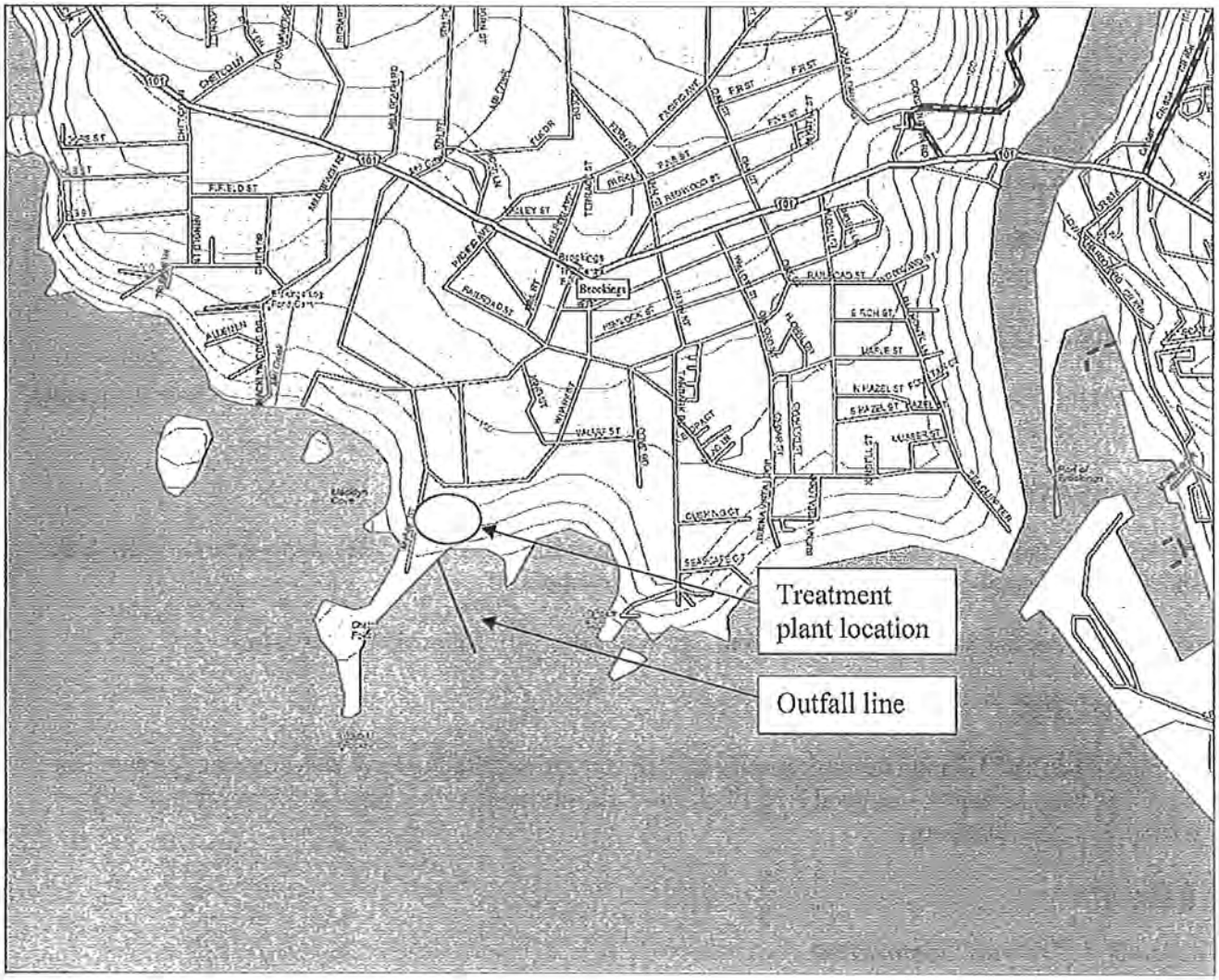


Figure 1: Facility and Outfall Location

2.2 Wastewater Treatment

Wastewater is moved to the treatment plant by both the City-owned collection system and the Harbor Sanitary District collection system. Both systems use a combination of gravity-flow lines, pump stations and pressure lines to move the wastewater.

The treatment plant is a convention design, with primary treatment, followed by secondary treatment, and concluding with disinfection before the wastewater is discharge to the Pacific Ocean. Biosolids are further processed in a separate system before disposal.

The initial primary treatment phase consists of a headworks section with bar screens and grit cyclones. This is followed by a trio of primary clarifiers, two rectangular units that are typically used, and an old circular unit that has been out of service for many years.

The secondary treatment phase consists of a trickling filter, followed by aeration basins using the activated sludge process. A pair of secondary clarifiers follow the aeration basins, and return the activated sludge either to the aeration basins or the biosolids handling section as appropriate.

Disinfection is accomplished using ultra-violet (UV) light. The effluent is then discharged to the Pacific Ocean through a submerged multi-port diffuser line.

Biosolids processing consists of thickening using a belt unit, along with anaerobic digestion. Liquid biosolids are either land-applied, or hauled to another facility for composting.

2.3 Changes in Operation

The last major plant upgrade was completed in 2000. No significant plant modifications have been made since that time. Planning is underway to upgrade the biosolids handling systems.

2.4 Groundwater Issues

All treatment takes place in concrete tanks. Unless one of the tanks was to develop a serious leak, there will be no impacts to groundwater from the treatment process.

The facility does not land-apply any effluent, nor make any effluent available for re-use.

2.5 Storm Water

Treatment plants of 1.0 mgd design capacity and greater are required to have a storm water permit. The facility has been assigned a General NPDES 1200-Z storm water permit, and all storm water discharges are covered under that permit.

2.6 Outfalls

Outfall 001 (Treated wastewater)

Wastewater is discharged through a single outfall to the Pacific Ocean. The outfall is located about 500 feet from shore, and is equipped with a diffuser. The diffuser has ten ports, each spaced 8 feet apart. The ports are on alternate sides of the discharge line. The line is always submerged, even during extremely low tides.

2.7 Industrial Pre-treatment

Pacific Wood Laminates/South Coast Lumber is the single industrial user that discharges to the collection system. Under Federal Rules, an existing source of this type is not considered a "categorical" industry, and therefore a pre-treatment program is not required at this time.

2.8 Biosolids

The management of biosolids generated by the City's facility is regulated by state rules (OAR 340-050). Previously, the City land-applied liquid biosolids on an approved site near Brookings. For the last several

years, however, the City has hauled the liquid biosolids to the Merlin Compositing Facility near Grants Pass. The Merlin facility is owned and operated by the City of Grants Pass.

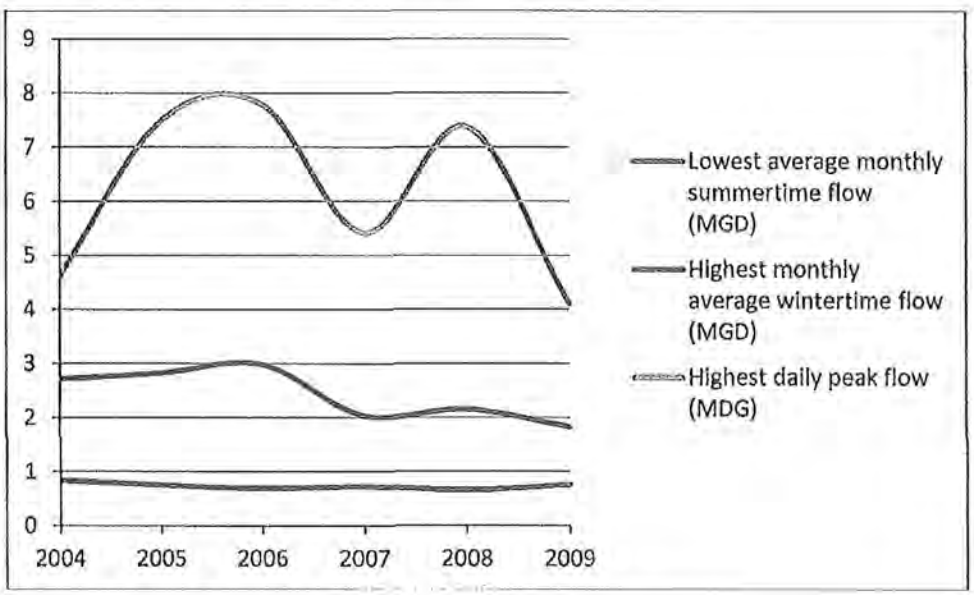
The City operates under a Department approved *Biosolids Management Plan*. The plan was last updated as part of the last permit renewal. The plan remains current, and characterises the City's past and proposed biosolids handling, treatment and disposal operations.

The current permit requires the submission of an annual biosolids monitoring report. In 2009 the City hauled the equivalent of 98 dry tons to the Merlin Compositing Facility.

2.9 Inflow and Infiltration (I/I)

In even the best maintained sanitary sewer collection systems, some non-sewage water gets into the system and is conveyed to the treatment plant. This non-sewage influent is called *Inflow and Infiltration* (I&I). Inflow is where storm water can directly enter the collection system. This occurs when storm drains, roof gutters and the like are directly piped into the sanitary sewer collection system. It also can occur when sewer cleanouts are not properly capped, or when manhole covers are below grade. Infiltration is where groundwater can enter the collection system through cracks in the pipes and joints between the pipes. Excess I&I can hydraulically overload the collection system and the treatment plant. It can also impact the treatment process by excessively diluting the incoming wastewater to the plant.

The highest average monthly wintertime flow, the lowest average summertime flow and the peak flow during this permit period is plotted below.



Summertime flows have remained constant during this permit cycle, indicating that the base flow to the plant has not increased. Average winter flows showed a decrease in 2007, and have remained constant since then. Peak flows have too much variability to note a trend at this time.

Overall, the data indicates that the City has a moderate issue with I&I. In order to comply with the new Federal regulations on storm-related sanitary sewer overflows, the City will need to continue its efforts to find and correct I&I issues within its collection system.

3.0 Receiving Water

3.1 Designated Beneficial Uses

The City of Brookings sewage treatment plant discharges to the Pacific Ocean just west of the mouth of the Chetco River. This is in the South Coast Basin. OAR 340-041-0300 (Table 300A) lists the beneficial uses for which water quality will be protected. Included in Table 300A for *Estuaries & Adjacent Marine Water* are:

- Industrial water supply,
- fish and aquatic life,
- wildlife and hunting,
- fishing,
- boating,
- water contact recreation,
- aesthetic quality,

commercial navigation and transportation.
The water quality standards for all water-bodies (Oregon Administrative Rules - OAR 340-41) and specifically the South Coast Basin (OAR 340-041-0300) were developed to protect these beneficial uses.

3.2 Receiving Stream Water Quality

Under the current permit, discharge is permitted to the Pacific Ocean year-round.

The Pacific Ocean is not listed on the Department's 2004/2006 List of Water Quality Limited Water Bodies (also called the 303(d) list). No Total Maximum Daily Loads (TMDLs) have been developed or are proposed for the Pacific Ocean in this basin.

Federal rules (40CFR125.120 – 40CFR125.124) require that a discharge into territorial seas that is to be permitted under the NPDES program be evaluated as to whether it will cause unreasonable degradation of the marine environment. Goals 6 and 19 of Oregon's State-wide Planning Goals and Guidelines and Oregon's Territorial Seas Plan require that the State's marine resources be conserved.

The Oregon Department of Environmental Quality (DEQ) believes that the intent of these criteria is to reduce or prevent the discharge of those persistent pollutants that bio-accumulate in the marine food chain. Pollutants found in sewage that are amenable to treatment by typical wastewater treatment plants include Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, bacteria, nutrients, and potentially toxic substances.

Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), and pH are not discrete substances that can accumulate in living organisms. BOD_5 is a measure of the oxygen used by microorganisms when

they break down organic matter and TSS is a measure of organic and inorganic solid materials that are suspended in the water column. pH is a measurement of the amount of hydrogen ions in solution.

Residual chlorine in treated wastewater, if any, immediately reacts with the bromide naturally present in seawater to produce other oxidants that are toxic to living organisms, i.e., have the same sanitizing effect as chlorine. These other oxidants are referred to as chlorine produced oxidants. Chlorine, which is still present in the reaction products, is too reactive to be bio-available from soil, water, or other environmental media and too reactive to bio-accumulate in the food chain.

Bacteria do not accumulate in other living organisms.

Nutrients, i.e., nitrogen and phosphorus, can have deleterious effects on the marine environment by stimulating algal blooms. These algal blooms have the potential to cause turbidity problems and fluctuations in dissolved oxygen and pH. However, nutrients do not bio-accumulate in the tissues of living organisms and do not bio-magnify in the trophic levels of marine food chains.

The 2007 Oregon Legislature passed Senate Bill 737, which required DEQ to develop a list of priority persistent pollutants that could potentially discharge to surface waters and have a documented effect on human health, wildlife and aquatic life (the "P3 List"). Oregon's 52 largest municipal wastewater treatment facilities tested their effluent for P3 pollutants, including many consumer-related pollutants such as pharmaceuticals and personal care product ingredients. Two discrete sample events were conducted at each facility.

Only two P3 pollutants were found over the initiation level in most municipal wastewater effluents: Cholesterol (CASRN 57-88-5) and Coprostanol (CASRN 360-68-9). Toxicity models concluded that these naturally-occurring by-products of human digestion are toxic and persistent in aquatic ecosystems. Effluent concentrations met criteria for inclusion on the P3 List but there are limited published scientific data on toxicological effects. Since toxic concentrations are unknown, the potential presence of these substances in the effluent is unlikely to cause unreasonable degradation of the marine environment.

DEQ used information submitted as part of the permit application and monitoring data from Discharge Monitoring Reports and the P3 scans to evaluate these issues. BOD_5, TSS and pH have consistently met permit limits. Ultra-violet light (UV) is used to disinfect the final effluent, and no chlorine products are used or are present. Like the majority of the test municipal plants, only cholesterol and coprostanol were found in the P3 scans. Therefore, DEQ has concluded that the discharge from the Brookings WWTP will not cause unreasonable degradation of the marine environment. Full text of these findings is in the source file and can be viewed at the Eugene DEQ office upon request

3.3 Mixing Zone Analysis

Federal regulations (40 CFR 131.13) allow for the use of mixing zones, also known as "allocated impact zones". These are small areas around a discharge where water quality standards may be suspended. Application of mixing zones must ensure acute toxicity to drifting organisms is prevented and the integrity of the water body as a whole is not impaired. EPA does not have specific regulations pertaining to mixing zones. Each state may adopt its own mixing zone regulations that are subject to review and approval by EPA. In States that lack approved mixing zone regulations, ambient water quality standards must be met

at the end of the pipe. OAR 340-041-0053(1) provides that the Department may suspend all or part of the water quality standards in a designated portion of the receiving water to serve as a zone of dilution for wastes and receiving waters to mix thoroughly.

The Department has developed mixing zone regulations and policy based in part on the acute and chronic aquatic life criteria. Based on EPA guidance and the Department's mixing zone regulations, two mixing zones may be developed for each discharge that reflect acute and chronic effects:

1) The acute mixing zone, also known as the "zone of initial dilution" (ZID),

2) The chronic mixing zone, usually referred to as "the mixing zone".

Acute criteria are suspended within the ZID but it is designed to prevent lethality to organisms passing through the ZID. Chronic criteria are suspended within the mixing zone and is designed to protect the integrity of the entire water body as a whole. The allowable size of the mixing zone should be based upon the relative size of the discharge to the receiving stream, the beneficial uses of the receiving stream, location of other discharges nearby, location of drinking water intakes, and other considerations. More specific guidance is available from EPA regarding criteria used in appropriately sizing a ZID. Primarily the ZID must be designed to prevent lethality to drifting organisms.

The mixing zone in the existing permit was defined as follows:

> *The allowable mixing zone shall not extend beyond a radius of 300 feet from the point of discharge.*

Note that a ZID was not defined.

Brown & Caldwell prepared a memo on the Brookings mixing zone in 1991, and updated it in 1997. Subsequently, the Department in 2007 modelled the discharge using CORMIX; a computer model that simulates effluent discharges into a receiving waterbody. The modelling analysis and results are documented in a June 8, 2007 memo.

On the basis of the modelling, the Department proposes to revise the mixing zone definition as follows:

> *The allowable mixing zone is that portion of the Pacific Ocean contained within a 300-foot radius of the point of discharge. The Zone of Immediate Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within thirty (30) feet of the point of discharge.*

The predicted dilutions for this mixing zone are as follows:

CORMIX Dilution Predictions		
Season	Edge of ZID (acute)	Edge of Mixing Zone (chronic)
Summer	20	157
Winter	17	43

3.4 Environmental Mapping

The 2007 analysis did not specifically address environmental mapping for the mixing zone. A review of available literature showed that there are no public access areas or drinking water intakes within 0.5 miles of the outfall. There are no other NPDES permits on this section of the Pacific Ocean. In addition, the ocean discharge findings discussed in the receiving stream water quality section above addresses environmental mapping.

4.0 Permit & Compliance History

4.1 Previous Permit Actions

The Department issued NPDES Permit 101773 on May 1st, 2000. The permit was modified in 2002 by a Permit Action Letter. The modification updated the allowable test methods for *E. coli* bacteria.

4.2 Current Permit Limits

a. Treated Effluent Outfall 001

(1) November 1st – April 30th:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly Average lb/day	Weekly Average lb/day	Daily Maximum lbs
BOD_5	25 mg/L	30 mg/L	730	1,100	2,000
TSS	25 mg/L	30 mg/L	730	1,100	2,000

(2) May 1st – October 31st:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
BOD_5	15 mg/L	25 mg/L	260	400	570
TSS	15 mg/L	25 mg/L	260	400	570

(3)

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	No chlorine or chlorine products shall be allowed.

4.3 Mixing zone

The mixing zone in the current permit is defined as follows:

> *The allowable mixing zone shall not extend beyond a radius of 300 feet from the point of discharge.*

The mixing zone definition in the proposed permit has been revised as follows:

> *The allowable mixing zone is that portion of the Pacific Ocean contained within a 300-foot radius of the point of discharge. The Zone of Immediate Dilution (ZID) is defined as that portion of the regulatory mixing zone that is within thirty (30) feet of the point of discharge.*

4.4 Inspection history

The facility was last inspected on July 12th, 2010. The facility was found to be operating in compliance with the permit, and no violations were documented. The inspection covered the treatment plant, bio-solids processing and the on-site laboratory.

4.5 Compliance history

The facility submits monthly Discharge Monitoring Reports (DMRs) to document compliance with their permit limits. A number of violations were documented during this permit cycle, and are summarized in *Appendix E*.

All violations have been corrected, and the DEQ now considers the facility to be in substantial compliance with the terms of the current permit.

5.0 Permit limitations

Two categories of effluent limitations exist for NPDES permits: 1) Technology based effluent limits, and 2) Water quality based effluent limits. Technology based effluent limits have been defined by state and federal rules, and were established to require a minimum level of treatment for industrial or municipal sources using available technology. The limit(s) are based on the capability of a given treatment method to reduce that pollutant to a certain concentration. In contrast, Water Quality based effluent limits are designed to be protective of the beneficial uses of the receiving water and are independent of the available treatment technology. In addition, when performing a permit renewal, there may be existing permit limits. These may be technology-based limits, water quality-based limits, or limits based on best professional judgment. When renewing a permit, the most stringent of technology based or water quality based limits apply.

5.1 Technology-Based Effluent Limits

EPA has established minimum secondary treatment standards for domestic wastewater treatment facilities, which are found in 40 CFR Part 133. A facility must achieve a biochemical oxygen demand (BOD_5) monthly average of 30 mg/l and a weekly average of 45 mg/l. The facility must also achieve a suspended solids (TSS) monthly average of 30 mg/l and a weekly average of 45 mg/l for the same period. The pH

must be between 6.0 and 9.0. In addition, the facility must remove at least 85% of the influent BOD_5 and TSS.

Oregon Administrative Rules also establish minimum design criteria for domestic treatment facilities. In the South Coast Basin, the rules may be found at OAR 340-041-0305. The BOD_5 and TSS minimum design criteria for ocean discharges is secondary treatment or the equivalent. The pH must be between 7.0 and 8.5.

5.2 Water Quality-Based Effluent Limits

Pollution parameters should be limited if there is a reasonable potential for the discharge to cause or contribute to an excursion above any state water quality criteria or standard.

The Department is required to determine whether the discharge has the reasonable potential to cause or contribute to exceeding a water quality standard. EPA has developed a method to make this determination for toxic pollutants called a *Reasonable Potential Analysis* (RPA). This methodology was developed primarily for acute and chronic criteria, but can be adapted to other criteria based on different frequencies and durations. The RPA for specific parameters is discussed below. An RPA relies on statistical probability to determine the likelihood that a discharge will violate an in-stream criterion based on the effluent data, its variability, available dilution, and the receiving water background concentration. The DEQ has developed RPA spreadsheets that employ EPA's methodology.

As part of the renewal application, the City of Brookings ran a scan for a number of pollutants of concern. The scans showed three pollutants present in detectable amounts: ammonia, zinc and Bis(2-ethylhexyl)phthalate. The test results for these three pollutants were analysed using the RPA spreadsheets. These spreadsheets are shown in *Appendix D*. None of three pollutants were found to have a reasonable potential to violate water quality standards. Therefore, no discharge limits for these three pollutants are included in the proposed permit.

5.3 Whole Effluent Toxicity

Whole Effluent Toxicity (WET) is a term used to describe the aggregate toxic effect of an aqueous sample (e.g., whole effluent wastewater discharge) as measured by an organism's response upon exposure to the sample (e.g., lethality, impaired growth or reproduction). WET tests replicate, to the greatest extent possible, the total effect and actual environmental exposure of aquatic life to toxic pollutants in an effluent without requiring the identification of the specific pollutants. WET testing is a vital component of the water quality standards implementation through the NPDES permitting process.

EPA's promulgated WET test methods include an acute test (96 hours or less, endpoint: mortality), and a chronic test (7 day life-cycle test, endpoints: growth, reproduction, and mortality). EPA has developed WET test protocols using both freshwater and marine and estuarine test species. EPA recommends running tests using an invertebrate, vertebrate and a plant to identify the most sensitive species for developing NPDES WET permit limits or testing requirements.

The organisms used in saltwater WET acute tests *Holmesimysis costata* (mysid shrimp) and *Menidia beryllina* (inland silverside). *Americamysis* (Mysidopsis) *bahia* may be substituted if *H. costata* is not

available. The organisms used in saltwater WET chronic tests *Holmesimysis costata* (mysid shrimp), *Atherinops affinis* (topsmelt) and *Macrocystis pyrifera* (giant kelp). *Americamysis (Mysidopsis) bahia* may be substituted if *H. costata* is not available. These organisms are indicators or surrogates for the aquatic community to be protected, and a measure of the real biological impact from exposure to the toxic pollutants. To protect water quality, EPA recommends that WET tests be used in NPDES permits together with requirements based on chemical-specific water quality criteria.

WET tests are designed to predict the impact and toxicity of effluents discharged from point sources into waters of the United States. WET monitoring requirements are included in NPDES permits to generate data for use in assessing whether the effluent as a whole demonstrates toxicity. The tests are used to determine the percentage of effluent that produces an adverse effect on a group of test organisms. The measured effect may be fertilization, growth, reproduction, or survival. An acute WET test is considered to show toxicity if lethality is found at concentrations less than those occurring at the edge of the zone of immediate dilution (ZID). A chronic WET test is considered to show toxicity if any adverse affect occurs at concentrations less than that which is known to occur at the edge of the mixing zone.

The facility conducted several WET tests during the previous permit cycle. The most recent test series was done in August 2006, and showed no statistically significant toxicity effects in any of the tests.

The proposed permit requires annual whole effluent toxicity (WET) tests using three species in the proposed permit. If the results of the first four tests show that the effluent is not toxic, no further Whole Effluent Toxicity testing will be required during this permit. Whole Effluent Toxicity tests are to be conducted in accordance with EPA test methods and procedural requirements as defined in Schedule D.

5.4 Anti-degradation/Anti-backsliding

An anti-degradation review was performed for this discharge. The permit is being renewed without any increase in discharge loadings. Permit renewals with the same discharge loadings are not considered to lower water quality from the existing conditions. Based on the anti-degradation review, the Department determined the proposed discharge complies with the Anti-degradation Policy for Surface Waters found in OAR 340-041-0026, and recommends proceeding with the permit renewal. Please refer to *Appendix A*.

6.0 Permit Draft Discussion

6.1 Face Page

The face page provides information about the permittee, description of the wastewater, outfall location, receiving stream information, permit approval authority, and a description of permitted activities. The permittee is authorised to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system. The permit allows discharge to the Pacific Ocean within the limits set by *Schedule A* and the following schedules. All other discharges are prohibited.

In accordance with *OAR Chapter 340, Division 49* all permitted municipal wastewater collection and treatment facilities are to receive a classification based on the size and complexity of the systems. The Department has incorporated the classification of the collection and treatment systems into the NPDES discharge permit. The Department evaluated the classifications for the upgraded treatment and collection

system as shown in *Appendix B*. The plant is in the process of adding a screw press to dewater the bio-solids. This is similar in complexity to a centrifuge, and so the screw press has been counted on that basis. The treatment system will be considered a Class III system, and the collection system will be considered a Class III system. These are the same classifications found in the existing permit.

NPDES permits can be issued for up to five years. The Department proposes to issue this permit for the full five year period.

The Department assigns a *Latitude Longitude Identification (LLID)* number to each facility. The LLID identifies the receiving waters on the basis of its latitude and longitude. A river mile is also typically assigned, which identifies where the discharge is located along the water body. The Pacific Ocean from the California border to the Rogue River has been assigned the LLID number 124431142271. Mileage numbers have not yet been assigned along most of the Oregon coast, so the placeholder 999 has been used. The river mile will be updated when mileage assignments have been made.

6.2 Schedule A, Waste Discharge Limitations

Schedule A contains the effluent limitations proposed for *Outfall 001*. In addition, there is a condition prohibiting adverse impacts on existing or potential beneficial uses of groundwater.

Outfall 001 – Treated effluent to the Pacific Ocean

The Department is proposing to retain the existing limits for Biological Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH and removal efficiency. The limit for *E. coli* bacteria is being replaced by limits for *Enterococci* and Fecal Coliform bacteria. These limits are discussed in more detail below.

BOD_5 and TSS concentration and mass limits

Based on the South Coast Basin design criteria, a minimum of secondary treatment is required. Secondary treatment in Oregon is defined as a monthly average concentration of 30 mg/l and a weekly average of 45 mg/l for both BOD_5 and TSS.

During the previous permit renewal, more stringent performance-based limits were used. In accordance with anti-backsliding rules, the Department is proposing to renew the permit with these more stringent limits.

The mass load limits in the existing permit were based on the performance-based limits and projected flows into the treatment plant. The Department is proposing to renew the permit with the same mass load limits.

BOD_5 and TSS Percent Removal Efficiency

The Federal standards for Percent Removal Efficiency are found at Code of Regulations 40 CFR, Part 133. Generally, a minimum 85 percent removal efficiency is required. This limit was used in the previous permit, and is retained in the proposed permit.

pH

The South Coast Basin water quality standard for pH is found at OAR 340-041-0305. The allowed range for ocean discharges is 7.0 to 8.5. Conversely, Federal standards for sewage treatment plants allow a range of 6.0 to 9.0. The Federal limits are applied to the majority of NPDES-permitted sewage treatment plants in the state.

The water quality standards for pH do not have to be met within the permittee's mixing zone. The water quality standards must, however, be met at the edge of the mixing zone. A Reasonable Potential Analysis (RPA) of the pH at the edge of mixing zone was performed and is shown as *Appendix C*. Analytical values used for the RPA were taken from the mixing zone analysis performed by Department staff and summarised in a Department memo dated June 8th, 2007.

The analysis showed no potential for an effluent limitation of 6.0 to 9.0 to cause an excursion outside the water quality standards of 7.0 to 8.5. Therefore the existing limit of 6.0 to 9.0 is retained in the proposed permit, and the Department considers this protective of water quality standards.

Enterococci and Fecal Coliform bacteria

The proposed permit includes effluent limits based on both fecal coliform and enterococci bacteria.

Since the discharge is to marine waters, Oregon Administrative Rule 340-041-0009(1)(b) establishes a numeric criteria of 14 fecal coliform organisms per 100 ml, with not more than ten percent of the samples exceeding 43 organisms per 100 ml. On December 16, 2004, the US EPA promulgated the Beach Act in Oregon, which established an additional standard for coastal recreation waters. The applicable standard to protect this use is a geometric mean enterococci bacteria concentration of not more than 35 organisms per 100 ml.

OAR 340-041-0009 also contains requirements regarding sewer overflows. These requirements are addressed in Schedule F (General Conditions) of the proposed permit. Regarding the *General Condition 6* found in *Section B* of *Schedule F* in this permit which prohibits overflows from wastewater conveyance systems, the Environmental Quality Commission (EQC) recognises that it is impossible to design and construct a conveyance system that will prevent overflows under all storm conditions. The applicant is not seeking permit coverage for overflows and the permit does not authorise such discharges. The State of Oregon has determined that all wastewater conveyance systems should be designed to transport storm events up to a specific size to the treatment facility. Therefore, in exercising its enforcement discretion regarding Sanitary Sewer Overflows, the Department will consider the following:

(1) Whether the permittee has conveyance and treatment facilities adequate to prevent overflows except during a storm event greater than the one-in-five-year, 24-hour duration storm from November 1 through May 21 and except during a storm event greater than the one-in-ten-year, 24-hour duration storm from May 22 through October 31. In addition, DEQ will also consider using enforcement discretion for overflows that occur during a storm event less than the one-in-five-year, 24-hour duration storm from November 1 through May 21 if the permittee had separate sanitary and storm sewers on January 10, 1996, had experienced sanitary sewer overflows due to inflow

and infiltration problems, and has submitted an acceptable plan to the Department to address these sanitary sewer overflows by January 1, 2010;

(2) Whether the permittee has provided the highest and best practicable treatment and/or control of wastes, activities, and flows and has properly operated the conveyance and treatment facilities;

(3) Whether the permittee has minimised the potential environmental and public health impacts from the overflow; and

(4) Whether the permittee has properly maintained the capacity of the conveyance system.

DEQ will review the permittee's determination of the one-in-five-year, 24-hour duration winter storm and the one-in-ten year, 24-hour duration summer storm as described above in the permit holder's facilities plan. In the event that a permit holder reports an overflow event associated with a storm event and DEQ does not have information from the permit holder sufficient to determine whether or not the storm event exceeds storm events as specified in OAR 340-041-0009(6) & (7), DEQ will perform the determination using the information contained in Figure 26 of the 1973 NOAA Atlas 2 entitled "Precipitation-Frequency Atlas of the Western United States, Volume X – Oregon". This figure is entitled "Isopluvials of 5-yr 24-hr precipitation in tenths of an inch". The Atlas can be obtained on line at:

http://hdsc.nws.noaa.gov/hdsc/pfds/other/or_pfds.html

However, the file is very large. A scanned version of Figure 26 is available at:

http://www.wrcc.dri.edu/pcpnfreq/or5y24.gif

DEQ will compare the information in this figure with rainfall data available from the National Weather Service, or other source as necessary.

Groundwater

Based on the Department's current information, this facility has a low potential for adversely impacting groundwater quality because the wastewater is contained in concrete or metal structures. The permit includes a condition in *Schedule A* that prohibits any adverse impact on groundwater quality. In addition, *Schedule D* of the proposed permit states that no groundwater evaluations will be required during this permit cycle.

6.3 Schedule B – Minimum Monitoring and Reporting Requirements

Schedule B describes the minimum monitoring and reporting necessary to demonstrate compliance with the conditions of this permit. The authority to require periodic reporting by permittees is included in ORS 468.065(5). Self-monitoring requirements are the primary means of ensuring that permit limitations are being met. In addition, other parameters may need to be monitored to collect information when insufficient information exists to establish a limit, but where there is a potential for a water quality concern.

In 1988, the Department developed a monitoring matrix for commonly monitored parameters. The matrix was updated in 2004. Proposed monitoring frequencies for all parameters are based on this matrix, and correspond to those of facilities of similar size and complexity in the state.

The permittee is required to have a laboratory Quality Assurance/Quality Control programme. The Department recognises that some tests do not accurately reflect the performance of a treatment facility due to quality assurance/quality control problems. These tests should not be considered when evaluating the compliance of the facility with the permit limitations. Thus, the Department is proposing to include in the opening paragraph of *Schedule B* a statement recognizing that some test results may be inaccurate, invalid or do not adequately represent the facility's performance and should not be used in calculations required by the permit.

Below is a discussion of some of the minimum monitoring requirements contained in the proposed permit.

Influent Monitoring

Monitoring of influent parameters is based on the matrix, and is as follows:

Item or Parameter	Minimum Frequency	Type of Sample
BOD_5	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
pH	3/Week	Grab

Effluent Monitoring – Outfall 001

Monitoring of effluent parameters at Outfall 001 is also based on the matrix. Outfall 001 monitoring is as follows:

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Continuous
Flow Meter Calibration	Semi-Annual	Verification
BOD_5	2/Week	24-hour Composite
TSS	2/Week	24-hour Composite
Pounds Discharged (BOD_5 and TSS)	2/Week	Calculation
pH	3/Week	Grab
Temperature	3/Week	Grab
Enterococci bacteria	2/Week	Grab
Fecal coliform bacteria	2/Week	Grab
UV Radiation Intensity	Daily	Reading
Average Percent Removed (BOD_5 and TSS)	Monthly	Calculation
Toxics and related parameters:		

Item or Parameter	Minimum Frequency	Type of Sample
Metals, cyanide, phenols and hardness	Twice per year for 2 years, September and February	24-hour daily composite
Volatile, Acid-extractable and Base/Neutral compounds	Twice per year for 2 years, September and February	24-hour Composite
Whole Effluent Toxicity	1/year	Composite (24-hour)

Biosolids

The Biosolids management section of the permit was updated with the current language and rules.

Reporting

The reporting period is the calendar month. Discharge Monitoring Reports (DMRs) must be submitted to the Department by the 15th day of the following month. The monitoring reports need to identify the principal operator(s) designated by the Permittee to supervise the treatment and collection systems. The reports must also include records of all applicable equipment breakdowns and bypassing.

Priority pollutants, consisting of metals, cyanide, phenols, hardness, volatile, acid-extractable and base/neutral compounds must be tested and reported twice a year for two years. After the two year test period, the Department intends to review the data and perform a Reasonable Potential Analysis (RPA) on the results. If any of the monitored pollutants fail the RPA (indicating potential toxicity), the Department will require additional testing. If the RPA shows no potential toxicity, the testing may be discontinued after the two year period.

Four Whole Effluent Toxicity (WET) tests must be performed over the life of the permit. These are to be done yearly, during a different quarter each year.

Two reports are required annually. The permittee must submit an annual report on Inflow and Infiltration (I&I) reduction activities and a report on bio-solids handling and sludge disposal activities.

6.4 Schedule D - Special Conditions

The proposed permit contains nine special conditions. The conditions include:

- A requirement to manage all biosolids in accordance with a DEQ-approved *Biosolids Management Plan*;
- A re-opener clause that allows the permit to be modified to include any new, more stringent biosolids management requirements;
- Test procedures and requirement for the WET testing. A dilution series has been specified on the basis of the mixing zone analysis. The species list has been modified to include a plant species, an invertebrate species and a vertebrate species. For consistency with previous WET tests, *M. Beryllina* (Inland Silverside) was retained for acute and chronic testing, even though a Pacific species would be preferred. The specified mussel and kelp species should address West Coast specific concerns.

- A requirement to have the collection system and treatment facility supervised by properly certified operators;
- A requirement to notify the Department of system malfunctions;
- A requirement to develop a spill prevention and response plan;
- A condition that states that the City will not be required to perform a hydro-geologic characterisation or groundwater monitoring during the term of this permit;
- A condition covering the use of recycled water at the plant;
- A requirement to submit an updated Inflow and Infiltration (I&I) plan.

6.5 Schedule E, Pre-Treatment Activities

Schedule E is used for facilities that are required to develop a pre-treatment programme to regulate industrial wastes that are discharged to the collection system. At this time, the City does not have any categorical industries that trigger the need for a pre-treatment programme. Therefore, the proposed permit does not have a *Schedule E.*

6.6 Schedule F, NPDES General Conditions

All NPDES permits issued in the state of Oregon contain certain conditions that remain the same regardless of the type of discharge and the activity causing the discharge. These conditions are called *General Conditions.* These conditions can be changed or modified only on a state-wide basis. The September 18th, 2009 edition is included as *Schedule F* of the draft permit.

Section A contains standard conditions which include compliance with the permit, assessment of penalties, mitigation of non-compliance, permit renewal application, enforcement actions, toxic discharges, property rights and referenced rules and statues.

Section B contains requirements for operation and maintenance of the pollution control facilities. This section included conditions for proper operation and maintenance, duty to halt or reduce activity in order to maintain compliance, bypass of treatment facilities, upset conditions, treatment of single operational events, overflows from wastewater conveyance systems and associated pump stations, public notification of effluent violation or overflow, and disposal of removed substances.

Section C contains requirements for monitoring and reporting. This section includes conditions for representative sampling, flow measurement, monitoring procedures, penalties of tampering, reporting of monitoring results, additional monitoring by the permittee, averaging of measurements, retention of records, contents of records, and inspection and entry.

Section D contains reporting requirements and includes conditions for reporting planned changes, anticipated non-compliance, permit transfers, progress on compliance schedules, non-compliance which may endanger public health or the environment, other non-compliances, and other information. *Section D* also contains signatory requirements and the consequences of falsifying reports.

Section E contains the definitions used throughout the permit.

The General Conditions were revised in 2008/2009. A summary of the changes is as follows:

- There are additional citations to the Federal *Clean Water Act* and *Code of Federal Regulations*, including references to standards for sewage sludge use or disposal.
- There is additional language regarding federal penalties.
- Bypass language has been made consistent with the *Code of Federal Regulations*.
- Overflow language has been modified. Formerly the language stated that overflows in response to the five or ten year storm event would not violate the permit. Now it states that overflows are prohibited. DEQ will continue to exercise enforcement discretion with respect to overflows consistent with the provisions of the Bacteria Rule (OAR 340-041-0009).
- Reporting requirements regarding overflows has been made more explicit.
- Requirements regarding emergency response and public notification plans have been made more explicit.
- Language pertaining to duty to provide information has been made more explicit.

Confidentiality of information is addressed.

6.6 Permit Processing/Public Comment/Appeal Process

The beginning and end date of the public comment period to receive written comments regarding this permit, and the contact name and telephone number are included in the public notice. The Permittee is the only party having standing to file a permit appeal. If the Permittee is dissatisfied with the conditions of the permit when issued, they may request a hearing before the EQC or its designated hearing officer, within 20 days of the final permit being mailed. The request for hearing must be sent to the Director of the Department. Any hearing held shall be conducted pursuant to regulations of the Department.

Appendix A: Anti-degradation Review Sheet

ANTIDEGRADATION REVIEW SHEET
FOR A PROPOSED INDIVIDUAL NPDES DISCHARGE

1. What is the name of Surface Water that receives the discharge? *Pacific Ocean*

   Briefly describe the proposed activity: *The facility is the municipal wastewater treatment plant for the City of Brookings and the community of Harbor in Curry County.*

   Is this review for a renewal OR new (circle one) permit application?
   Go to Step 2.

---

2. Is this surface water an **Outstanding Resource Water** or **upstream** from an **Outstanding Resource Water**?
   Yes. Go to Step 5.
   No. Go to Step 3.

3. Is this surface water a **High Quality Water**?

   Yes. Go to Step 8.
   No. Go to Step 4.

---

8. Will the proposed activity result in a Lowering of Water Quality in the **High Quality Water**[see OAR 340-041-0004(3)-(5) for a description in rule of discharges that do not result in lowering of water quality or do not constitute a new and/or increased discharge or are otherwise exempt from anti-degradation review; otherwise see "Is an Activity Likely to Lower Water Quality?" in *Anti-degradation Policy Implementation Internal Management Directive for NPDES Permits and Section 401 Water Quality Certifications*.]

   Yes. Go to Step 9.
   No. *The proposed permit contains the same effluent concentration limits and mass load limits as the existing permit.* Proceed with Permit Application. Go to Step 21.

---

21. On the basis of the Anti-degradation Review, the following is recommended:

    XX Proceed with Application to Interagency Coordination and Public Comment Phase.

    ____ Deny Application; return to applicant and provide public notice.

Action Approved

Section:	*Western Region-Water Quality*
Review Prepared By:	*Andy Ullrich*
Phone:	*(541) 776-6189*
Date Prepared:	*October 8, 2010*

Appendix B: Treatment and Collection System Classification

General Requirements (OAR 340-049-0015) - Each owner of a regulated wastewater system must have its system supervised by one or more operators who hold a valid certificate for the type of system, wastewater treatment or collection, at a grade equal to or greater than the wastewater system classification as defined in OAR-340-049-0020 and 0025. **Because classification establishes the operator certificate type and grade required for compliance, it must be determined prior to start-up of a new or upgraded facility.**

Wastewater treatment system classifications are derived from the total points assigned based on criteria shown in OAR 340-049-0025 (see Step 1 of the worksheet). Pursuant to OAR 340-049-0020(4), if the complexity of a treatment system is not reflected in -0025, DEQ may classify a system higher as long as the designation is consistent with the intent of the classification system (see Step 2 of the worksheet).

Collection system classifications are based on a service area design population to be handled by the wastewater treatment facility (see footnote on page 1 of worksheet). Like treatment, if deemed appropriate, DEQ may classify the system higher than by population alone (OAR 340-049-0020(5)). For example, the design service area population for "X" Sanitary District is 1350 (Class I), but there are 280 city-maintained STEP or STEG units and a chemical feed system for control of hydrogen sulfide. A Class II designation may be appropriate to meet the intent of the classification system to establish minimum operator requirements for experience and knowledge.

Upon written notice to the wastewater system owner, DEQ may change the classification of a wastewater system and give the owner reasonable time to comply with requirements of the new classification (OAR 340-049-0020(6)). If you have any questions, please contact the Operator Certification Program office in The Dalles at (541) 298-7255 x35.

Classification of Wastewater Systems (OAR 340-049-0020) All wastewater systems regulated under OAR 340-049 will be classified by DEQ as wastewater treatment systems and/or wastewater collection systems, as appropriate, in accordance with the following classification system:

Wastewater Treatment Systems	Wastewater Collection Systems
Class I - 30 total points or less	Class I - 1,500 or less design population
Class II - 31-55 total points	Class II - 1,501 to 15,000 design population
Class III - 56-75 total points	Class III - 15,001 to 50,000 design population
Class IV - 76 or more points	Class IV - 50,001 or more design population

Definitions used in these regulations unless otherwise required by context (see OAR 340-049-0010):

"Average Dry Weather Flow" (ADWF) means the design average dry weather flow capacity of the wastewater treatment system in gallons per day or Million Gallons per Day (MGD), as approved by the Department.

"Industrial Waste" means liquid wastes from an industrial or commercial process discharged into a wastewater system for conveyance and treatment.

"NPDES Permit" means a waste discharge permit issued in accordance with requirements and procedures of the National Pollutant Discharge Elimination System authorized by Section 402 of the Federal Clean Water Act and OAR 340, Division 45.

"Population" means the design population of the wastewater system represented as the number of people or the population equivalent the system is designed to serve. Equivalent population ordinarily is determined based on 70 gallons per person per day average dry weather flow (ADWF) or 0.17 lbs. BOD5 per person per day, whichever is greater.

"Wastewater" or "sewage" means the water-carried human or animal waste from residences, buildings, industrial establishments or other places, together with such groundwater infiltration and surface water as may be present. The admixture of domestic and industrial waste or other by-products, such as sludge, is also considered wastewater or sewage.

"Wastewater Treatment System" or "Sewage Treatment System" means any structure, equipment or process for treating and disposing of, or recycling or reusing wastewater and sludge (including industrial waste) that is discharged to the wastewater system.

"Wastewater Collection System" or "Sewage Collection System" means the trunks, arterials, pumps, pump/lift stations, piping and other appurtenances necessary to collect and carry away wastewater or other liquid waste treatable in a community or private wastewater treatment facility.

"Wastewater System" means "Sewage Treatment Works" defined in ORS 448.405 as any structure, equipment or process required to collect, carry away and treat domestic waste and dispose of sewage as defined in ORS 454.010. Typically, components of a wastewater system include a wastewater collection system and a wastewater treatment system.

"WPCF Permit" means a Water Pollution Control Facilities permit to construct and operate a collection, treatment and/or disposal system with no discharge to navigable waters

WW System Common Name: Brookings sewage treatment plant

Facility ID: 11297 **Location:** Brookings

Total Points (from page 3): 72 **WWT Class (check):** ☐ I ☐ II ☒ III ☐ IV

Design Population1: 18218 **WWC Class (check):** ☐ I ☐ II ☒ III ☐ IV

Design ADWF load (Influent MGD) 1.7 **Design BOD load (Influent lbs./day)** 3,500

Classified by: Andy Ullrich **Date:** September 24, 2010

Date this classification filed with the Operator Certification Office:

System start-up date for this classification (new, upgrade or expansion): 2000

Is this a change from a prior classification? (check): ☐ Yes ☒ No

STEP 1 - Criteria for Classifying Wastewater Treatment Systems (OAR 340-049-0025)

(1) **Design Population or Population Equivalent Points** (10 Points Maximum)

☐ Less than 750	0.5 points
☐ 751 to 2000	1 point
☐ 2001 to 5000	1.5 points
☐ 5001 to 10,000	2 points
☒ Greater than 10,000	3 points+1 pt. for ea. add. 10k
Part 1 Subtotal	***3 points***

(2) **Average Dry Weather Flow (Design Capacity) Points** (10 points Maximum)

☐ Less than 0.075 MGD	0.5 point
☐ Greater than 0.075 to 0.1 MGD	1 point
☐ Greater than 0.1 to 0.5 MGD	1.5 points
☐ Greater than 0.5 to 1.0 MGD	2 points
☒ Greater than 1.0 MGD	3 points+1 pt. for ea. add. MGD
Part 2 Subtotal	***3 points***

(3) **Unit Process Points** (Check all that apply)

Preliminary Treatment and Plant Hydraulics: See also STEP 2

☐ Comminution (cutter, shredder, grinder, barminutor, etc.)	1 point
☒ Grit Removal, gravity	1 point
☐ Grit Removal, mechanical	2 points
☒ Screen(s), in-situ or mechanical (coarse solids only)	1 point
☐ Pump/Lift Station(s) (pumping of main flow)	2 points
☐ Flow Equalization (any type)	1 point
Subtotal	***2 points***

Primary Treatment:

☐ Community Septic Tank(s) (STEP, STEG, etc)	2 points
☒ Clarifier(s)	5 points
☐ Flotation Clarifier(s)	7 points
☐ Chemical Addition System	2 points
☐ Imhoff Tanks, (large septic tank or similar sedimentation & digestion)	3 points
Subtotal	***5 points***
Page 1 Subtotal	***13 points***

1 See "Population" definition. Use the design average daily equivalent load per person for Influent Flow or Influent BOD5, whichever is greater. This value is used to determine the Collection System Classification.

Unit Process Points – **Continued** (Check all that apply)

Secondary, Advanced, and Tertiary Treatment **See also STEP 2:**

☐ Low Rate Trickling Filter(s) (no recirculation)	7 points
☐ High Rate Trickling Filter(s) (recirculation)	10 points
☒ Trickling Filter - Solids Contact System	12 points
☐ Activated Sludge (includes SBR & basic MBR process)	15 points
☐ Pure Oxygen Activated Sludge	20 points
☐ Activated Bio Filter Tower less than 0.1 MGD	6 points
☐ Activated Bio Filter Tower greater than 0.1 MGD	12 points
☐ Rotating Biological Contactors 1 to 4 shafts	7 points
☐ Rotating Biological Contactors, 5 or more shafts	12 points
☐ Stabilization Lagoons, 1 to 3 cells without aeration	5 points
☐ Stabilization Lagoons, 1 or more cells with primary aeration	7 points
☐ Stabilization Lagoons, 2 or more cells with full aeration	9 points
☐ Recirculating Gravel Filter	7 points
☐ Chemical Precipitation Unit(s)	3 points
☐ Gravity Filtration Unit(s)	2 points
☐ Pressure Filtration Unit(s)	4 points
☐ Nitrogen Removal, Biological (BNR) or Chemical/Biological System	4 points
☐ Nitrogen Removal, Designed Extended Aeration Only (Nitrification)	2 points
☐ Phosphorus Removal Unit(s)	4 points
☐ Effluent Microscreen(s)	2 points
☐ Chemical Flocculation Unit(s)	3 points
☐ Chemical Addition System @ 2 points (describe):	0 points
Subtotal	***12 points***

Solids Handling (Excludes long-term storage in lagoons above) **See also STEP 2:**

☐ Anaerobic Primary Sludge Digester(s) w/o Mixing and Heating	5 points
☐ Anaerobic Primary Sludge Digester(s) with Mixing and Heating	7 points
☒ Anaerobic Primary and Secondary Sludge Digesters	10 points
☐ Sludge Digester Gas reuse	3 points
☐ Aerobic Sludge Digester(s)	8 points
☐ Sludge Storage Lagoon(s) (List Basin(s) or Tank(s) under STEP 2)	2 points
☐ Sludge Lagoon(s) with aeration	3 points
☐ Sludge Drying Bed(s)	1 point
☐ Sludge Air or Gravity Thickening	3 points
☐ Sludge Composting, In Vessel	12 points
☒ Sludge Belt(s) or Vacuum Press/Dewatering	5 points
☒ Sludge Centrifuge(s)	5 points
☐ Sludge Incineration	12 points
☒ Sludge Chemical Addition Unit(s) (alum, polymer, alkaline stab. etc.)	2 points
☐ Non-Beneficial Sludge Disposal (landfill or burial)	1 point
☐ Beneficial Sludge Utilization (see also STEP 2)	3 points
Subtotal	***22 points***

Disinfection:

☐ Liquid Chlorine Disinfection	2 points
☐ Gas Chlorine Disinfection	5 points
☐ Dechlorination System	4 points
☒ Other disinfection systems including ultraviolet and ozonation	5 points
Subtotal	***5 points***
Page 2 Subtotal	***39 points***

(4) **Effluent Permit Requirement Points** (Check as applicable) **See also STEP 2**:

☐ Minimum of secondary effluent limitations for BOD and/or TSS	2 points
☒ Minimum of 20 mg/L BOD and/or Total Suspended Solids	3 points
☐ Minimum of 10 mg/L BOD and/or Total Suspended Solids	4 points
☐ Minimum of 5 mg/L BOD and/or Total Suspended Solids	5 points
☐ Effluent limitations for effluent oxygen (For other limits see Step 2)	1 point
Part 4 Subtotal	***3 points***

(5) **Variation In Raw Waste Points**. Points in this category will be awarded only when conditions are extreme to the extent that operation and handling procedure changes are needed to adequately treat waste due to variation of raw waste (strength or flow)

☐ Recurring deviations or excessive variations 100% to 200%	2 points
☐ Recurring deviations or excessive variations of more than 200%, or conveyance and treatment of industrial wastes by pretreatment program	4 points
☐ Septage or truck-hauled waste	2 points
Part 5 Subtotal	***0 points***

(6) **Sampling and Laboratory Testing Points** (check as applicable)

☐ Sample for BOD, Total Suspended Solids performed by outside lab or	2 points
☒ BOD or Total Suspended Solids analysis performed at treatment plant	4 points
☐ Bacteriological analysis performed by outside lab or	1 point
☒ Bacteriological analysis performed at WWT plant lab	2 points
☒ Nutrient, Heavy Metals or Organics analysis performed by outside lab or	3 points (≤1/mo. 1 pt)
☐ Nutrient, Heavy Metals or Organics analysis performed at WWT plant	5 points
Part 6 Subtotal	***7 points***
Parts 4-6 Total	***10 points****

OAR 340-049-0025 Accumulated Points, pg1 13, pg2 39 & pg3* 10 = 62 Go to Step 2▼

STEP 2 - Complexity Not Reflected Above (OAR 340-049 0020(4))

Note: This step may justify a higher classification. Points shown are given as guidance.

☐ Fine Screen Preliminary Treatment (includes washing & compaction)	2 points
☒ SCADA or similar instrumentation providing data w/ process op. (2-4 pts)	2 points
☐ Post aeration, includes mechanical and diffused aeration (not cascade)	1 point
☐ Class A recycled water (storage, distribution & monitoring)	6 points
☐ Class B, C, D and non-disinfected recycle (surface & subsurface)	3 points
☐ Sludge dewatering using bag or tube system	1 point
☐ Composting, ASP or windrow	6 points
☒ Land application of biosolids by system operator (add to BSU pts. Pg. 2)	5 points
☒ Odor or corrosion control (separate or combined)	2 points
☐ Chemical/Physical advanced waste treatment (10 -15 points)	0 points
☐ Reverse Osmosis or Electro-dialysis	15 points
☐ Other Effluent Requirements @ 1 pt (describe): _____	__ point(s)
☐ Other (describe): _____	__ point(s)
OAR 340-049-0020(4) points	***9 points***

Accumulated Point Total - Steps 1 and 2 (enter here and on page 1) *72 points*

A COPY OF THIS COMPLETED WORKSHEET TO BE FILED WITH THE OPERATOR CERTIFICATION PROGRAM OFFICE, WQ DIVISION, PRIOR TO SYSTEM START-UP

Appendix C: pH Reasonable Potential Analysis Worksheet

Calculation of pH of a mixture of two flows.
Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

	RPA for pH	
INPUT	Lower pH	Upper pH
	Criteria	Criteria
1. DILUTION FACTOR AT MZ BOUNDARY - (Qe+Qr)/Qe	43	43
2. UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	13.0	13.0
pH:	8.3	8.3
Alkalinity (mg CaCO3/L):	110.0	110.0
3. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.0	20.0
pH:	6.0	9.0
Alkalinity (mg CaCO3/L):	40.9	40.9
4. APPLICABLE PH CRITERIA	6.0	9.0
OUTPUT		
1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.44	6.44
Effluent pKa:	6.38	6.38
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.99	0.99
Effluent Ionization Fraction:	0.29	1.00
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	111.51	111.51
Effluent Total Inorganic Carbon (mg CaCO3/L):	139.47	41.00
4. CONDITIONS AT MIXING ZONE BOUNDARY		
Temperature (deg C):	13.16	13.16
Alkalinity (mg CaCO3/L):	108.39	108.39
Total Inorganic Carbon (mg CaCO3/L):	112.16	109.87
pKa:	6.44	6.44
pH at Mixing Zone Boundary:	**7.9**	**8.3**
Is there Reasonable Potential?	**No**	**No**

Appendix D: Effluent Reasonable Potential Analysis Worksheets

Ammonia

Facility Name: Brookings STP **Date:** 6/22/2011

Dilution Values? (Y/N)	y	calculated
Low Flow Dilution @ ZID (1Q10)	20	*
Low Flow Dilution @ MZ (7Q10)	157	*
Low Flow Dilution @ MZ (30Q5)	*	*
High Flow Dilution @ ZID (1Q10)	17	*
High Flow Dilution @ MZ (7Q10)	43	*
High Flow Dilution @ MZ (30Q5)	*	*
Enter data below if no dilution data is available		
Data to estimate dilution	**Summer**	**Winter**
Effluent Flow (mgd) =	*	*
1Q10 (CFS) =	*	*
7Q10 (CFS) =	*	*
30Q5 (CFS) =	*	*
% dilution at MZ =	*	*
% dilution at ZID =	*	*

Confidence Level =	99%
Probability Basis =	95%

Summer data	Effluent	Stream	Mixed ZID	Mixed MZ	
pH * =	7	8.3	8.2	8.3	(6.5-9)
Temp * =	23	13	13.5	13.1	°C
Alkalinity =	40.9	110			
Salmonids Present? (Y/N)	n/a	y			
Salmonid Spawning? (Y/N)	n/a	n			
Fresh Water ? (Y/N)	n/a	n			
Salinity (ppt)	0	30	28.5	29.8	
Winter data					
pH * =	7	8.3	8.2	8.2	(6.5-9)
Temp * =	16	13	13.2	13.1	°C
Alkalinity =	40.9	110			
Salmonids Present? (Y/N)	n/a	y			
Salmonid Spawning? (Y/N)	n/a	n			
Fresh Water ? (Y/N)	n/a	n			
Salinity (ppt)	0	30	28.2	29.3	

PARAMETER	# of Samples	Highest Conc. mg/l	Coef. of Variance	Calculated Maximum Conc. mg/l	Background Conc. mg/l	Maximum Conc. at ZID mg/l	Maximum Conc. at MZ mg/l	WQ CRITERIA Acute (CMC) mg/l	WQ CRITERIA Chronic (CCC) mg/l	REASONABLE POTENTIAL? ACUTE	REASONABLE POTENTIAL? CHRONIC	ZID	MZ
Low Flow Season													
AMMONIA - Saltwater	66	9.500	0.60	10.45	0.00	0.52	0.07	6.3	0.78	**NO**	**NO**	**ZID**	**MZ**
High Flow Season													
AMMONIA - Saltwater	51	6.000	0.60	7.20	0.00	0.42	0.17	6.9	0.87	**NO**	**NO**	**ZID**	**MZ**

Zinc

Dilution Values? (Y/N)	Y	calculated
Dilution @ ZID	17	*
Dilution @ MZ	43	*
If no dilution values enter info below		
Facility Effluent Flow	*	MGD
7Q10	*	CFS
1Q10	*	CFS
% dilution at ZID	*	%
% dilution at MZ	*	%
Fresh Water? (Y/N)	N	

Hardness	mg/L $CaCO_3$
Effluent	96
Stream	400
Mixed	
ZID	382
MZ	393

Confidence Level		99%
Probability Basis		95%

PARAMETER	# of Samples	Highest Conc. See IMD	Coef. of Varience	Calculated Max Effluent Conc.	Background Conc. See IMD	Maximum Conc. at ZID	Maximum Conc. at MZ	WQ CRITERIA 1 Hour (CMC)	4 Day (CCC)	REASONABLE POTENTIAL ?	
		µg/l		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	ACUTE	CHRONIC
ZINC +	1	61.00	0.60	549.00	0.87	33.11	13.62	95	86	**NO**	**NO**

Phthalate

Dilution Values?	Y		Dilution Model	Dilution Calculated
Harmonic Mean Flow (cfs)	(See IMD)	*	43	*
30Q5 (cfs)	(See IMD)	*	43	*
Effluent Flow (mgd)	(See IMD)	*		
% Dilution		*		

Confidence Level		95%
Probability Basis		95%

PARAMETER	Carcinogen?	# of Samples	Effluent Conc. See IMD	Coef. of Varience	Calculated Max Effluent Conc.	Background Conc. See IMD	Maximum conc at regulatory boundary	WQ CRITERIA Water and Fish Ingestion	Fish Consumption	Reasonable Potential? Water and Fish Ingestion	Fish Consumption
	Y or N		µg/l		µg/l	µg/l	µg/l	µg/l	ug/L		
Bis(2-ethylhexyl)phthalate	N	1	4.60	0.60	28.52	0.00	0.6633	1.200	2.20	**NO**	**NO**

Appendix E: Compliance History

The facility submits monthly Discharge Monitoring Reports (DMRs) to document compliance with their permit limits. Compliance is also determined by periodic on-site inspections. The following violations were documented during the current permit cycle (May 1st, 2000 to date).

Warning Letters			
Violation date	Warning Letter date	Parameter	Violation Class
2000-05-20	2000-06-08	Effluent violation - pH violation	Class 3
2001-01-31	2001-02-02	Conducted only 1 bio-assay in year 2000 (2 tests required	Class 2
2001-10-11	2001-10-31	Failure to report UV radiation readings	Class 2
2001-10-11	2001-10-31	Failure to operate and maintain all facilities and systems of treatment and control at all times.	Class 2
2004-04-01	2005-03-30	Land applied bio-solids during unauthorised months of the year	Class 2
2006-02-24	2006-05-09	Effluent pH below permit limit of 6.0	Class 2
2006-05-10	2006-08-22	Effluent pH below permit limit of 6.0	Class 3

Enforcement Actions			
Violation date	Action	Parameter	Penalty
2006-11-14	Notice of Civil Penalty Assessment	Violating a technology based effluent limit	$260

TABLE 30: Aquatic Life Water Quality Criteria for Toxic Pollutants

Effective April 18, 2014

Aquatic Life Criteria Summary

The concentration for each compound listed in Table 30 is a criterion not to be exceeded in waters of the state in order to protect aquatic life. The aquatic life criteria apply to waterbodies where the protection of fish and aquatic life are the designated uses. All values are expressed as micrograms per liter (µg/L). Compounds are listed in alphabetical order with the corresponding information: the Chemical Abstract Service (CAS) number, whether there is a human health criterion for the pollutant (i.e. "y"= yes, "n" = no), and the associated aquatic life freshwater and saltwater acute and chronic criteria. Italicized pollutants are not identified as priority pollutants by EPA. Dashes in the table column indicate that there is no aquatic life criterion.

Unless otherwise noted in the table below, the acute criterion is the Criterion Maximum Concentration (CMC) applied as a one-hour average concentration, and the chronic criterion is the Criterion Continuous Concentration (CCC) applied as a 96-hour (4 days) average concentration. The CMC and CCC criteria should not be exceeded more than once every three years. Footnote A, associated with eleven pesticide pollutants in Table 30, describes the exception to the frequency and duration of the toxics criteria stated in this paragraph.

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
1	Aldrin	309002	y	3 [A]	--	1.3 [A]	--
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
2	*Alkalinity*		n	--	20,000 [B]	--	--
[B] *Criterion shown is the minimum (i.e. CCC in water may not be below this value in order to protect aquatic life).*							

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
3	*Ammonia*	7664417	n	*Criteria are pH, temperature, and salmonid or sensitive coldwater species dependent--See document USEPA January 1985 (Fresh Water).* [M]		*Ammonia criteria for saltwater may depend on pH and temperature. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)--1989 (EPA 440/5-88-004; http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm)*	
[M] *See expanded endnote M equations at bottom of Table 30 to calculate freshwater ammonia criteria*							
4	Arsenic	7440382	y	340 [C, D]	150 [C, D]	69 [C, D]	36 [C, D]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [D] *Criterion is applied as total inorganic arsenic (i.e. arsenic (III) + arsenic (V)).*							
5	BHC Gamma (Lindane)	58899	y	0.95	0.08 [A]	0.16 [A]	--
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
6	Cadmium	7440439	n	*See* **E**	*See* **C, F**	40 [C]	8.8 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as "total recoverable" and is a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote E at bottom of Table 30.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
7	Chlordane	57749	y	2.4 [A]	0.0043 [A]	0.09 [A]	0.004 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
8	*Chloride*	16887006	n	860,000	230,000	--	--
9	*Chlorine*	7782505	n	19	11	13	7.5

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
10	*Chlorpyrifos*	2921882	n	0.083	0.041	0.011	0.0056
11	Chromium III	16065831	n	*See* **C, F**	*See* **C, F**	--	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
12	Chromium VI	18540299	n	16 [C]	11 [C]	1100 [C]	50 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*							
13	Copper	7440508	y	*See* **E**	*See* **E**	4.8 [C]	3.1 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as "total recoverable" and is a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote E at bottom of Table 30.*							
14	Cyanide	57125	y	22 [J]	5.2 [J]	1 [J]	1 [J]
[J] *This criterion is expressed as µg free cyanide (CN)/L.*							
15	DDT 4,4'	50293	y	1.1 [A, G]	0.001 [A, G]	0.13 [A, G]	0.001 [A, G]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [G] *This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).*							
16	*Demeton*	8065483	n	--	0.1	--	0.1
17	Dieldrin	60571	y	0.24	0.056	0.71 [A]	0.0019 [A]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*							
18	Endosulfan	115297	n	0.22 [A, H]	0.056 [A, H]	0.034 [A, H]	0.0087 [A, H]
[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [H] *This value is based on the criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha- and beta-endosulfan.*							
19	Endosulfan Alpha	959988	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
[A] See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.							
20	Endosulfan Beta	33213659	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
[A] See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.							
21	Endrin	72208	y	0.086	0.036	0.037 [A]	0.0023 [A]
[A] See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.							
22	*Guthion*	86500	n	--	0.01	--	0.01
23	Heptachlor	76448	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.							
24	Heptachlor Epoxide	1024573	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
[A] See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.							
25	*Iron (total)*	7439896	n	--	1000	--	--
26	Lead	7439921	n	*See* **C , F**	*See* **C , F**	210 [C]	8.1 [C]
[C] Criterion is expressed in terms of "dissolved" concentrations in the water column. *[F] The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
27	*Malathion*	121755	n	--	0.1	--	0.1
28	Mercury (total)	7439976	n	2.4	0.012	2.1	0.025
29	*Methoxychlor*	72435	y	--	0.03	--	0.03
30	*Mirex*	2385855	n	--	0.001	--	0.001
31	Nickel	7440020	y	*See* **C , F**	*See* **C , F**	74 [C]	8.2 [C]
[C] Criterion is expressed in terms of "dissolved" concentrations in the water column. *[F] The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
32	*Parathion*	56382	n	0.065	0.013	--	--
33	Pentachlorophenol	87865	y	*See* **H**	*See* **H**	13	7.9

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
[H] *Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).*							
34	*Phosphorus Elemental*	7723140	n	--	--	--	0.1
35	Polychlorinated Biphenyls (PCBs)	NA	y	2 [K]	0.014 [K]	10 [K]	0.03 [K]
[K] *This criterion applies to total PCBs (e.g.* determined as Aroclors or congeners)							
36	Selenium	7782492	y	*See* **C** , **L**	4.6 [C]	290 [C]	71 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [L] *The CMC=(1/[(f1/CMC1)+(f2/CMC2)]µg/L) * CF where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively,and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively. See expanded endnote F for the Conversion Factor (CF) for selenium.*							
37	Silver	7440224	n	*See* **C** , **F**	0.10 [C]	1.9 [C]	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater acute criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
38	*Sulfide Hydrogen Sulfide*	7783064	n	--	2	--	2
39	Toxaphene	8001352	y	0.73	0.0002	0.21	0.0002
40	*Tributyltin (TBT)*	688733	n	0.46	0.063	0.37	0.01
41	Zinc	7440666	y	*See* **C , F**	*See* **C , F**	90 [C]	81 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							

Expanded Endnotes A, E, F, M

Endnote A: Alternate Frequency and Duration for Certain Pesticides

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Endnote E: Equations for Hardness-Dependent Freshwater Metals Criteria for Cadmium Acute and Copper Acute and Chronic Criteria

The freshwater criterion for this metal is expressed as total recoverable with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness are calculated using the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

$$\textbf{CMC} = (\exp(m_A*[\ln(\text{hardness})] + b_A))$$

$$\textbf{CCC} = (\exp(m_C*[\ln(\text{hardness})] + b_C))$$

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.128	-3.828	N/A	N/A
Copper	0.9422	-1.464	0.8545	-1.465

Endnote F: Equations for Hardness-Dependent Freshwater Metals Criteria and Conversion Factor Table

The freshwater criterion for this metal is expressed as dissolved with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness are calculated using the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

$$\textbf{CMC} = (\exp(m_A*[\ln(\text{hardness})] + b_A))*CF$$

$$\textbf{CCC} = (\exp(m_C*[\ln(\text{hardness})] + b_C))*CF$$

"CF" is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Chemical	m_A	b_A	m_C	b_C
Cadmium	N/A	N/A	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59	--	--
Zinc	0.8473	0.884	0.8473	0.884

The conversion factors (CF) below must be used in the equations above for the hardness-dependent metals in order to convert total recoverable metals criteria to dissolved metals criteria. For metals that are not hardness-dependent (i.e. arsenic, chromium VI, selenium, and silver (chronic)), or are saltwater criteria, the criterion value associated with the metal in Table 30 already reflects a dissolved criterion based on its conversion factor below.

Conversion Factor (CF) Table for Dissolved Metals

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	N/A	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	N/A	N/A	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

Endnote M: Equations for Freshwater Ammonia Calculations

Acute Criterion

The 1-hour average concentration of un-ionized ammonia (mg/L NH_3) may not exceed more often than once every three years on average, the numerical value given by:

CMC_{NH3} = 0.52/FT/FPH/2 where:

FT = temperature adjustment factor
FPH = pH adjustment factor
TCAP = temperature cap

$FT = 10^{0.03(20-TCAP)}$; $TCAP \leq T \leq 30^{\circ}$ C
$FT = 10^{0.03(20-T)}$; $0 \leq T \leq TCAP$

$FPH = 1$ $8 \leq pH \leq 9$
$FPH = \frac{1 + 10^{7.4-pH}}{1.25}$ $6.5 \leq pH \leq 8$

TCAP = 20 ˚C; Salmonids and other sensitive coldwater species present

TCAP = 25 ˚C; Salmonids and other sensitive coldwater species absent

Chronic Criterion
The 4-day average concentration of un-ionized ammonia (mg/L NH_3) may not exceed more often than once every three years on average, the average numerical value given by:

CCC_{NH3} = 0.80/FT/FPH/RATIO

where FT and FPH are as above for acute criterion and:

RATIO = 16 *where* 7.7 ≤ pH ≤ 9

$$\text{RATIO} = 24 \times \left[\frac{10^{7.7 - pH}}{1 + 10^{7.4 - pH}} \right] \quad \textit{where} \quad 6.5 \leq pH \leq 7.7$$

TCAP = 15 ˚C; Salmonids and other sensitive coldwater species present
TCAP = 20 ˚C; Salmonids and other sensitive coldwater species absent

TABLE 31: Aquatic Life Water Quality Guidance Values for Toxic Pollutants

Effective April 18, 2014

Water Quality Guidance Values Summary [A]

The concentration for each compound listed in Table 31 is a guidance value that can be used in application of Oregon's Toxic Substances Narrative (340-041-0033(2)) to waters of the state in order to protect aquatic life. All values are expressed as micrograms per liter (µg/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047), corresponding Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic guidance values, and aquatic life saltwater acute and chronic guidance values.

Table 31

Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
56	Acenaphthene	83329	1,700	520	970	710
17	Acrolein	107028	68	21	55	
18	Acrylonitrile	107131	7,550	2,600		
1	Antimony	7440360	9,000	1,600		
19	Benzene	71432	5,300		5,100	700
59	Benzidine	92875	2,500			
3	Beryllium	7440417	130	5.3		
19 B	BHC (Hexachlorocyclohexane-Technical)	319868	100		0.34	
21	Carbon Tetrachloride	56235	35,200		50,000	
	Chlorinated Benzenes		250	50	160	129

Table 31

Aquatic Life Water Quality Guidance Values for Toxic Pollutants

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
	Chlorinated naphthalenes		1,600		7.5	
	Chloroalkyl Ethers		238,000			
26	Chloroform	67663	28,900	1,240		
45	Chlorophenol 2-	95578	4,380	2,000		
	Chlorophenol 4-	106489			29,700	
52	Methyl-4-chlorophenol 3-	59507	30			
5a	Chromium (III)	16065831			10,300	
109	DDE 4,4'-	72559	1,050		14	
110	DDD 4,4'-	72548	0.06		3.6	
	Diazinon	333415	0.08	0.05		
	Dichlorobenzenes		1,120	763	1,970	
29	Dichloroethane 1,2-	107062	118,000	20,000	113,000	
	Dichloroethylenes		11,600		224,000	
46	Dichlorophenol 2,4-	120832	2,020	365		
31	Dichloropropane 1,2-	78875	23,000	5,700	10,300	3,040
32	Dichloropropene 1,3-	542756	6,060	244	790	
47	Dimethylphenol 2,4-	105679	2,120			
	Dinitrotoluene		330	230	590	370
16	Dioxin (2,3,7,8-TCDD)	1746016	0.01	38 pg/L		
85	Diphenylhydrazine 1,2-	122667	270			
33	Ethylbenzene	100414	32,000		430	
86	Fluoranthene	206440	3,980		40	16
	Haloethers		360	122		
	Halomethanes		11,000		12,000	6,400
89	Hexachlorobutadiene	87683	90	9.3	32	
90	Hexachlorocyclopentadiene	77474	7	5.2	7	
91	Hexachloroethane	67721	980	540	940	
93	Isophorone	78591	117,000		12,900	

Table 31 Aquatic Life Water Quality Guidance Values for Toxic Pollutants						
EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
94	Naphthalene	91203	2,300	620	2,350	
95	Nitrobenzene	98953	27,000		6,680	
	Nitrophenols		230	150	4,850	
26 B	Nitrosamines	35576911	5,850		3,300,000	
	Pentachlorinated ethanes		7,240	1,100	390	281
54	Phenol	108952	10,200	2,560	5,800	
	Phthalate esters		940	3	2,944	3.4
	Polynuclear Aromatic Hydrocarbons				300	
	Tetrachlorinated Ethanes		9,320			
37	Tetrachloroethane 1,1,2,2-	79345		2,400	9,020	
	Tetrachloroethanes		9,320			
38	Tetrachloroethylene	127184	5,280	840	10,200	450
	Tetrachlorophenol 2,3,5,6					440
12	Thallium	7440280	1,400	40	2,130	
39	Toluene	108883	17,500		6,300	5,000
	Trichlorinated ethanes		18,000			
41	Trichloroethane 1,1,1-	71556			31,200	
42	Trichloroethane 1,1,2-	79005		9,400		
43	Trichloroethylene	79016	45,000	21,900	2,000	
55	Trichlorophenol 2,4,6-	88062		970		

The following chemicals/compounds/classes are of concern due to the potential for toxic effects to aquatic organisms; however, no guidance values are designated. If these compounds are identified in the waste stream, then a review of the scientific literature may be appropriate for deriving guidance values.

- Polybrominated diphenyl ethers (PBDE)
- Polybrominated biphenyls (PBB)
- Pharmaceuticals

- Personal care products
- Alkyl Phenols
- Other chemicals with Toxic effects

Footnotes:

A Values in Table 31 are applicable to all basins.

B This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).

TABLE 40: Human Health Water Quality Criteria for Toxic Pollutants

Effective April 18, 2014

Human Health Criteria Summary

The concentration for each pollutant listed in Table 40 was derived to protect Oregonians from potential adverse health impacts associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water. The "organism only" criteria are established to protect fish and shellfish consumption and apply to waters of the state designated for fishing. The "water + organism" criteria are established to protect the consumption of drinking water, fish, and shellfish, and apply where both fishing and domestic water supply (public and private) are designated uses. All criteria are expressed as micrograms per liter (µg/L), unless otherwise noted. Pollutants are listed in alphabetical order. Additional information includes the Chemical Abstract Service (CAS) number, whether the criterion is based on carcinogenic effects (can cause cancer in humans), and whether there is an aquatic life criterion for the pollutant (i.e. "y"= yes, "n" = no). All the human health criteria were calculated using a fish consumption rate of 175 grams per day unless otherwise noted. A fish consumption rate of 175 grams per day is approximately equal to 23 8-ounce fish meals per month. For pollutants categorized as carcinogens, values represent a cancer risk of one additional case of cancer in one million people (i.e. 10^{-6}), unless otherwise noted. All metals criteria are for total metal concentration, unless otherwise noted. Italicized pollutants represent non-priority pollutants. The human health criteria revisions established by OAR 340-041-0033 and shown in Table 40 do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act until approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
1	Acenaphthene	83329	n	n	95	99
2	Acrolein	107028	n	n	0.88	0.93

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
3	Acrylonitrile	107131	y	n	0.018	0.025
4	Aldrin	309002	y	y	0.0000050	0.0000050
5	Anthracene	120127	n	n	2900	4000
6	Antimony	7440360	n	n	5.1	64
7	Arsenic (inorganic) [A]	7440382	y	y	2.1	2.1(freshwater) 1.0 (saltwater)
	[A] *The arsenic criteria are expressed as total inorganic arsenic. The "organism only" freshwater criterion is based on a risk level of approximately 1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1 x 10^{-4}.*					
8	Asbestos [B]	1332214	y	n	7,000,000 fibers/L	--
	[B] *The human health risks from asbestos are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
9	*Barium* [C]	7440393	n	n	1000	--
	[C] *The human health criterion for barium is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
10	Benzene	71432	y	n	0.44	1.4
11	Benzidine	92875	y	n	0.000018	0.000020
12	Benz(a)anthracene	56553	y	n	0.0013	0.0018
13	Benzo(a)pyrene	50328	y	n	0.0013	0.0018
14	Benzo(b)fluoranthene 3,4	205992	y	n	0.0013	0.0018
15	Benzo(k)fluoranthene	207089	y	n	0.0013	0.0018
16	BHC Alpha	319846	y	n	0.00045	0.00049
17	BHC Beta	319857	y	n	0.0016	0.0017
18	BHC Gamma (Lindane)	58899	n	y	0.17	0.18
19	Bromoform	75252	y	n	3.3	14
20	Butylbenzyl Phthalate	85687	n	n	190	190
21	Carbon Tetrachloride	56235	y	n	0.10	0.16
22	Chlordane	57749	y	y	0.000081	0.000081
23	Chlorobenzene	108907	n	n	74	160
24	Chlorodibromomethane	124481	y	n	0.31	1.3

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
25	Chloroethyl Ether bis 2	111444	y	n	0.020	0.053
26	Chloroform	67663	n	n	260	1100
27	Chloroisopropyl Ether bis 2	108601	n	n	1200	6500
28	*Chloromethyl ether, bis*	542881	y	n	0.000024	0.000029
29	Chloronaphthalene 2	91587	n	n	150	160
30	Chlorophenol 2	95578	n	n	14	15
31	*Chlorophenoxy Herbicide (2,4,5,-TP)* [D]	93721	n	n	10	--
	[D] *The Chlorophenoxy Herbicide (2,4,5,-TP) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
32	*Chlorophenoxy Herbicide (2,4-D)* [E]	94757	n	n	100	--
	[E] *The Chlorophenoxy Herbicide (2,4-D) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
33	Chrysene	218019	y	n	0.0013	0.0018
34	Copper [F]	7440508	n	y	1300	--
	[F] *Human health risks from copper are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
35	Cyanide [G]	57125	n	y	130	130
	[G] *The cyanide criterion is expressed as total cyanide (CN)/L.*					
36	DDD 4,4'	72548	y	n	0.000031	0.000031
37	DDE 4,4'	72559	y	n	0.000022	0.000022
38	DDT 4,4'	50293	y	y	0.000022	0.000022
39	Dibenz(a,h)anthracene	53703	y	n	0.0013	0.0018
40	Dichlorobenzene(m) 1,3	541731	n	n	80	96
41	Dichlorobenzene(o) 1,2	95501	n	n	110	130
42	Dichlorobenzene(p) 1,4	106467	n	n	16	19
43	Dichlorobenzidine 3,3'	91941	y	n	0.0027	0.0028

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
44	Dichlorobromomethane	75274	y	n	0.42	1.7
45	Dichloroethane 1,2	107062	y	n	0.35	3.7
46	Dichloroethylene 1,1	75354	n	n	230	710
47	Dichloroethylene trans 1,2	156605	n	n	120	1000
48	Dichlorophenol 2,4	120832	n	n	23	29
49	Dichloropropane 1,2	78875	y	n	0.38	1.5
50	Dichloropropene 1,3	542756	y	n	0.30	2.1
51	Dieldrin	60571	y	y	0.0000053	0.0000054
52	Diethyl Phthalate	84662	n	n	3800	4400
53	Dimethyl Phthalate	131113	n	n	84000	110000
54	Dimethylphenol 2,4	105679	n	n	76	85
55	Di-n-butyl Phthalate	84742	n	n	400	450
56	Dinitrophenol 2,4	51285	n	n	62	530
57	*Dinitrophenols*	25550587	n	n	62	530
58	Dinitrotoluene 2,4	121142	y	n	0.084	0.34
59	Dioxin (2,3,7,8-TCDD)	1746016	y	n	0.00000000051	0.00000000051
60	Diphenylhydrazine 1,2	122667	y	n	0.014	0.020
61	Endosulfan Alpha	959988	n	y	8.5	8.9
62	Endosulfan Beta	33213659	n	y	8.5	8.9
63	Endosulfan Sulfate	1031078	n	n	8.5	8.9
64	Endrin	72208	n	y	0.024	0.024
65	Endrin Aldehyde	7421934	n	n	0.030	0.030
66	Ethylbenzene	100414	n	n	160	210
67	Ethylhexyl Phthalate bis 2	117817	y	n	0.20	0.22
68	Fluoranthene	206440	n	n	14	14
69	Fluorene	86737	n	n	390	530
70	Heptachlor	76448	y	y	0.0000079	0.0000079
71	Heptachlor Epoxide	1024573	y	y	0.0000039	0.0000039
72	Hexachlorobenzene	118741	y	n	0.000029	0.000029
73	Hexachlorobutadiene	87683	y	n	0.36	1.8
74	*Hexachlorocyclo-hexane-Technical*	608731	y	n	0.0014	0.0015

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
75	Hexachlorocyclopentadiene	77474	n	n	30	110
76	Hexachloroethane	67721	y	n	0.29	0.33
77	Indeno(1,2,3-cd)pyrene	193395	y	n	0.0013	0.0018
78	Isophorone	78591	y	n	27	96
79	*Manganese* [H]	7439965	n	n	--	100
	[H] *The "fish consumption only" criterion for manganese applies only to salt water and is for total manganese. This EPA recommended criterion predates the 1980 human health methodology and does not utilize the fish ingestion BCF calculation method or a fish consumption rate.*					
80	*Methoxychlor* [I]	72435	n	y	100	--
	[I] *The human health criterion for methoxychlor is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
81	Methyl Bromide	74839	n	n	37	150
82	Methyl-4,6-dinitrophenol 2	534521	n	n	9.2	28
83	Methylene Chloride	75092	y	n	4.3	59
84	Methylmercury (mg/kg) [J]	22967926	n	n	--	0.040 mg/kg
	[J] *This value is expressed as the fish tissue concentration of methylmercury. Contaminated fish and shellfish is the primary human route of exposure to methylmercury.*					
85	Nickel	7440020	n	y	140	170
86	*Nitrates* [K]	14797558	n	n	10000	--
	[K] *The human health criterion for nitrates is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
87	Nitrobenzene	98953	n	n	14	69
88	*Nitrosamines*	35576911	y	n	0.00079	0.046
89	*Nitrosodibutylamine, N*	924163	y	n	0.0050	0.022
90	*Nitrosodiethylamine, N*	55185	y	n	0.00079	0.046
91	Nitrosodimethylamine, N	62759	y	n	0.00068	0.30
92	Nitrosodi-n-propylamine, N	621647	y	n	0.0046	0.051
93	Nitrosodiphenylamine, N	86306	y	n	0.55	0.60
94	*Nitrosopyrrolidine, N*	930552	y	n	0.016	3.4

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
95	*Pentachlorobenzene*	608935	n	n	0.15	0.15
96	Pentachlorophenol	87865	y	y	0.15	0.30
97	Phenol	108952	n	n	9400	86000
98	Polychlorinated Biphenyls (PCBs) [L]	NA	y	y	0.0000064	0.0000064
	[L] *This criterion applies to total PCBs (e.g. determined as Aroclors or congeners).*					
99	Pyrene	129000	n	n	290	400
100	Selenium	7782492	n	y	120	420
101	*Tetrachlorobenzene, 1,2,4,5-*	95943	n	n	0.11	0.11
102	Tetrachloroethane 1,1,2,2	79345	y	n	0.12	0.40
103	Tetrachloroethylene	127184	y	n	0.24	0.33
104	Thallium	7440280	n	n	0.043	0.047
105	Toluene	108883	n	n	720	1500
106	Toxaphene	8001352	y	y	0.000028	0.000028
107	Trichlorobenzene 1,2,4	120821	n	n	6.4	7.0
108	Trichloroethane 1,1,2	79005	y	n	0.44	1.6
109	Trichloroethylene	79016	y	n	1.4	3.0
110	Trichlorophenol 2,4,6	88062	y	n	0.23	0.24
111	*Trichlorophenol, 2, 4, 5-*	95954	n	n	330	360
112	Vinyl Chloride	75014	y	n	0.023	0.24
113	Zinc	7440666	n	y	2100	2600

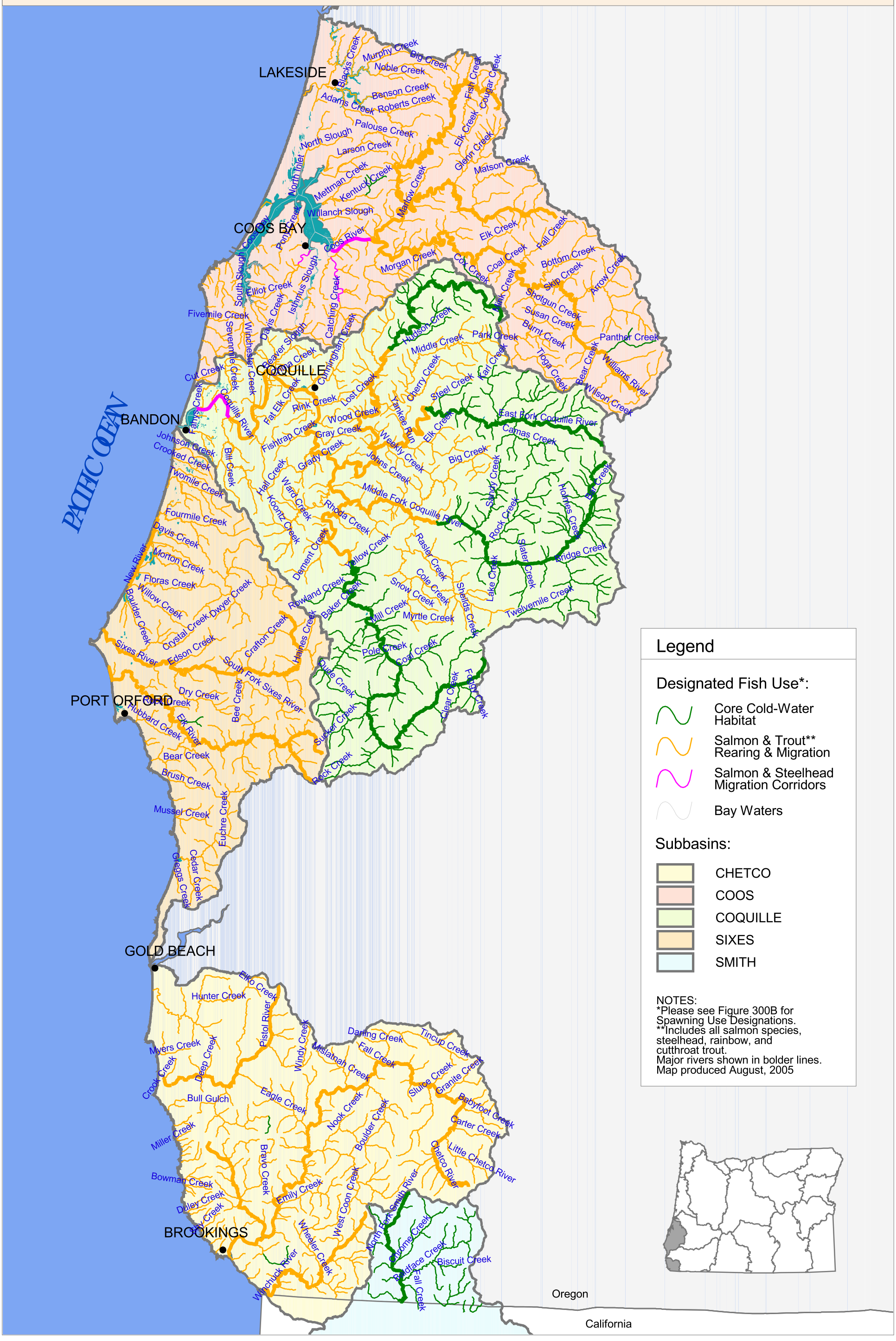
Table 300A

Designated Beneficial Uses
South Coast Basin
(340-41-0300)

Beneficial Uses	Estuaries & Adjacent Maine Waters	All Steams & Tributaries Thereto
Public Domestic Water Supply[1]		X
Private Domestic Water Supply[1]		X
Industrial Water Supply	X	X
Irrigation		X
Livestock Watering		X
Fish & Aquatic Life[2]	X	X
Wildlife & Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power		X
Commercial Navigation & Transportation	X	
[1] With adequate pretreatment (filtration & disinfection) and natural quality to meet drinking water standards.		
[2] See also Figures 300A and 300B for fish use designations for this basin.		

Table produced November, 2003

Draft Revised Figure 300A: Fish Use Designations*
South Coast Basin, Oregon



Oregon
John A Kitzhaber, M.D., Governor

Department of Environmental Quality
Western Region Salem Office
750 Front Street NE, Suite 120
Salem, OR 97301-1039
(503) 378-8240
FAX (503) 373-7944
TTY (503) 378-3684

June 20, 2012

Loree Pryce, P.E.
City of Brookings
898 Elk Drive
Brookings, OR 97415-9648

RE: PERMIT ACTION LETTER
NPDES Permit No. 101773
File No.: 11297
Facility: Brookings Sewage Treatment Plant
Curry County

Dear Ms. Pryce:

We have reviewed your request for a short-term extension of a report due date in your NPDES permit.

Your June 19th, 2012 request is for a one-time extension of the due date in *Schedule D, Condition 9* of your NPDES permit. This condition requires the submission of an updated Inflow and Infiltration (I&I) reduction plan.

Our review indicates your request is not likely to pose any environmental risk. In accordance with OAR 340-045-055(2)(a)(C), your request is approved. The report due date is extended 120 days, and is now due October 31st, 2012.

This Permit Action Letter is an administrative modification to your NPDES Permit. Please attach it to the permit. If you are dissatisfied with the conditions or limitations of this permit action, you have 20 days to request a hearing before the Environmental Quality Commission or its authorised representative. Any such request shall be made in writing to the Director and shall clearly state the grounds for the request.

If you have any questions regarding this letter, please call Andy Ullrich in our Medford office at 541-776-6189.

Sincerely,

Steve Schnurbusch
Acting Water Quality Manager
Western Region

cc: EPA Region X
HQ-WQ OIS
Andy Ullrich, DEQ – Medford Office
Carrie Everett, DEQ-Salem

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DEQ-DC1

APPENDIX B: **FIGURES AND MAPPING**

Climate Data

Firm Maps

Wetlands Map

NOAA 24-hour Isopluvial Maps

Flow Mapping Locations, Figures B1 – B8

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: BROOKINGS 2 SE, OR

COOP ID: 351055

Climate Division: OR 1 **NWS Call Sign: 4BK** **Elevation: 46 Feet** **Lat: 42°02N** **Lon: 124°15W**

Precipitation (inches)

	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	11.28	10.94	6.19	1953	17	24.55	1998	.50	1985	17.2	14.3	7.8	3.8	3.21	4.28	5.90	7.30	8.68	10.11	11.70	13.57	16.00	19.80	23.35
Feb	10.14	8.62	5.65	1948	21	21.07	1998	3.24	1988	16.7	14.0	7.6	3.2	3.18	4.14	5.57	6.80	7.98	9.21	10.56	12.14	14.18	17.36	20.30
Mar	9.61	9.60	8.79	1932	18	15.92	1995	4.06	1992	18.2	14.5	7.0	2.7	4.37	5.22	6.39	7.35	8.23	9.13	10.08	11.17	12.55	14.63	16.51
Apr	5.72	4.96	4.38	1937	13	15.34	1993	1.32	1973	13.9	10.4	4.1	1.4	1.63	2.17	2.99	3.71	4.40	5.13	5.93	6.88	8.11	10.04	11.83
May	3.61	3.26	5.97	1963	6	9.92	1993	.01	1982	9.5	6.4	2.5	1.0	.26	.48	.95	1.44	2.00	2.64	3.41	4.38	5.74	8.03	10.30
Jun	1.83	1.35	6.00	1933	9	4.90	1995	.36+	1991	5.9	3.5	1.0	.4	.25	.40	.66	.92	1.18	1.48	1.82	2.23	2.80	3.72	4.61
Jul	.51	.26	3.71	1947	26	2.40	1993	.00+	1980	3.3	1.0	.3	.1	.00	.01	.06	.12	.20	.30	.43	.60	.85	1.29	1.74
Aug	1.04	.29	3.61	1983	29	6.04	1983	.00+	1998	4.5	1.7	.6	.3	.00	.00	.01	.08	.20	.38	.66	1.08	1.73	2.97	4.30
Sep	1.95	.88	3.27	1951	30	7.38	1977	.00	1999	5.5	3.1	1.4	.6	.00	.03	.16	.35	.63	.99	1.49	2.18	3.23	5.13	7.13
Oct	5.22	4.33	5.45	1990	30	12.37	1981	.16	1978	10.0	7.0	3.7	1.8	.60	1.01	1.74	2.46	3.24	4.11	5.12	6.37	8.08	10.89	13.63
Nov	10.58	8.84	5.53	1953	22	26.01	1973	3.82	1993	17.4	13.9	7.8	3.6	3.43	4.43	5.91	7.18	8.39	9.65	11.03	12.64	14.72	17.95	20.93
Dec	11.99	11.18	6.88	1954	30	30.60	1996	2.10	1976	17.6	14.6	8.8	4.2	3.07	4.20	5.94	7.48	9.00	10.60	12.38	14.49	17.25	21.61	25.69
Ann	73.48	71.68	8.79	Mar 1932	18	30.60	Dec 1996	.00+	Sep 1999	139.7	104.4	52.6	23.1	46.01	51.07	57.70	62.82	67.44	71.95	76.67	81.93	88.39	97.89	106.21

+ Also occurred on an earlier date(s)
# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1931-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

FIRM Maps Legend

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane South Zone (FIPS Zone 3602), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator grid values, zone 15N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 25, 2009

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

The **projection** used in the preparation of this map was Oregon State Plane South Zone (FIPS zone 3602). The **horizontal datum** was NAD 27, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by the State of Oregon and Curry County. This information was compiled from Curry County (2005), Oregon Water Resources Department (2006), OR/WA Bureau of Land Management (2000), USDA-FSA (2005), and National Geodetic Survey (2007) at a scale of 1:24000.

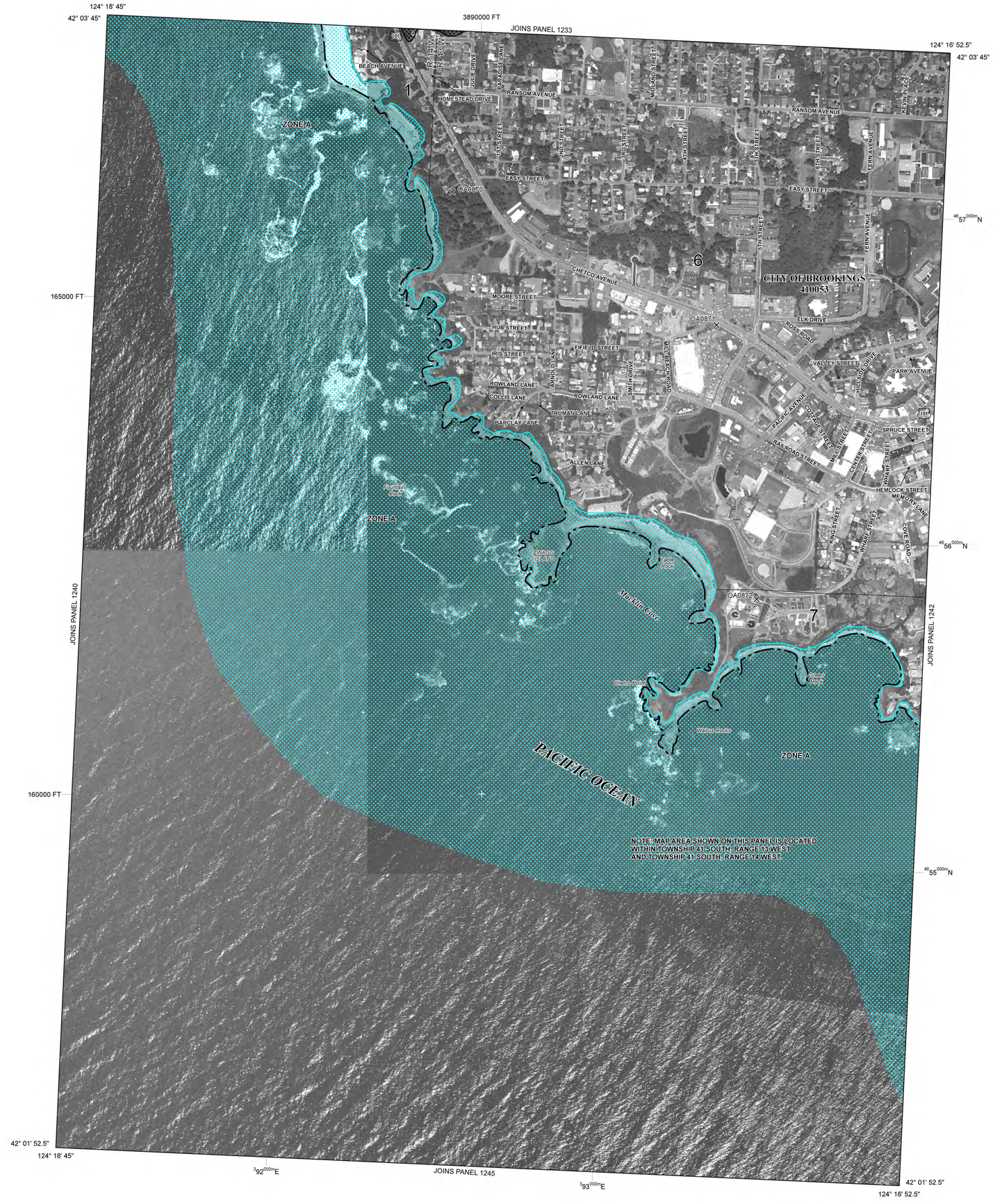
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
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ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Oregon State Plane South Zone (FIPS Zone 3602), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 15N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1241E

FIRM

FLOOD INSURANCE RATE MAP

CURRY COUNTY, OREGON
AND INCORPORATED AREAS

PANEL 1241 OF 1475
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BROOKINGS, CITY OF	410053	1241	E
CURRY COUNTY	410052	1241	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
41015C1241E

EFFECTIVE DATE
SEPTEMBER 25, 2009

Federal Emergency Management Agency

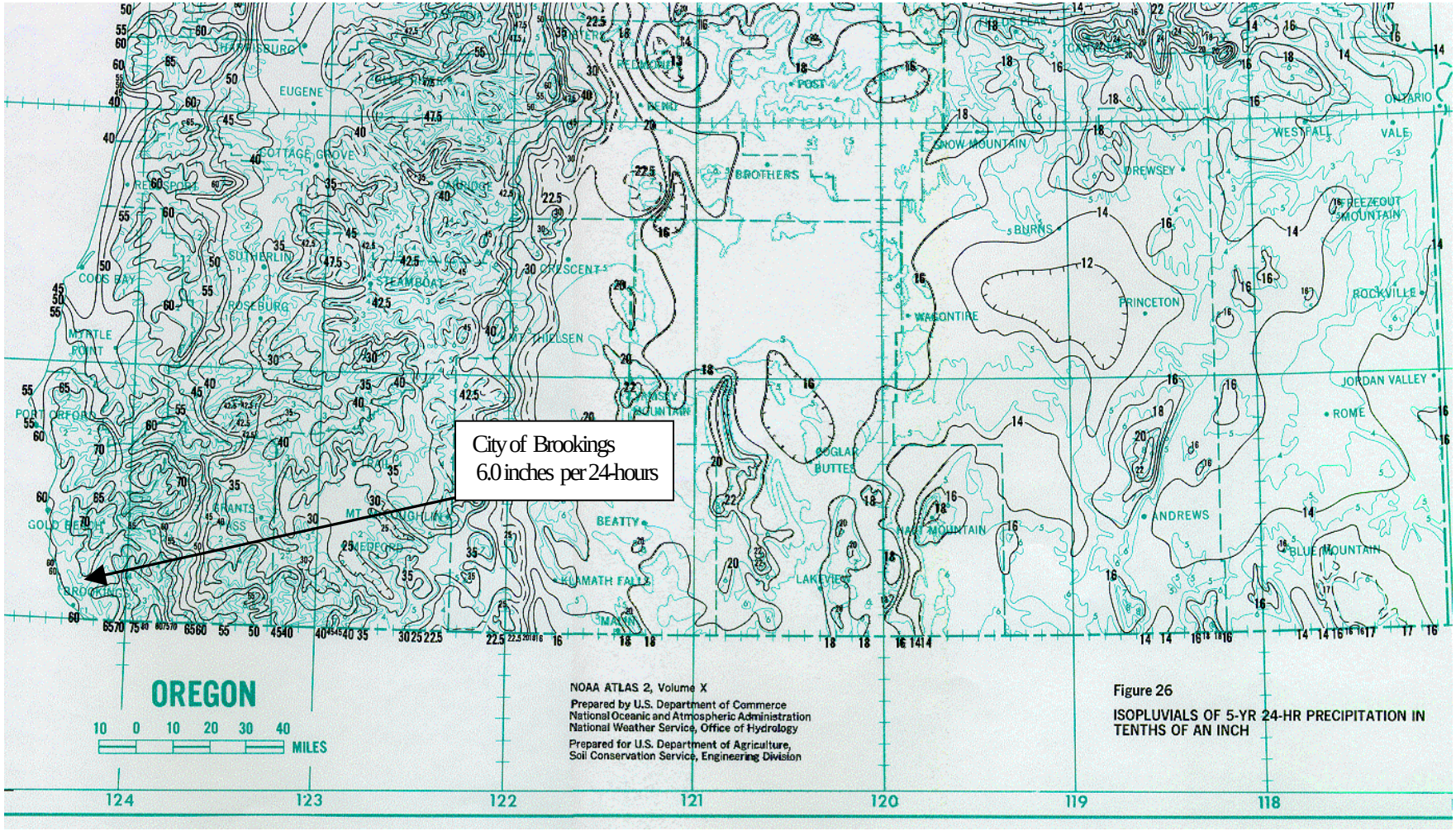
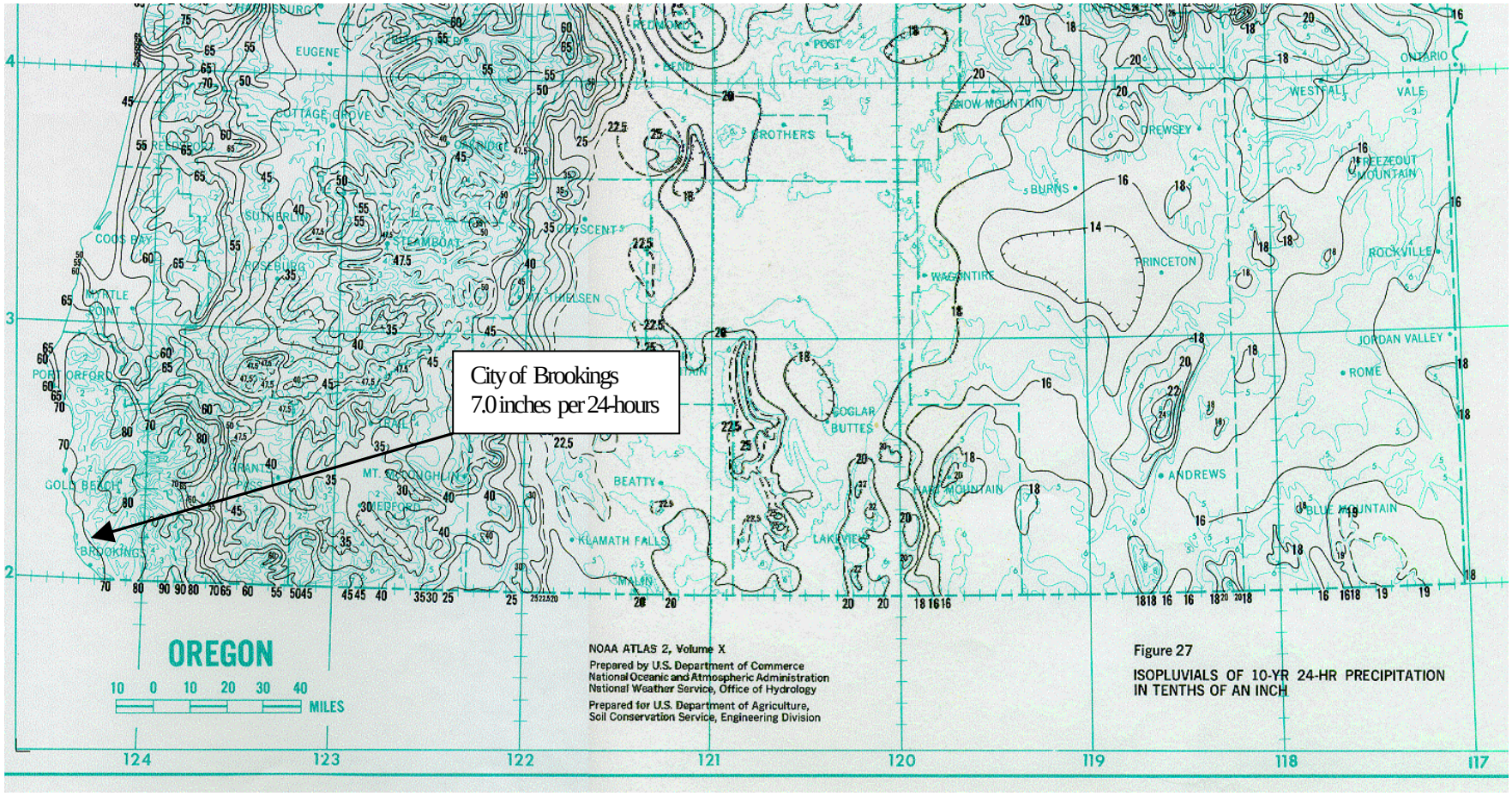


Figure 26

ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

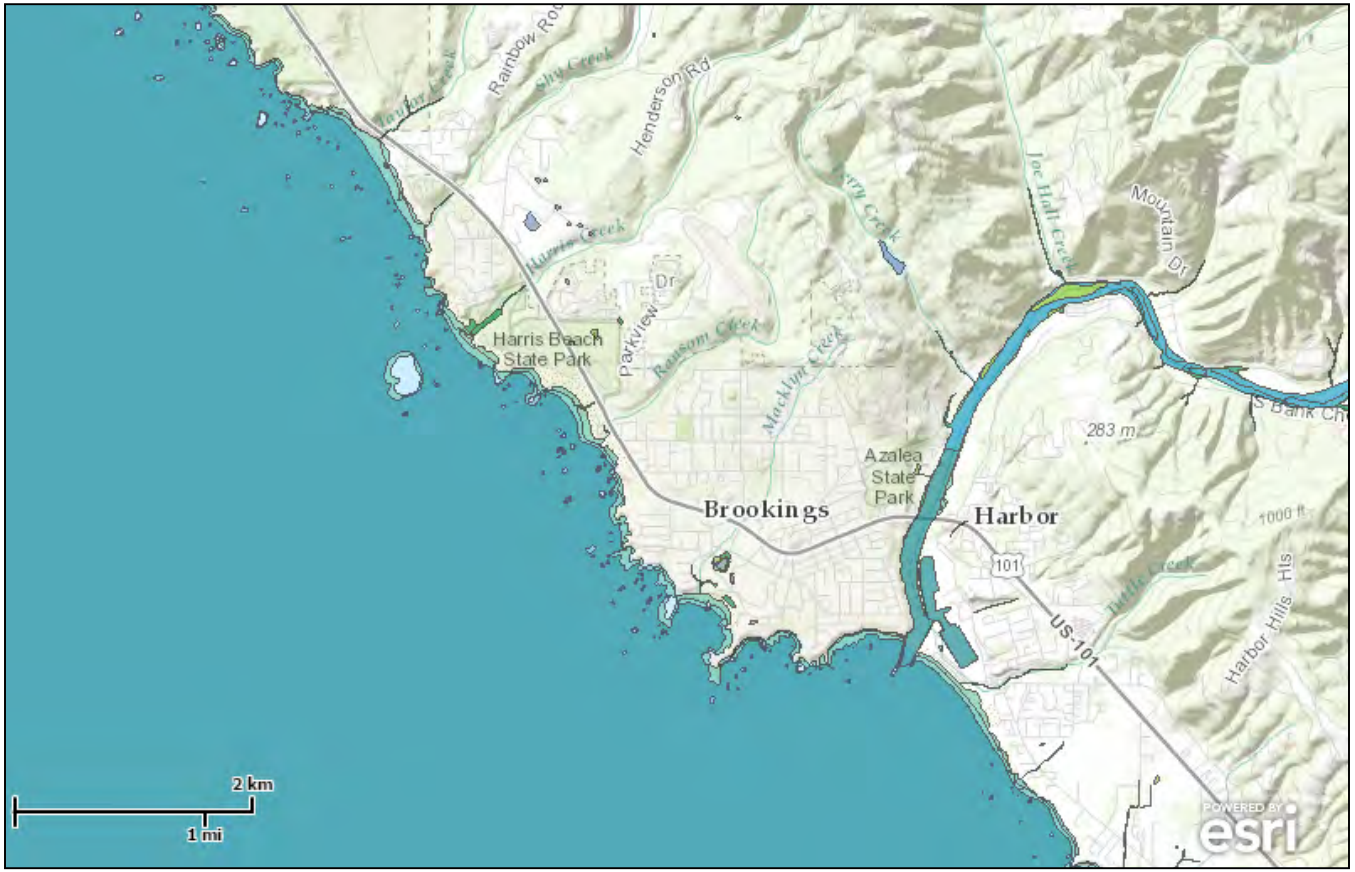
+


City of Brookings
7.0 inches per 24-hours
OREGON
10 0 10 20 30 40
MILES
NOAA ATLAS 2, Volume X
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division
Figure 27
ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH
EUGENE
COTTAGE GROVE
REEDSPORT
SUTHERLIN
COOS BAY
ROSEBURG
STEAMBOAT
MT. THIELSEN
PORT ORFORD
GOLD BEACH
BROOKINGS
MT. MCLOUGHLIN
MEDFORD
BEATTY
KLAMATH FALLS
MALIN
BEND
POST
BROTHERS
SNOW MOUNTAIN
DREWSEY
BURNS
PRINCETON
WAGONTIRE
COGLAR BUTTES
LAKEVIEW
ANDREWS
WESTFALL
VALE
ONTARIO
DEEZEOUT MOUNTAIN
ROCKVILLE
JORDAN VALLEY
ROME
BLUE MOUNTAIN
124
123
122
121
120
119
118
117

U.S. Fish and Wildlife Service

National Wetlands Inventory

Sep 24, 2014

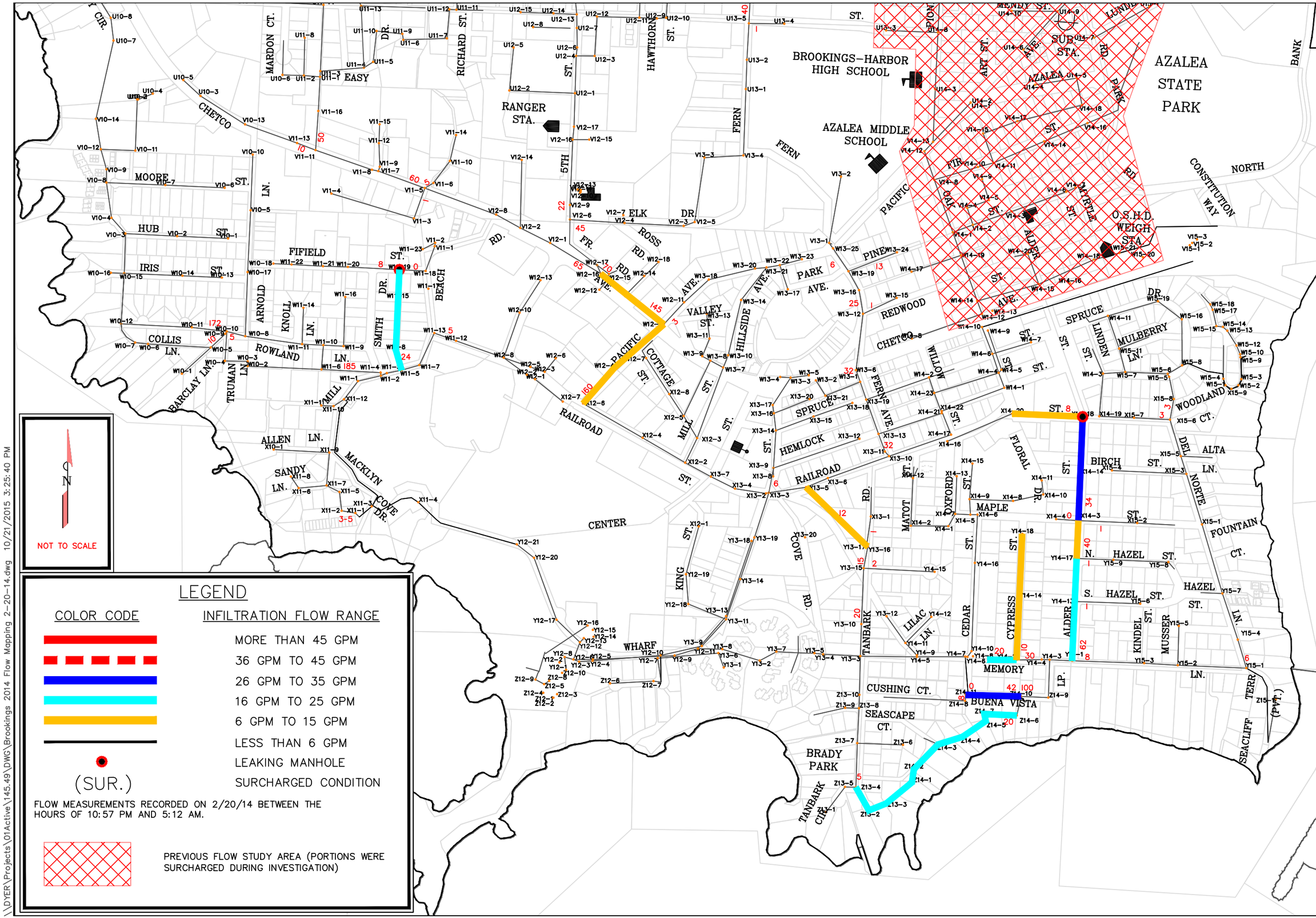


Wetlands

- 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.

User Remarks:



LEGEND

COLOR CODE	INFILTRATION FLOW RANGE
	MORE THAN 45 GPM
	36 GPM TO 45 GPM
	26 GPM TO 35 GPM
	16 GPM TO 25 GPM
	6 GPM TO 15 GPM
	LESS THAN 6 GPM
	LEAKING MANHOLE
(SUR.)	SURCHARGED CONDITION

FLOW MEASUREMENTS RECORDED ON 2/20/14 BETWEEN THE HOURS OF 10:57 PM AND 5:12 AM.

PREVIOUS FLOW STUDY AREA (PORTIONS WERE SURCHARGED DURING INVESTIGATION)

FIGURE NO. B.1

CITY OF BROOKINGS
CURRY COUNTY, OREGON

FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 2-20-14.dwg 10/21/2015 3:25:40 PM

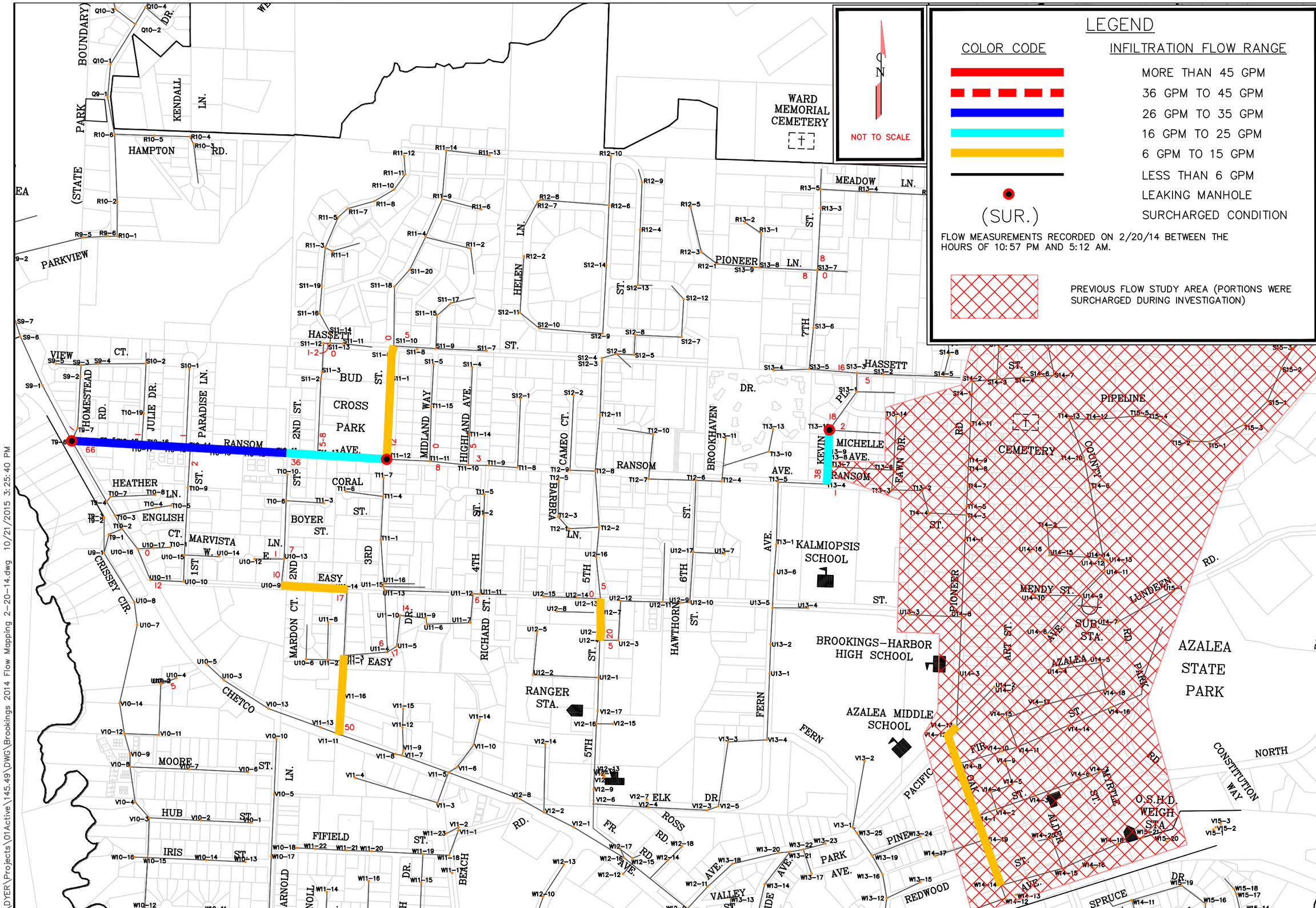


FIGURE NO. B.2

CITY OF BROOKINGS
CURRY COUNTY, OREGON

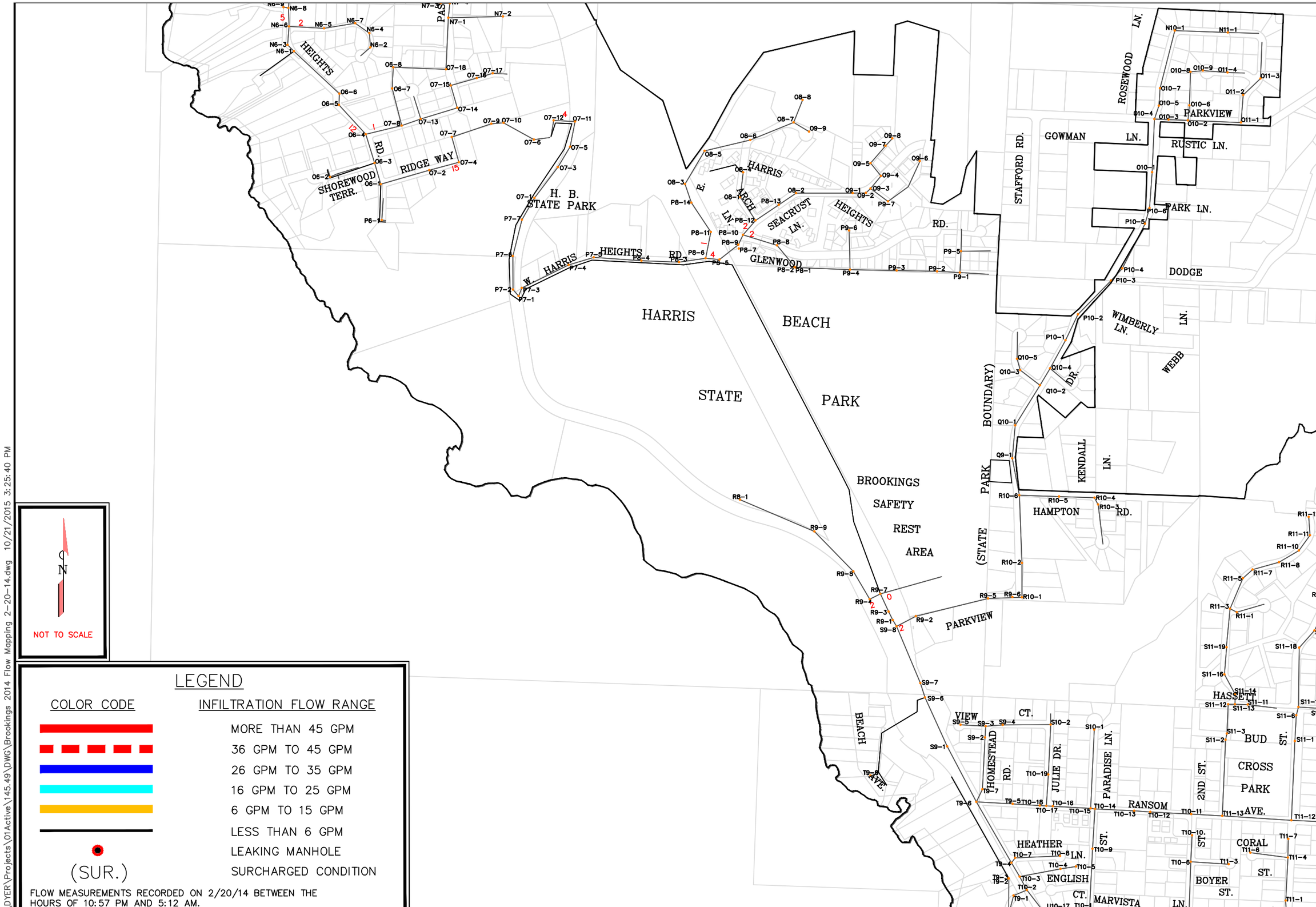
FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 2-20-14.dwg 10/21/2015 3:25:40 PM



N

NOT TO SCALE

LEGEND

COLOR CODE	INFILTRATION FLOW RANGE
	MORE THAN 45 GPM
	36 GPM TO 45 GPM
	26 GPM TO 35 GPM
	16 GPM TO 25 GPM
	6 GPM TO 15 GPM
	LESS THAN 6 GPM
	LEAKING MANHOLE
(SUR.)	SURCHARGED CONDITION

FLOW MEASUREMENTS RECORDED ON 2/20/14 BETWEEN THE HOURS OF 10:57 PM AND 5:12 AM.

FIGURE NO. B.3

CITY OF BROOKINGS
CURRY COUNTY, OREGON

FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 2-20-14.dwg 10/21/2015 3:25:40 PM

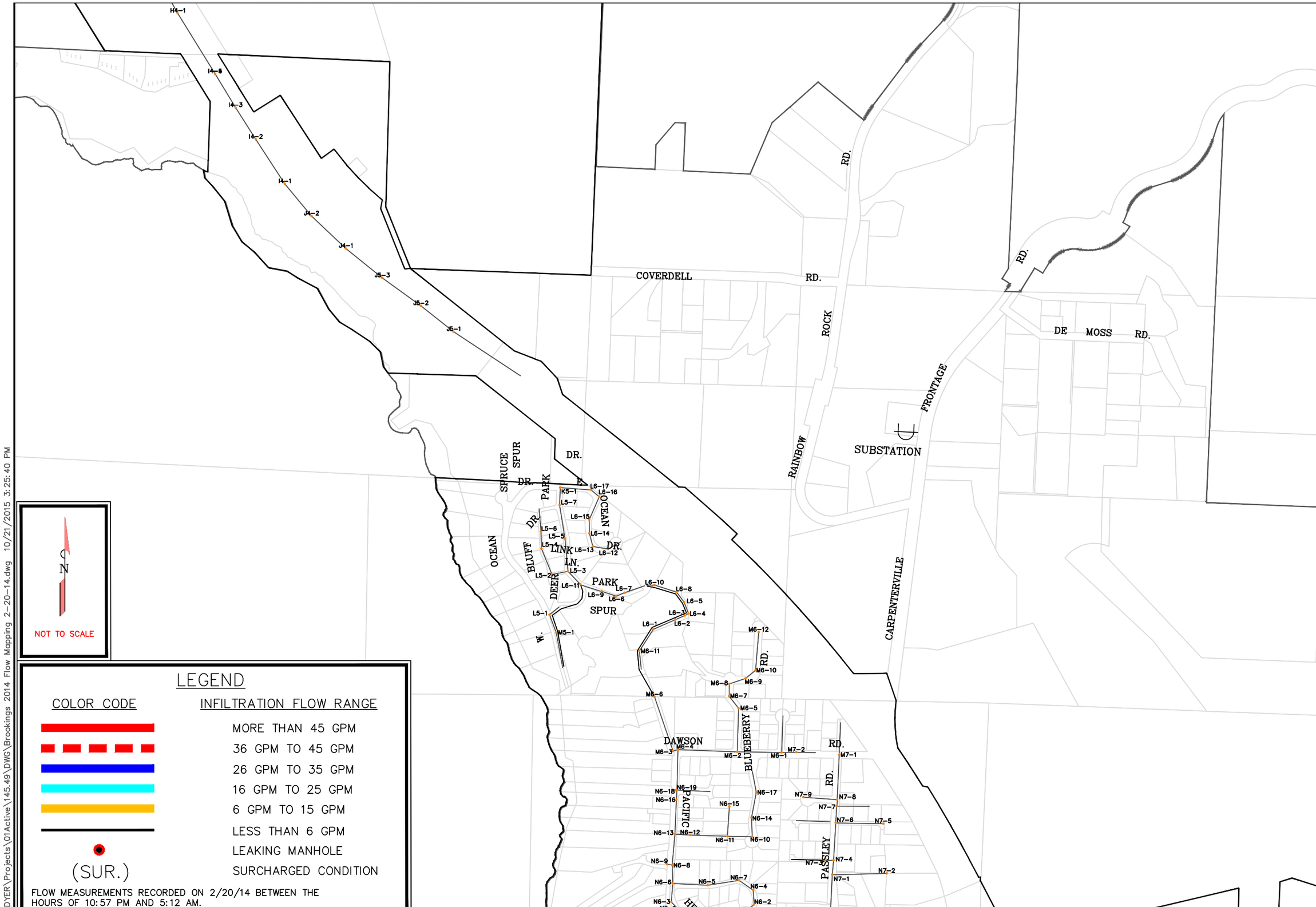


FIGURE NO. B.4

CITY OF BROOKINGS
CURRY COUNTY, OREGON

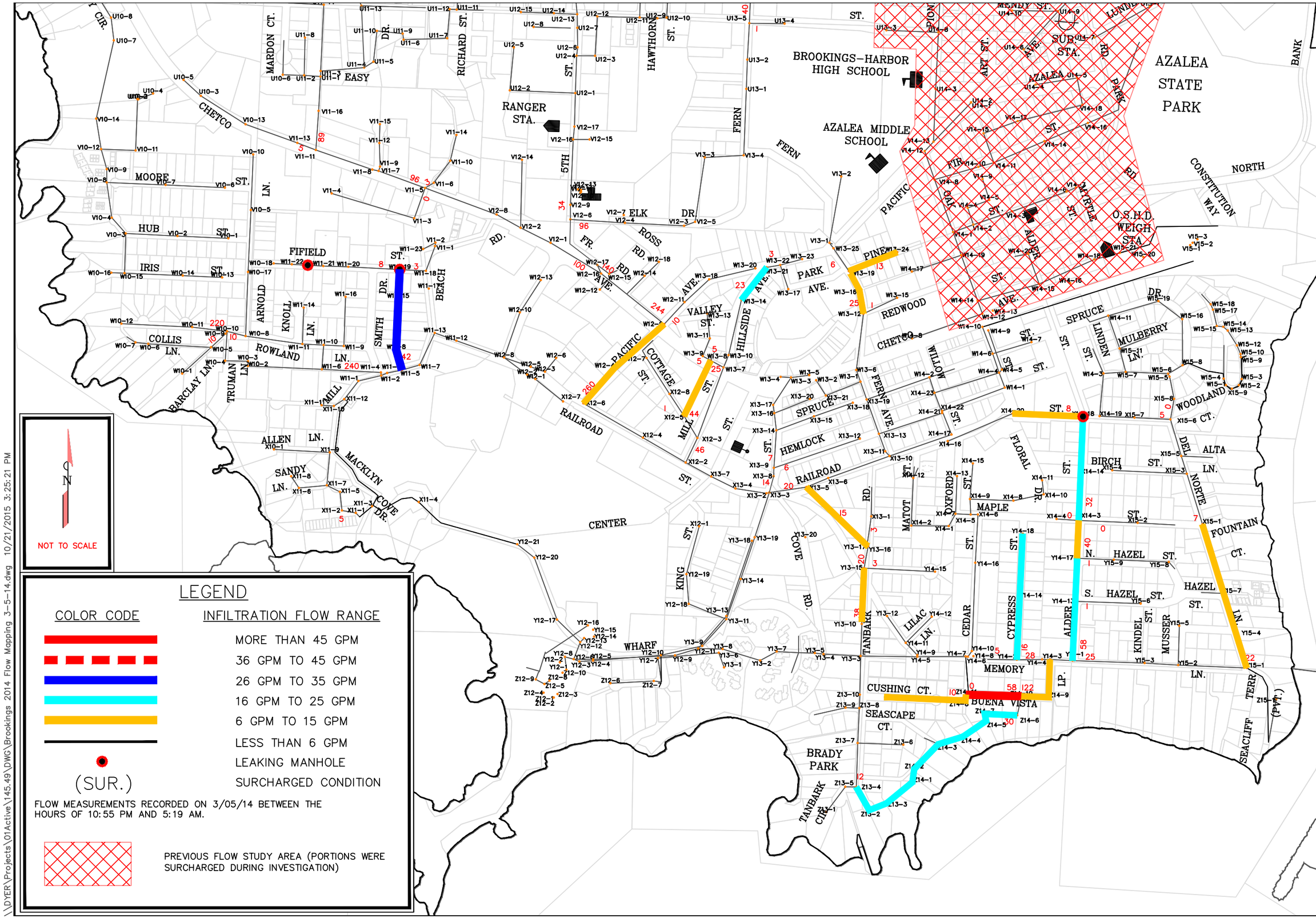
FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 2-20-14.dwg 10/21/2015 3:25:40 PM



LEGEND

COLOR CODE	INFILTRATION FLOW RANGE
	MORE THAN 45 GPM
	36 GPM TO 45 GPM
	26 GPM TO 35 GPM
	16 GPM TO 25 GPM
	6 GPM TO 15 GPM
	LESS THAN 6 GPM
●	LEAKING MANHOLE
(SUR.)	SURCHARGED CONDITION

FLOW MEASUREMENTS RECORDED ON 3/05/14 BETWEEN THE HOURS OF 10:55 PM AND 5:19 AM.

PREVIOUS FLOW STUDY AREA (PORTIONS WERE SURCHARGED DURING INVESTIGATION)

FIGURE NO. B.5

CITY OF BROOKINGS
CURRY COUNTY, OREGON

FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 3-5-14.dwg 10/21/2015 3:25:21 PM

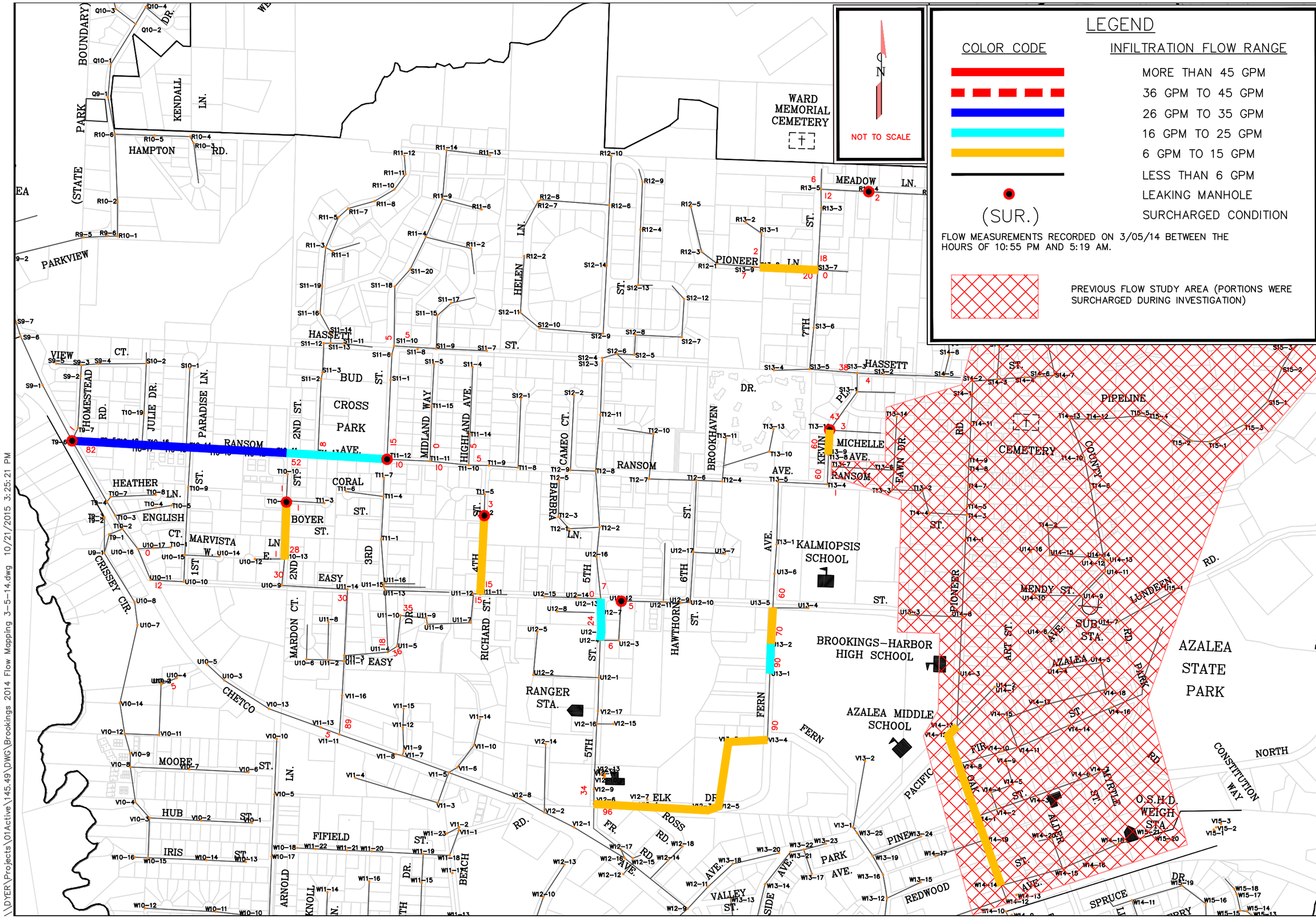


FIGURE NO. B.6

CITY OF BROOKINGS
CURRY COUNTY, OREGON

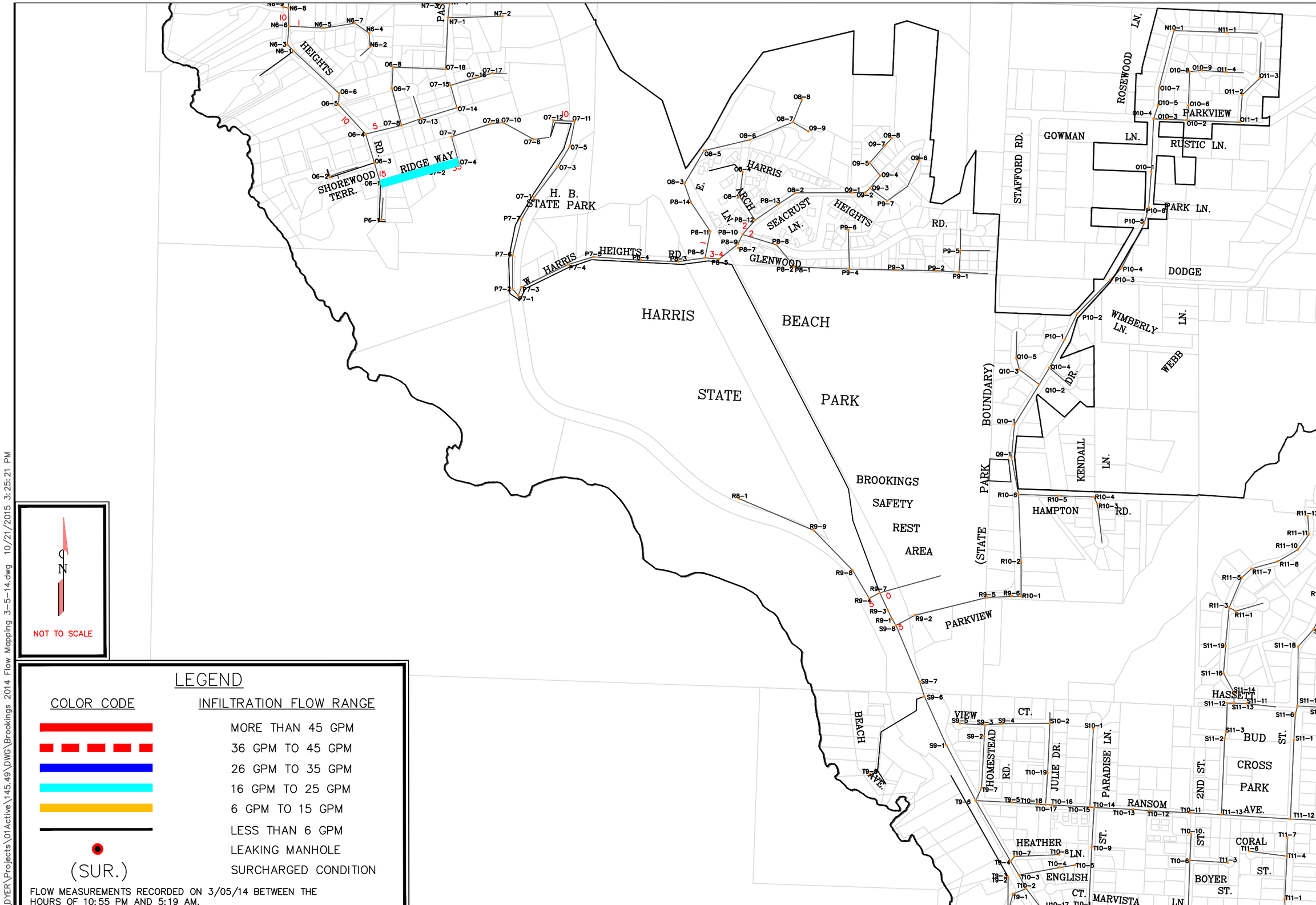
FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 3-5-14.dwg 10/21/2015 3:25:21 PM



LEGEND

COLOR CODE	INFILTRATION FLOW RANGE
	MORE THAN 45 GPM
	36 GPM TO 45 GPM
	26 GPM TO 35 GPM
	16 GPM TO 25 GPM
	6 GPM TO 15 GPM
	LESS THAN 6 GPM
	LEAKING MANHOLE
(SUR.)	SURCHARGED CONDITION

FLOW MEASUREMENTS RECORDED ON 3/05/14 BETWEEN THE HOURS OF 10:55 PM AND 5:19 AM.

FIGURE NO. B.7

CITY OF BROOKINGS
CURRY COUNTY, OREGON

FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 3-5-14.dwg 10/21/2015 3:25:21 PM

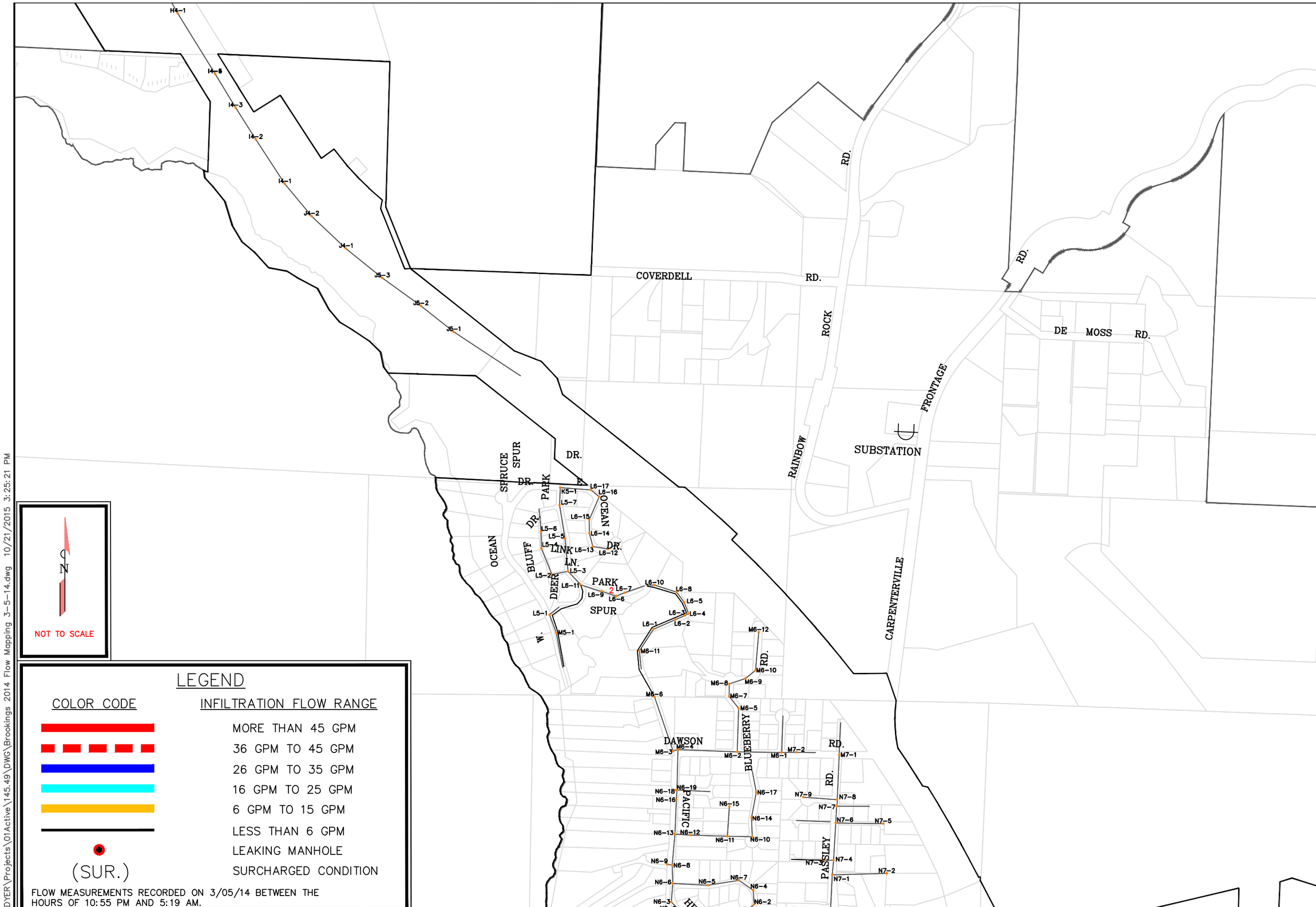


FIGURE NO.
B.8

CITY OF BROOKINGS
CURRY COUNTY, OREGON

FLOW MAPPING LOCATIONS

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS

DATE: FEBRUARY 2014

PROJECT NO.: 145.00C

\\DYER\Projects\01Active\145.49\DWG\Brookings 2014 Flow Mapping 3-5-14.dwg 10/21/2015 3:25:21 PM

APPENDIX C: **COST ESTIMATES AND FUNDING**

Cost Estimates

PRELIMINARY COST ESTIMATE - PRIORITY 1 I/I PROJECTS

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Cons. Facility & Temp Control	1	LS	$31,000	$ 31,000
2	Demolition & Site Prep	1	LS	$25,000	$ 25,000
3	Flagging	250	HR	$50	$ 12,500
4	Foundation Stabalization	47	CY	$30	$ 1,417
5	Sewer Line Replacement (Class C Backfill)	510	LF	$100	$ 51,000
6	Chemical Grouting	340	LF	$25	$ 8,500
8	Inversion Lining	2520	LF	$40	$ 100,800
9	Repair or Replace Existing Cleanouts	67	EA	500	$ 33,500
10	Repair or Replace Existing Catch Basin	2	EA	$1,000	$ 2,000
11	Repair or Replace Existing Manhole	17	EA	$4,000	$ 68,000
12	Remove & Replace Asphalt Concrete Pavement	2550	SF	$10	$ 25,500
13	Landscaping and Erosion Conrol	1	LS	$4,000	$ 4,000
				Construction	**$ 363,217**
				Engineering - Design	**$ 54,000**
				Engineering and Construction Management	**$ 36,000**
				Contingency	**$ 54,000**
				Environmental Assessment	**$ 15,000**
				Permit Support and TV Inspection Report	**$ 15,000**
				Regulatory Review	**$ 4,000**
				Grant Administration	**$ 9,000**
				Labor Standards Monitoring	**$ 5,000**
				Legal	**$ 3,000**
				TOTAL PROJECT COST	**$ 558,217**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	0	$ 35	$ -	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ -**	**$ -**

P	A	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Item @ 15 yrs.	LS	0	$ 2,500	$ -	$ -
2	Item @ 10 yrs	LS	0	$ 2,500	$ -	$ -
3	Item @ 5 yrs	LS	0	$ 2,500	$ -	$ -
	Salvage Values @ 20 Years					
4	None	LS	0	$ -	$ -	$ -
				OTHER COSTS OVER STUDY PERIOD TOTAL		**$ -**

P	F	n	i	(1+i)^n
$0.00	$0.00	15	0.016	1.268836
$0.00	$0.00	10	0.016	1.172026
$0.00	$0.00	5	0.016	1.082601

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 558,217
Operations and Maintenance Cost	$ -	$ -
Other Costs Over Study Period		$ -
PRESENT WORTH COST OF ALTERNATIVE		**$ 558,217**

PRELIMINARY COST ESTIMATE - PRIORITY 2 I/I PROJECTS

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Cons. Facility & Temp Control	1	LS	$28,000	$ 28,000
2	Demolition & Site Prep	1	LS	$23,000	$ 23,000
3	Flagging	400	HR	$50	$ 20,000
4	Foundation Stabalization	55	CY	$30	$ 1,639
5	Sewer Line Replacement (Class C Backfill)	590	LF	$100	$ 59,000
6	Chemical Grouting	400	LF	$25	$ 10,000
8	Inversion Lining	2930	LF	$40	$ 117,200
9	Repair Plugged House Vent	2	EA	$500	$ 1,000
10	Repair Roof Drain	5	EA	$500	$ 2,500
11	Repair or Replace Service Laterals	33	EA	$1,000	$ 33,000
12	Remove & Replace Asphalt Concrete Pavement	2950	SF	$10	$ 29,500
13	Landscaping and Erosion Conrol	1	LS	$4,000	$ 4,000
				Construction	**$ 328,839**
				Engineering - Design	**$ 49,000**
				Engineering and Construction Management	**$ 33,000**
				Contingency	**$ 49,000**
				Environmental Assessment	**$ 15,000**
				Permit Support and TV Inspection Report	**$ 19,000**
				Regulatory Review	**$ 3,000**
				Grant Administration	**$ 8,000**
				Labor Standards Monitoring	**$ 5,000**
				Legal	**$ 3,000**
				TOTAL PROJECT COST	**$ 512,839**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	0	$ 35	$ -	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ -**	**$ -**

P	A	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373643891

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Item @ 15 yrs.	LS	0	$ 2,500	$ -	$ -
2	Item @ 10 yrs	LS	0	$ 2,500	$ -	$ -
3	Item @ 5 yrs	LS	0	$ 2,500	$ -	$ -
	Salvage Values @ 20 Years					
4	None	LS	0	$ -	$ -	$ -
				OTHER COSTS OVER STUDY PERIOD TOTAL		**$ -**

P	F	n	i	(1+i)^n
$0.00	$0.00	15	0.016	1.268836371
$0.00	$0.00	10	0.016	1.17202555
$0.00	$0.00	5	0.016	1.082601289
P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373643891

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 512,839
Operations and Maintenance Cost	$ -	$ -
Other Costs Over Study Period		$ -
PRESENT WORTH COST OF ALTERNATIVE		**$ 512,839**

PRELIMINARY COST ESTIMATE - PRIORITY 1 PUMP STATION IMPROVEMENT ITEMS

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Cons. Facility & Temp Control	1	LS	$12,700	$ 12,700
2	Demolition & Site Prep Incl. Tank Removals	1	LS	$16,000	$ 16,000
3	Flagging	20	HR	$35	$ 700
4	Foundation Stabalization	16	CY	$50	$ 800
5	Excavation (DT 4 & 5)	34	CY	$120	$ 4,080
6	Backfill (DT 4 & 5)	18	CY	$50	$ 900
7	Contaminated Soil Removal & Disposal (DT 4 & 5)	7	CY	$1,100	$ 7,700
8	New Above Ground Fuel Tank (DT 4 & 5)	2	EA	$9,500	$ 19,000
9	Concrete Wall (DT 4 & 5)	1	CY	$900	$ 900
10	Concrete Slab (DT 4 & 5)	4	CY	$800	$ 3,200
11	Guide Rail Replacement	440	LF	$80	$ 35,200
12	Moisture Detection Device and Electrical Repairs (DT3)	1	LS	$15,000	$ 15,000
13	Landscaping and Erosion Conrol	1	LS	$2,500	$ 2,500
				Construction	**$ 118,680**
				Contingency	**$ 18,000**
				Engineering	**$ 21,000**
				Additional Consultant	**$ 6,000**
				Admin. / Legal / Easements	**$ 4,000**
				TOTAL PROJECT COST	**$ 167,680**

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor Additional - Annual	HRS	2	$ 35	$ 70	
2	Testing Labor Additional - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles Additional - Annual	MILE	(100)	$ 1.50	$ (150.00)	
4	Operational Labor Additional- Annual	HRS	(16)	$ 35	$ (560)	
5	Maintenance/Repair Labor Additional - Annual	HRS	(40)	$ 35	$ (1,400)	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power Additional - Annual	KWH	0	0.09	$ -	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ (2,040)**	**$ (34,681)**

P	A	n	i	(1+i)^n
-$34,681.18	-$2,040.00	20	0.016	1.373644

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Item @ 15 yrs.	LS	1	$ (4,000)	$ (4,000)	$ (3,152)
2	Item @ 10 yrs	LS	1	$ (6,000)	$ (6,000)	$ (5,119)
3	Item @ 5 yrs	LS	1	$ (8,000)	$ (8,000)	$ (7,390)
	Salvage Values @ 20 Years					
4	None	LS	0	$ -	$ -	$ -
					OTHER COSTS OVER STUDY PERIOD TOTAL	**$ (15,661)**

P	F	n	i	(1+i)^n
-$3,152.49	-$4,000.00	15	0.016	1.268836
-$5,119.34	-$6,000.00	10	0.016	1.172026
-$7,389.61	-$8,000.00	5	0.016	1.082601

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D

Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 167,680
Operations and Maintenance Cost	$ (2,040)	$ (34,681)
Other Costs Over Study Period		$ (15,661)
PRESENT WORTH COST OF ALTERNATIVE		**$ 117,337**

PRELIMINARY COST ESTIMATE - PRIORITY 2 PUMP STATION IMPROVEMENT ITEMS

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Cons. Facility & Temp Control	1	LS	$13,000	$ 13,000
2	Demolition & Site Prep	1	LS	$9,000	$ 9,000
3	Flagging	40	HR	$50	$ 2,000
6	Portable High Pressure Jet Washing System	1	EA	$12,000	$ 12,000
7	1" Air Release Valves	7	EA	$600	$ 4,200
8	6" Check Valves	7	EA	$3,300	$ 23,100
9	6" Gate Valves	7	EA	$2,500	$ 17,500
10	Control Panels	3	EA	$11,000	$ 33,000
11	Influent Pipe Repair	1	LS	$5,000	$ 5,000
12	Pump Replacement	0	EA	$40,000	$ -
13	Repair Root Intrusion	1	LS	$2,500	$ 2,500
14	Bypass Pumping	1	LS	$2,500	$ 2,500
15	Landscaping and Erosion Conrol	1	LS	$1,000	$ 1,000
				Construction	$ 124,800
				Contingency	$ 19,000
				Engineering	$ 22,000
				Additional Consultant	$ 6,000
				Admin. / Legal / Easements	$ 4,000
				TOTAL PROJECT COST	$ 175,800

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor Additional - Annual	HRS	1	$ 35	$ 35	
2	Testing Labor Additional - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles Additional- Annual	MILE	(300)	$ 1.50	$ (450.00)	
4	Operational LaborAdditional - Annual	HRS	(40)	$ 35	$ (1,400)	
5	Maintenance/Repair Labor Additional - Annual	HRS	(120)	$ 35	$ (4,200)	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power Savings - Annual	KWH	(11,388)	0.09	$ (1,025)	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (7,040)**	**$ (119,683)**

Testing for each control panel

40 hrs per year for maint ea. pump station, 2 days w/ 2 men repairs
Elec. Power - 1500 KWH per each control panel

P	A	n	i	(1+i)^n
-$119,682.72	-$7,039.92	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Control Panels @ 15 yrs	EA	3	$13,750	$ 41,250	$ 32,510
2	Control Panels @ 10 yrs	EA	3	$13,750	$ 41,250	$ 35,195
3	Control Panels @ 5 yrs	EA	3	$13,750	$ 41,250	$ 38,103
4	Replace Pumps @ 15 yrs	EA	13	$50,000	$ 650,000	$ 512,280
5	Replace Pumps @ 10 yrs	EA	13	$50,000	$ 650,000	$ 554,595
6	1" Air Release Valves @ 15 yrs	EA	7	$ 750	$ 5,250	$ 4,138
7	6" Check Valves @ 15 yrs	EA	7	$4,125	$ 28,875	$ 22,757
8	6" Gate Valves @ 15 yrs	EA	7	$3,125	$ 21,875	$ 17,240
9	1" Air Release Valves @ 10 yrs	EA	7	$ 750	$ 5,250	$ 4,479
10	6" Check Valves @ 10 yrs	EA	7	$4,125	$ 28,875	$ 24,637
11	6" Gate Valves @ 10 yrs	EA	7	$3,125	$ 21,875	$ 18,664
12	1" Air Release Valves @ 5 yrs	EA	7	$ 750	$ 5,250	$ 4,849
13	6" Check Valves @ 5 yrs	EA	7	$4,125	$ 28,875	$ 26,672
14	6" Gate Valves @ 5 yrs	EA	7	$3,125	$ 21,875	$ 20,206
	Salvage Values @ 20 Years					
15	None	LS	1	$ -	$ -	$ -
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$ 1,316,327**
					$ 1,591,750	

P	F	n	i	(1+i)^n
$32,510.10	$41,250.00	15	0.016	1.268836
$35,195.48	$41,250.00	10	0.016	1.172026
$38,102.67	$41,250.00	5	0.016	1.082601
$512,280.40	$650,000.00	15	0.016	1.268836
$554,595.42	$650,000.00	10	0.016	1.172026
$4,137.65	$5,250.00	15	0.016	1.268836
$22,757.07	$28,875.00	15	0.016	1.268836
$17,240.21	$21,875.00	15	0.016	1.268836
$4,479.42	$5,250.00	10	0.016	1.172026
$24,636.83	$28,875.00	10	0.016	1.172026
$18,664.27	$21,875.00	10	0.016	1.172026
$4,849.43	$5,250.00	5	0.016	1.082601
$26,671.87	$28,875.00	5	0.016	1.082601
$20,205.96	$21,875.00	5	0.016	1.082601

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 175,800
Operations and Maintenance Cost	$ (7,040)	$ (119,683)
Other Costs Over Study Period		$ 1,316,327
PRESENT WORTH COST OF ALTERNATIVE		**$ 1,372,444**

PRELIMINARY COST ESTIMATE - PRIORITY 3 PUMP STATION IMPROVEMENT ITEMS

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Cons. Facility & Temp Control	1	LS	$11,000	$ 11,000
2	Demolition & Site Prep	1	LS	$11,000	$ 11,000
3	LED Lighting per Pump Station	13	EA	$5,000	$ 65,000
4	Replace Hardwire Connections with Meltronic Connector per Pump Station	4	EA	$7,500	$ 30,000
5	Portable Trailer-Mounted Engine Generator	1	EA	$35,000	$ 35,000
6	Landscaping and Erosion Conrol	1	LS	$1,500	$ 1,500
7	Soft Start per pump	21	EA	$4,500	$ 94,500
				Construction	**$ 248,000**
				Contingency	**$ 37,000**
				Engineering	**$ 37,000**
				Additional Consultant	**$ 12,000**
				Admin. / Legal / Easements	**$ 7,000**
				TOTAL PROJECT COST	**$ 341,000**

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor Additional - Annual	HRS	4	$ 35	$ 140	
2	Testing Labor Additional - Annual	HRS	2	$ 35	$ 70	
3	Vehicle Operation Miles - Annual	MILE	50	$ 1.50	$ 75.00	
4	Operational Labor Additional - Annual	HRS	(20)	$ 35	$ (700)	
5	Maintenance/Repair Labor Additional - Annual	HRS	(16)	$ 35	$ (560)	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power Savings - Annual	KWH	(7,008)	$ 0.09	$ (631)	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ (1,606)**	**$ (27,298)**

P	A	n	i	(1+i)^n
-$27,298.17	-$1,605.72	20	0.016	1.373644

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Replace Hardwire Connections with Meltronic Connector per Pump Station @ 15 yrs	EA	3	$9,375	$ 28,125	$ 22,166	$22,165.98	$28,125.00	15	0.016	1.268836
2	Replace Hardwire Connections with Meltronic Connector per Pump Station @ 10 yrs	EA	3	$9,375	$ 28,125	$ 23,997	$23,996.92	$28,125.00	10	0.016	1.172026
3	Replace Hardwire Connections with Meltronic Connector per Pump Station @ 5 yrs	EA	3	$9,375	$ 28,125	$ 25,979	$25,979.09	$28,125.00	5	0.016	1.082601
4	Portable Trailer-Mounted Engine Generator @ 5 yrs	EA	1	$ 43,750	$ 43,750	$ 40,412	$40,411.92	$43,750.00	5	0.016	1.082601
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
4	None	LS	0	$ -	$ -	$ -	$0.00	$0.00	20	0.016	1.373644
					OTHER COSTS OVER STUDY PERIOD TOTAL	**$ 112,554**					

Table D

Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 341,000
Operations and Maintenance Cost	$ (1,606)	$ (27,298)
Other Costs Over Study Period		$ 112,554
PRESENT WORTH COST OF ALTERNATIVE		**$ 426,256**

Oak, Hemlock, Railroad, and Wharf Streets

COST ESTIMATE - New Sewer Improvements Priority I Project 1

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$24,000.00	$ 24,000
2	Mobilization & Demob.	1	LS	$40,000.00	$ 40,000
3	18" Dia. Gravity Sewer Cl C BKF	3050	LF	$140.00	$ 427,000
4	Manholes 8'-12'	12	EA	$4,500.00	$ 54,000
5	AC Pavement C&R	3050	LF	$45.00	$ 137,250
6	Foundation Rock	100	CY	$50.00	$ 5,000
7	Traffic Control	480	HR	$45.00	$ 21,600
8	Service Connection Replace.	50	EA	2000	$ 100,000
9	Misc. Costs	1	LS	$30,000.00	$ 30,000
				Construction	**$ 838,850**
				Contingency	**$ 85,000**
				Engineering	**$ 154,000**
				Additional Consultant	**$ 12,000**
				Admin. / Legal / Easements	**$ 13,000**
				TOTAL PROJECT COST	**$ 1,102,850**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	2	$ 35	$ 70	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annu	HRS	6	$ 35	$ 210	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 280**	**$ 4,760**

P	A	n	i	(1+i)^n
$4,760.16	$280.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1		$ -	$0
	Repair Parts @ 10 Yrs	LS	1	$ 500	$ 500	$427
	Repair Parts @ 15 Yrs	LS	1		$ -	$0
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$427**

P	F	n	i	(1+i)^n
$0.00	$0.00	5	0.016	1.082601
$426.61	$500.00	10	0.016	1.172026
$0.00	$0.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$1,102,850
Operations and Maintenance Cost	$ 280	$4,760
Other Costs Over Study Period		$427
PRESENT WORTH COST OF ALTERNATIVE		**$1,108,037**

Rowland Ln, W. End of Rowland Ln to Mill Bch. Rd.

COST ESTIMATE - New Sewer Improvements Priority I Project 2

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$15,300.00	$ 15,300
2	Mobilization & Demob.	1	LS	$30,000.00	$ 30,000
3	24" Dia. Gravity Sewer Cl C BKF	1930	LF	$120.00	$ 231,600
4	Manholes 8'-12'	10	EA	$4,500.00	$ 45,000
5	AC Pavement C&R	1930	LF	$45.00	$ 86,850
6	Foundation Rock	50	CY	$50.00	$ 2,500
7	Remove & Dispose Existing Pipe	1930	LF	$20.00	$ 38,600
8	Traffic Control	288	HR	$45.00	$ 12,960
9	Service Connection Replace.	36	EA	2000	$ 72,000
10	Misc. Costs	1	LS	$20,000.00	$ 20,000
				Construction	**$ 554,810**
				Contingency	**$ 55,500**
				Engineering	**$ 99,900**
				Additional Consultant	**$ 5,500**
				Admin. / Legal / Easements	**$ 8,300**
				TOTAL PROJECT COST	**$ 724,010**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	2	$ 35	$ 70	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annu	HRS	6	$ 35	$ 210	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 280**	**$ 4,760**

P	A	n	i	(1+i)^n
$4,760.16	$280.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1		$ -	$0
	Repair Parts @ 10 Yrs	LS	1	$ 500	$ 500	$427
	Repair Parts @ 15 Yrs	LS	1		$ -	$0
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$427**

P	F	n	i	(1+i)^n
$0.00	$0.00	5	0.016	1.082601
$426.61	$500.00	10	0.016	1.172026
$0.00	$0.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$724,010
Operations and Maintenance Cost	$ 280	$4,760
Other Costs Over Study Period		$427
PRESENT WORTH COST OF ALTERNATIVE		**$729,197**

Crissy Circle to Moore Street

COST ESTIMATE - New Sewer Improvements Priority I Project 3

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$9,400.00	$ 9,400
2	Mobilization & Demob.	1	LS	$16,000.00	$ 16,000
3	24" Dia. Gravity Sewer Cl C BKF	450	LF	$180.00	$ 81,000
4	24" Dia. Gravity Sewer Cl B BKF	770	LF	$165.00	$ 127,050
4	Manholes 8'-12'	5	EA	$4,500.00	$ 22,500
5	AC Pavement C&R	450	LF	$45.00	$ 20,250
6	Foundation Rock	50	CY	$50.00	$ 2,500
7	Remove & Dispose Existing Pipe	1220	LF	$20.00	$ 24,400
8	Traffic Control	96	HR	$45.00	$ 4,320
9	Service Connection Replace.	8	EA	2000	$ 16,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 338,420**
				Contingency	**$ 34,000**
				Engineering	**$ 61,000**
				Additional Consultant	**$ 3,400**
				Admin. / Legal / Easements	**$ 5,000**
				TOTAL PROJECT COST	**$ 441,820**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	1	$ 35	$ 35	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annu	HRS	2	$ 35	$ 70	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 105**	**$ 1,785**

P	A	n	i	(1+i)^n
$1,785.06	$105.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1		$ -	$0
	Repair Parts @ 10 Yrs	LS	1	$ 300	$ 300	$256
	Repair Parts @ 15 Yrs	LS	1		$ -	$0
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$256**

P	F	n	i	(1+i)^n
$0.00	$0.00	5	0.016	1.082601
$255.97	$300.00	10	0.016	1.172026
$0.00	$0.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Taylor Creek Pump Station

COST ESTIMATE - New Sewer Improvements Priority I Project 4

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$13,100.00	$ 13,100
2	Mobilization & Demob.	1	LS	$22,000.00	$ 22,000
3	12" Dia. Gravity Sewer Cl C BKF	20	LF	$180.00	$ 3,600
4	8" Dia. Force Main Cl C BKF	40	LF	$165.00	$ 6,600
5	New Pump Station	1	LS	$400,000.00	$ 400,000
6	Manholes 8'-12'	2	EA	$4,500.00	$ 9,000
7	AC Pavement C&R	20	LF	$45.00	$ 900
8	Foundation Rock	5	CY	$50.00	$ 250
9	Remove & Dispose Existing Pipe	50	LF	$20.00	$ 1,000
10	Traffic Control	8	HR	$45.00	$ 360
11	Service Connection Replace.	0	EA	2000	$ -
12	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 471,810**
				Contingency	**$ 47,200**
				Engineering	**$ 85,000**
				Additional Consultant	**$ 16,700**
				Admin. / Legal / Easements	**$ 7,100**
				TOTAL PROJECT COST	**$ 627,810**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	8	$ 35	$ 280	
2	Testing Labor - Annual	HRS	4	$ 35	$ 140	
4	Operational Labor - Annual	HRS	78	$ 35	$ 2,730	
5	Maintenance/Repair Labor - Annu	HRS	32	$ 35	$ 1,120	
7	Elec. Power - Annual	KWH	43,800	0.09	$ 3,942	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 8,212**	**$ 139,609**

P	A	n	i	(1+i)^n
$139,608.76	$8,212.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ 3,000	$ 3,000	$2,771
	Repair Parts @ 10 Yrs	LS	1	$ 5,000	$ 5,000	$4,266
	Repair Parts @ 15 Yrs	LS	1	$ 75,000	$ 75,000	$59,109
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$66,146**

P	F	n	i	(1+i)^n
$2,771.10	$3,000.00	5	0.016	1.082601
$4,266.12	$5,000.00	10	0.016	1.172026
$59,109.28	$75,000.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

COST ESTIMATE - New Sewer Improvements Priority I Project 5

Hwy 101, Ext. Ex. 8" FM @ Carpenterville Rd-Park View Dr.

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$9,400.00	$ 9,400
2	Mobilization & Demob.	1	LS	$16,000.00	$ 16,000
3	8" Dia. Forcemain Cl C BKF	5360	LF	$55.00	$ 294,800
4	8" Gate Valves	4	EA	$2,000.00	$ 8,000
5	AC Pavement C&R	5360	LF	$45.00	$ 241,200
6	Foundation Rock	70	CY	$50.00	$ 3,500
7	Traffic Control	96	HR	$45.00	$ 4,320
8	ARV	4	EA	$2,000.00	$ 8,000
9	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 600,220**
				Contingency	**$ 34,000**
				Engineering	**$ 61,000**
				Additional Consultant	**$ 3,400**
				Admin. / Legal / Easements	**$ 5,000**
				TOTAL PROJECT COST	**$ 703,620**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	2	$ 35	$ 70	
4	Operational Labor - Annual	HRS		$ 35	$ -	
5	Maintenance/Repair Labor - Annu	HRS	6	$ 35	$ 210	
7	Elec. Power - Annual	KWH		0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 280**	**$ 4,760**

P	A	n	i	(1+i)^n
$4,760.16	$280.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1		$ -	$0
	Repair Parts @ 10 Yrs	LS	1	$ 500	$ 500	$427
	Repair Parts @ 15 Yrs	LS	1		$ -	$0
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$427**

P	F	n	i	(1+i)^n
$0.00	$0.00	5	0.016	1.082601
$426.61	$500.00	10	0.016	1.172026
$0.00	$0.00	15	0.016	1.268836
P	**F**	**n**	**i**	**(1+i)^n**
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$703,620
Operations and Maintenance Cost	$ 280	$4,760
Other Costs Over Study Period		$427
PRESENT WORTH COST OF ALTERNATIVE		**$708,807**

Mill Beach Road to Railroad St and Pacific Avenue (Rpl FM)

COST ESTIMATE - New Sewer Improvements Priority I Project 6

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Control, Mob, Demob	1	LS	$25,000.00	$ 25,000
2	24" gravity Sewer & Trench 6'	2240	LF	$120.00	$ 268,800
3	Install 4" FM through 8" aband FM	840	LF	$35.00	$ 29,400
4	Asphalt Surf. Cut & Replace	150	LF	$35.00	$ 5,250
5	Manholes	6	EA	$5,000.00	$ 30,000
6	Clear & Grup	1	LS	$2,500.00	$ 2,500
7	Demolition of Existing Pump Sta.	1	LS	$15,000.00	$ 15,000
8	Connection to existing MH	2	LS	$800.00	$ 1,600
9	Testing, clean up	1	EA	1200	$ 1,200
				Construction	**$ 378,750**
				Contingency	**$ 37,900**
				Engineering	**$ 68,200**
				Additional Consultant	**$ 17,000**
				Admin. / Legal / Easements	**$ 5,700**
				TOTAL PROJECT COST	**$ 507,550**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	(6)	$ 35	$ (210)	
2	Testing Labor - Annual	HRS	(12)	$ 35	$ (420)	
3	Operational Labor - Annual	HRS	(160)	$ 35	$ (5,600)	
4	Maintenance/Repair Labor - Annual	HRS	(140)	$ 35	$ (4,900)	
5	Vechile Operation Miles - Annual	MILE	(500)	$ 1.50	$ (750)	
6	Parts - Annual	LS	(1)	$ 3,500	$ (3,500)	
7	Elec. Power - Annual	KWH	(50,000)	0.09	$ (4,500)	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (19,880)**	**$ (337,972)**

P	A	n	i	(1+i)^n
-$337,971.53	-$19,880.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1		$ -	$0
	Repair Parts @ 10 Yrs	LS	1	$ 250	$ 250	$213
	Repair Parts @ 15 Yrs	LS	1		$ -	$0
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$213**

P	F	n	i	(1+i)^n
$0.00	$0.00	5	0.016	1.082601
$213.31	$250.00	10	0.016	1.172026
$0.00	$0.00	15	0.016	1.268836
P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$507,550
Operations and Maintenance Cost	$ (19,880)	-$337,972
Other Costs Over Study Period		$213
PRESENT WORTH COST OF ALTERNATIVE		**$169,792**

COST ESTIMATE - New Sewer Improvements Priority II Project 9

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$5,300.00	$ 5,300
2	Mobilization & Demob.	1	LS	$8,800.00	$ 8,800
3	8" Dia. Gravity Sewer Cl C BKF	750	LF	$80.00	$ 60,000
4	Manholes 8'-12'	5	EA	$4,500.00	$ 22,500
5	AC Pavement C&R	750	LF	$36.00	$ 27,000
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	750	LF	$20.00	$ 15,000
8	Traffic Control	128	HR	$45.00	$ 5,760
9	Service Connection Replace.	15	EA	2000	$ 30,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 190,110**
				Contingency	**$ 19,000**
				Engineering	**$ 34,200**
				Additional Consultant	**$ 1,900**
				Admin. / Legal / Easements	**$ 2,900**
				TOTAL PROJECT COST	**$ 248,110**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**

P	A	n	i	(1+i)^n
-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (200)	$ (200)	-$185
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (1,000)	$ (1,000)	-$788
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,399**

P	F	n	i	(1+i)^n
-$184.74	-$200.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$788.12	-$1,000.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$248,110
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,399
PRESENT WORTH COST OF ALTERNATIVE		**$243,140**

COST ESTIMATE - New Sewer Improvements Priority II Project 10

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$2,900.00	$ 2,900
2	Mobilization & Demob.	1	LS	$4,900.00	$ 4,900
3	8" Dia. Gravity Sewer Cl C BKF	390	LF	$80.00	$ 31,200
4	Manholes 8'-12'	2	EA	$4,500.00	$ 9,000
5	AC Pavement C&R	390	LF	$36.00	$ 14,040
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	390	LF	$20.00	$ 7,800
8	Traffic Control	64	HR	$45.00	$ 2,880
9	Service Connection Replace.	10	EA	2000	$ 20,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 105,470**
				Contingency	**$ 10,500**
				Engineering	**$ 19,000**
				Additional Consultant	**$ 1,100**
				Admin. / Legal / Easements	**$ 1,600**
				TOTAL PROJECT COST	**$ 137,670**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
				OTHER COSTS OVER STUDY PERIOD TOTAL		**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836
P	**F**	**n**	**i**	**(1+i)^n**
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$137,670
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$134,041**

COST ESTIMATE - New Sewer Improvements Priority II Project 11

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$7,200.00	$ 7,200
2	Mobilization & Demob.	1	LS	$12,100.00	$ 12,100
3	8" Dia. Gravity Sewer Cl C BKF	615	LF	$80.00	$ 49,200
4	8" Dia. Gravity Sewer Cl B BKF	615	LF	$70.00	$ 43,050
5	Manholes 8'-12'	5	EA	$4,500.00	$ 22,500
6	AC Pavement C&R	615	LF	$36.00	$ 22,140
7	Foundation Rock	10	CY	$50.00	$ 500
8	Remove & Dispose Existing Pipe	1230	LF	$20.00	$ 24,600
9	Traffic Control	96	HR	$45.00	$ 4,320
10	Service Connection Replace.	30	EA	2000	$ 60,000
11	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 260,610**
				Contingency	**$ 26,100**
				Engineering	**$ 47,000**
				Additional Consultant	**$ 2,600**
				Admin. / Legal / Easements	**$ 3,900**
				TOTAL PROJECT COST	**$ 340,210**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (500)	$ (500)	-$462
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (500)	$ (500)	-$394
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,283**

P	F	n	i	(1+i)^n
-$461.85	-$500.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$394.06	-$500.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.03	1.806111

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$340,210
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,283
PRESENT WORTH COST OF ALTERNATIVE		**$336,547**

COST ESTIMATE - New Sewer Improvements Priority II Project 12

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,200.00	$ 4,200
2	Mobilization & Demob.	1	LS	$7,000.00	$ 7,000
3	8" Dia. Gravity Sewer Cl C BKF	345	LF	$80.00	$ 27,600
4	Manholes 8'-12'	4	EA	$4,500.00	$ 18,000
5	AC Pavement C&R	345	LF	$36.00	$ 12,420
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	345	LF	$20.00	$ 6,900
8	Traffic Control	48	HR	$45.00	$ 2,160
9	Service Connection Replace.	30	EA	2000	$ 60,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 150,780**
				Contingency	**$ 15,100**
				Engineering	**$ 27,100**
				Additional Consultant	**$ 1,500**
				Admin. / Legal / Easements	**$ 2,300**
				TOTAL PROJECT COST	**$ 196,780**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(3)	$ 35	$ (105)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (105)**	**$ (1,785)**

P	A	n	i	(1+i)^n
-$1,785.06	-$105.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$196,780
Operations and Maintenance Cost	$ (105)	-$1,785
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$193,746**

COST ESTIMATE - New Sewer Improvements Priority II Project 13

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,200.00	$ 4,200
2	Mobilization & Demob.	1	LS	$7,000.00	$ 7,000
3	10" Dia. Gravity Sewer Cl C BKF	620	LF	$90.00	$ 55,800
4	Manholes 8'-12'	3	EA	$4,500.00	$ 13,500
5	AC Pavement C&R	620	LF	$36.00	$ 22,320
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	620	LF	$20.00	$ 12,400
8	Traffic Control	96	HR	$45.00	$ 4,320
9	Service Connection Replace.	10	EA	2000	$ 20,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 152,040**
				Contingency	**$ 15,200**
				Engineering	**$ 27,400**
				Additional Consultant	**$ 1,500**
				Admin. / Legal / Easements	**$ 2,300**
				TOTAL PROJECT COST	**$ 198,440**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)						
7	Elec. Power - Annual	KWH	0	0.09	$ -						
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**	-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ (300)	$ (300)	-$277	-$277.11	-$300.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ (600)	$ (600)	-$512	-$511.93	-$600.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ (900)	$ (900)	-$709	-$709.31	-$900.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,498**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$198,440
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,498
PRESENT WORTH COST OF ALTERNATIVE		**$193,372**

COST ESTIMATE - New Sewer Improvements Priority II Project 14

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,200.00	$ 4,200
2	Mobilization & Demob.	1	LS	$7,000.00	$ 7,000
3	8" Dia. Gravity Sewer Cl C BKF	700	LF	$80.00	$ 56,000
4	Manholes 8'-12'	3	EA	$4,500.00	$ 13,500
5	AC Pavement C&R	700	LF	$36.00	$ 25,200
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	700	LF	$20.00	$ 14,000
8	Traffic Control	112	HR	$45.00	$ 5,040
9	Service Connection Replace.	7	EA	2000	$ 14,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 151,440**
				Contingency	**$ 15,100**
				Engineering	**$ 27,300**
				Additional Consultant	**$ 1,500**
				Admin. / Legal / Easements	**$ 2,300**
				TOTAL PROJECT COST	**$ 197,640**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**

P	A	n	i	(1+i)^n
-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$197,640
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$192,821**

COST ESTIMATE - New Sewer Improvements Priority II Project 15

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,400.00	$ 4,400
2	Mobilization & Demob.	1	LS	$7,300.00	$ 7,300
3	8" Dia. Gravity Sewer Cl C BKF	670	LF	$80.00	$ 53,600
4	Manholes 8'-12'	3	EA	$4,500.00	$ 13,500
5	AC Pavement C&R	670	LF	$36.00	$ 24,120
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	670	LF	$20.00	$ 13,400
8	Traffic Control	112	HR	$45.00	$ 5,040
9	Service Connection Replace.	10	EA	2000	$ 20,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 156,860**
				Contingency	**$ 15,700**
				Engineering	**$ 28,200**
				Additional Consultant	**$ 1,600**
				Admin. / Legal / Easements	**$ 2,400**
				TOTAL PROJECT COST	**$ 204,760**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (400)	$ (400)	-$341
	Repair Parts @ 15 Yrs	LS	1	$ (600)	$ (600)	-$473
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
				OTHER COSTS OVER STUDY PERIOD TOTAL		**-$1,045**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$341.29	-$400.00	10	0.016	1.172026
-$472.87	-$600.00	15	0.016	1.268836
P	**F**	**n**	**i**	**(1+i)^n**
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$204,760
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,045
PRESENT WORTH COST OF ALTERNATIVE		**$201,335**

COST ESTIMATE - New Sewer Improvements Priority II Project 16

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$2,300.00	$ 2,300
2	Mobilization & Demob.	1	LS	$3,800.00	$ 3,800
3	8" Dia. Gravity Sewer Cl C BKF	300	LF	$80.00	$ 24,000
4	Manholes 8'-12'	1	EA	$4,500.00	$ 4,500
5	AC Pavement C&R	300	LF	$36.00	$ 10,800
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	300	LF	$20.00	$ 6,000
8	Traffic Control	48	HR	$45.00	$ 2,160
9	Service Connection Replace.	9	EA	2000	$ 18,000
10	Misc. Costs	1	LS	$10,000.00	$ 10,000
				Construction	**$ 82,060**
				Contingency	**$ 8,200**
				Engineering	**$ 14,800**
				Additional Consultant	**$ 800**
				Admin. / Legal / Easements	**$ 1,200**
				TOTAL PROJECT COST	**$ 107,060**

Table B

O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(3)	$ 35	$ (105)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (105)**	**$ (1,785)**

P	A	n	i	(1+i)^n
-$1,785.06	-$105.00	20	0.016	1.373644

Table C

Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
				OTHER COSTS OVER STUDY PERIOD TOTAL		**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D

Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$107,060
Operations and Maintenance Cost	$ (105)	-$1,785
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$104,026**

COST ESTIMATE - New Sewer Improvements Priority II Project 17

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$3,800.00	$ 3,800
2	Mobilization & Demob.	1	LS	$6,100.00	$ 6,100
3	8" Dia. Gravity Sewer Cl C BKF	545	LF	$80.00	$ 43,600
4	Manholes 8'-12'	3	EA	$4,500.00	$ 13,500
5	AC Pavement C&R	545	LF	$36.00	$ 19,620
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	545	LF	$20.00	$ 10,900
8	Traffic Control	96	HR	$45.00	$ 4,320
9	Service Connection Replace.	9	EA	2000	$ 18,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 132,340**
				Contingency	**$ 13,200**
				Engineering	**$ 23,800**
				Additional Consultant	**$ 1,300**
				Admin. / Legal / Easements	**$ 2,000**
				TOTAL PROJECT COST	**$ 172,640**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)						
7	Elec. Power - Annual	KWH	0	0.09	$ -						
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**	-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ (200)	$ (200)	-$185	-$184.74	-$200.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ (400)	$ (400)	-$341	-$341.29	-$400.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ (600)	$ (600)	-$473	-$472.87	-$600.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$999**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$172,640
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$999
PRESENT WORTH COST OF ALTERNATIVE		**$169,261**

COST ESTIMATE - New Sewer Improvements Priority II Project 18

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$5,100.00	$ 5,100
2	Mobilization & Demob.	1	LS	$8,600.00	$ 8,600
3	8" Dia. Gravity Sewer Cl B BKF	1030	LF	$70.00	$ 72,100
4	Manholes 8'-12'	4	EA	$4,500.00	$ 18,000
5	AC Pavement C&R	20	LF	$36.00	$ 720
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	1030	LF	$20.00	$ 20,600
8	Traffic Control	160	HR	$45.00	$ 7,200
9	Service Connection Replace.	20	EA	2000	$ 40,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 185,070**
				Contingency	**$ 18,500**
				Engineering	**$ 33,300**
				Additional Consultant	**$ 1,900**
				Admin. / Legal / Easements	**$ 2,800**
				TOTAL PROJECT COST	**$ 241,570**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**

P	A	n	i	(1+i)^n
-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (400)	$ (400)	-$369
	Repair Parts @ 10 Yrs	LS	1	$ (600)	$ (600)	-$512
	Repair Parts @ 15 Yrs	LS	1	$ (800)	$ (800)	-$630
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
				OTHER COSTS OVER STUDY PERIOD TOTAL		**-$1,512**

P	F	n	i	(1+i)^n
-$369.48	-$400.00	5	0.016	1.082601
-$511.93	-$600.00	10	0.016	1.172026
-$630.50	-$800.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$241,570
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,512
PRESENT WORTH COST OF ALTERNATIVE		**$236,488**

COST ESTIMATE - New Sewer Improvements Priority II Project 19

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,900.00	$ 4,900
2	Mobilization & Demob.	1	LS	$8,400.00	$ 8,400
3	8" Dia. Gravity Sewer Cl C BKF	745	LF	$80.00	$ 59,600
4	Manholes 8'-12'	4	EA	$4,500.00	$ 18,000
5	AC Pavement C&R	745	LF	$36.00	$ 26,820
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	745	LF	$20.00	$ 14,900
8	Traffic Control	128	HR	$45.00	$ 5,760
9	Service Connection Replace.	11	EA	2000	$ 22,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 176,130**
				Contingency	**$ 17,600**
				Engineering	**$ 31,700**
				Additional Consultant	**$ 1,800**
				Admin. / Legal / Easements	**$ 2,600**
				TOTAL PROJECT COST	**$ 229,830**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**

P	A	n	i	(1+i)^n
-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (400)	$ (400)	-$369
	Repair Parts @ 10 Yrs	LS	1	$ (600)	$ (600)	-$512
	Repair Parts @ 15 Yrs	LS	1	$ (800)	$ (800)	-$630
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,512**

P	F	n	i	(1+i)^n
-$369.48	-$400.00	5	0.016	1.082601
-$511.93	-$600.00	10	0.016	1.172026
-$630.50	-$800.00	15	0.016	1.268836
P	**F**	**n**	**i**	**(1+i)^n**
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$229,830
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,512
PRESENT WORTH COST OF ALTERNATIVE		**$224,748**

COST ESTIMATE - New Sewer Improvements Priority II Project 20

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$7,300.00	$ 7,300
2	Mobilization & Demob.	1	LS	$12,200.00	$ 12,200
3	15" Dia. Gravity Sewer Cl C BKF	1093	LF	$110.00	$ 120,230
4	Manholes 8'-12'	4	EA	$4,500.00	$ 18,000
5	AC Pavement C&R	1093	LF	$36.00	$ 39,348
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	1093	LF	$20.00	$ 21,860
8	Traffic Control	160	HR	$45.00	$ 7,200
9	Service Connection Replace.	11	EA	2000	$ 22,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 263,888**
				Contingency	**$ 26,400**
				Engineering	**$ 47,500**
				Additional Consultant	**$ 2,600**
				Admin. / Legal / Easements	**$ 4,000**
				TOTAL PROJECT COST	**$ 344,388**

Table B

O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(8)	$ 35	$ (280)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ (280)**	**$ (4,760)**

P	A	n	i	(1+i)^n
-$4,760.16	-$280.00	20	0.016	1.373644

Table C

Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (400)	$ (400)	-$369
	Repair Parts @ 10 Yrs	LS	1	$ (600)	$ (600)	-$512
	Repair Parts @ 15 Yrs	LS	1	$ (800)	$ (800)	-$630
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
				OTHER COSTS OVER STUDY PERIOD TOTAL		**-$1,512**

P	F	n	i	(1+i)^n
-$369.48	-$400.00	5	0.016	1.082601
-$511.93	-$600.00	10	0.016	1.172026
-$630.50	-$800.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D

Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$344,388
Operations and Maintenance Cost	$ (280)	-$4,760
Other Costs Over Study Period		-$1,512
PRESENT WORTH COST OF ALTERNATIVE		**$338,116**

COST ESTIMATE - New Sewer Improvements Priority II Project 21

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$2,400.00	$ 2,400
2	Mobilization & Demob.	1	LS	$4,000.00	$ 4,000
3	8" Dia. Gravity Sewer Cl C BKF	332	LF	$80.00	$ 26,560
4	Manholes 8'-12'	1	EA	$4,500.00	$ 4,500
5	AC Pavement C&R	332	LF	$36.00	$ 11,952
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	332	LF	$20.00	$ 6,640
8	Traffic Control	48	HR	$45.00	$ 2,160
9	Service Connection Replace.	8	EA	2000	$ 16,000
10	Misc. Costs	1	LS	$12,000.00	$ 12,000
				Construction	**$ 86,962**
				Contingency	**$ 8,700**
				Engineering	**$ 15,700**
				Additional Consultant	**$ 900**
				Admin. / Legal / Easements	**$ 1,300**
				TOTAL PROJECT COST	**$ 113,562**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$113,562
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$109,933**

COST ESTIMATE - New Sewer Improvements Priority II Project 22

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$6,100.00	$ 6,100
2	Mobilization & Demob.	1	LS	$10,100.00	$ 10,100
3	8" Dia. Gravity Sewer Cl C BKF	920	LF	$80.00	$ 73,600
4	Manholes 8'-12'	5	EA	$4,500.00	$ 22,500
5	AC Pavement C&R	920	LF	$36.00	$ 33,120
6	Foundation Rock	15	CY	$50.00	$ 750
7	Remove & Dispose Existing Pipe	920	LF	$20.00	$ 18,400
8	Traffic Control	144	HR	$45.00	$ 6,480
9	Service Connection Replace.	16	EA	2000	$ 32,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 218,050**
				Contingency	**$ 21,800**
				Engineering	**$ 39,300**
				Additional Consultant	**$ 2,200**
				Admin. / Legal / Easements	**$ 3,300**
				TOTAL PROJECT COST	**$ 284,650**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836
P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$284,650
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$281,021**

COST ESTIMATE - New Sewer Improvements Priority II Project 23

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$5,600.00	$ 5,600
2	Mobilization & Demob.	1	LS	$9,300.00	$ 9,300
3	8" Dia. Gravity Sewer Cl C BKF	870	LF	$80.00	$ 69,600
4	Manholes 8'-12'	3	EA	$4,500.00	$ 13,500
5	AC Pavement C&R	870	LF	$36.00	$ 31,320
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	870	LF	$20.00	$ 17,400
8	Traffic Control	128	HR	$45.00	$ 5,760
9	Service Connection Replace.	16	EA	2000	$ 32,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 199,980**
				Contingency	**$ 20,000**
				Engineering	**$ 36,000**
				Additional Consultant	**$ 2,000**
				Admin. / Legal / Easements	**$ 3,000**
				TOTAL PROJECT COST	**$ 260,980**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**

P	A	n	i	(1+i)^n
-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591
	Salvage Values @ 20 Years					
2	None	LS	(1)	$ -	$ -	$0
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**

P	F	n	i	(1+i)^n
-$230.93	-$250.00	5	0.016	1.082601
-$426.61	-$500.00	10	0.016	1.172026
-$591.09	-$750.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$260,980
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$257,351**

COST ESTIMATE - New Sewer Improvements Priority II Project 24

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,400.00	$ 4,400
2	Mobilization & Demob.	1	LS	$7,400.00	$ 7,400
3	8" Dia. Gravity Sewer Cl C BKF	665	LF	$80.00	$ 53,200
4	Manholes 8'-12'	2	EA	$4,500.00	$ 9,000
5	AC Pavement C&R	665	LF	$36.00	$ 23,940
6	Foundation Rock	10	CY	$50.00	$ 500
7	Remove & Dispose Existing Pipe	665	LF	$20.00	$ 13,300
8	Traffic Control	112	HR	$45.00	$ 5,040
9	Service Connection Replace.	14	EA	2000	$ 28,000
10	Misc. Costs	1	LS	$15,000.00	$ 15,000
				Construction	**$ 159,780**
				Contingency	**$ 1,600**
				Engineering	**$ 28,800**
				Additional Consultant	**$ 1,600**
				Admin. / Legal / Easements	**$ 2,400**
				TOTAL PROJECT COST	**$ 194,180**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(4)	$ 35	$ (140)						
7	Elec. Power - Annual	KWH	0	0.09	$ -						
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (140)**	**$ (2,380)**	-$2,380.08	-$140.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ (250)	$ (250)	-$231	-$230.93	-$250.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ (500)	$ (500)	-$427	-$426.61	-$500.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ (750)	$ (750)	-$591	-$591.09	-$750.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,249**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$194,180
Operations and Maintenance Cost	$ (140)	-$2,380
Other Costs Over Study Period		-$1,249
PRESENT WORTH COST OF ALTERNATIVE		**$190,551**

COST ESTIMATE - New Sewer Improvements Priority II Project 25

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$10,100.00	$ 10,100
2	Mobilization & Demob.	1	LS	$16,900.00	$ 16,900
3	12" Dia. Gravity Sewer Cl C BKF	260	LF	$90.00	$ 23,400
4	15" Dia. Gravity Sewer Cl C BKF	1310	LF	$110.00	$ 144,100
5	Manholes 8'-12'	6	EA	$4,500.00	$ 27,000
6	AC Pavement C&R	1570	LF	$36.00	$ 56,520
7	Foundation Rock	10	CY	$50.00	$ 500
8	Remove & Dispose Existing Pipe	1570	LF	$20.00	$ 31,400
9	Traffic Control	240	HR	$45.00	$ 10,800
10	Service Connection Replace.	12	EA	2000	$ 24,000
11	Misc. Costs	1	LS	$20,000.00	$ 20,000
				Construction	**$ 364,720**
				Contingency	**$ 36,500**
				Engineering	**$ 65,600**
				Additional Consultant	**$ 3,600**
				Admin. / Legal / Easements	**$ 5,500**
				TOTAL PROJECT COST	**$ 475,920**

Table B
O&M ESTIMATE - NA

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(6)	$ 35	$ (210)						
7	Elec. Power - Annual	KWH	0	0.09	$ -						
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (210)**	**$ (3,570)**	-$3,570.12	-$210.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts - NA

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ (400)	$ (400)	-$369	-$369.48	-$400.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ (600)	$ (600)	-$512	-$511.93	-$600.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ (800)	$ (800)	-$630	-$630.50	-$800.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$1,512**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$475,920
Operations and Maintenance Cost	$ (210)	-$3,570
Other Costs Over Study Period		-$1,512
PRESENT WORTH COST OF ALTERNATIVE		**$470,838**

COST ESTIMATE - PLANT COATINGS

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$1,300.00	$ 1,300
2	Mobilization & Demob.	1	LS	$2,200.00	$ 2,200
3	Prep. at Headworks	400	SF	$10.00	$ 4,000
4	Prep. at Primary Clarifiers	900	SF	$8.00	$ 7,200
5	Prep. at Trickling Filters	400	SF	$0.00	$ -
6	Prep. at Contact Stab/Re-Aeration	400	SF	$4.00	$ 1,600
7	Prep. at 2ndary Clarifiers	900	SF	$10.00	$ 9,000
8	Prep. at Plant Water	175	SF	$5.00	$ 875
9	Prep. at Sluge Thck./Digestion	200	SF	$8.00	$ 1,600
10	Prep. at Sludge Storage	2500	SF	$4.00	$ 10,000
11	Prep. Misc.	1000	SF	$10.00	$ 10,000
12	Coatings at Headworks	400	SF	$9.00	$ 3,600
13	Coatings at Primary Clarifiers	900	SF	$7.00	$ 6,300
14	Coatings at Trickling Filters	400	SF	$7.00	$ 2,800
15	Coatings at Contact Stab/Re-Aeration	400	SF	$7.00	$ 2,800
16	Coatings at 2ndary Clarifiers	900	SF	$9.00	$ 8,100
17	Coatings at Plant Water	175	SF	$7.00	$ 1,225
18	Coatings at Sluge Thck./Digestion	200	SF	$7.00	$ 1,400
19	Coatings at Sludge Storage	2500	SF	$7.00	$ 17,500
20	Coatings Misc.	1000		$7.00	$ 7,000
				Construction	**$ 91,500**
				Contingency	**$ 9,200**
				Engineering	**$ 16,500**
				Additional Consultant (Elec)	**$ 1,800**
				Admin. / Legal / Easements	**$ 1,400**
				TOTAL PROJECT COST	**$ 120,400**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	8	$ 35	$ 280						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	80	$ 35	$ 2,800						
7	Elec. Power - Annual	KWH	0	0.09	$ -		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 3,150**	**$ 53,552**	$53,551.83	$3,150.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Coatings @ 5 Yrs	LS	1	$ 3,500	$ 3,500	$3,233	$3,232.95	$3,500.00	5	0.016	1.082601
	Repair Coatings @ 10 Yrs	LS	1	$ 10,000	$ 10,000	$8,532	$8,532.24	$10,000.00	10	0.016	1.172026
	RepairCoatings @ 15 Yrs	LS	1	$ 15,000	$ 15,000	$11,822	$11,821.86	$15,000.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	0	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$23,587**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$120,400
Operations and Maintenance Cost	$ 3,150	$53,552
Other Costs Over Study Period		$23,587
PRESENT WORTH COST OF ALTERNATIVE		**$197,539**

COST ESTIMATE - REPLACE MECHANICAL BAR SCREEN - Immediate

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,600.00	$ 4,600
2	Mobilization & Demob.	1	LS	$7,600.00	$ 7,600
3	Crane Rental	3	Days	$1,200.00	$ 3,600
4	New Bar Screen Equipment Cost	1	LS	$130,000.00	$ 130,000
5	Bar Screen Removal Labor	30	HRS	$65.00	$ 1,950
6	Bar Screen Disposal Cost	1	LS	$3,000.00	$ 3,000
7	Bar Screen Installation Labor	60	HRS	$65.00	$ 3,900
8	Electrical Wiring & Connection	1	LS	$4,500.00	$ 4,500
9	Misc. New Hardware	1	LS	$2,000.00	$ 2,000
10	Misc. Parts/Repair	1	LS	$4,000.00	$ 4,000
				Construction	**$ 165,150**
				Contingency	**$ 16,500**
				Engineering	**$ 29,700**
				Additional Consultant (Elec)	**$ 3,300**
				Admin. / Legal / Easements	**$ 2,500**
				TOTAL PROJECT COST	**$ 217,150**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	(12)	$ 35	$ (420)						
5	Maintenance/Repair Labor - Annual	HRS	(30)	$ 35	$ (1,050)						
7	Elec. Power - Annual	KWH	0	0.09	$ -						
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (1,400)**	**$ (23,801)**	-$23,800.81	-$1,400.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ 3,500	$ 3,500	$3,233	$3,232.95	$3,500.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ 3,500	$ 3,500	$2,986	$2,986.28	$3,500.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ 3,500	$ 3,500	$2,758	$2,758.43	$3,500.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$8,978**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$217,150
Operations and Maintenance Cost	$ (1,400)	-$23,801
Other Costs Over Study Period		$8,978
PRESENT WORTH COST OF ALTERNATIVE		**$202,327**

COST ESTIMATE - REP. MECH. B. S. Degrit Rehab & Classifer - 10 Yr Future

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)						
1	Temp. Facilities and Control	1	LS	$9,100.00	$ 9,100		9058.5				
2	Mobilization & Demob.	1	LS	$15,000.00	$ 15,000		15097.5				
3	Crane Rental	3	Days	$1,200.00	$ 3,600						
4	New Bar Screen Equipment Cost	1	LS	$130,000.00	$ 130,000						
5	Bar Screen Removal Labor	30	HRS	$65.00	$ 1,950						
6	Bar Screen Disposal Cost	1	LS	$3,000.00	$ 3,000						
7	Bar Screen Installation Labor	60	HRS	$65.00	$ 3,900						
8	Degritter Paddles & Drive	1	LS	$14,000.00	$ 14,000						
9	New Classifer	1	LS	$45,000.00	$ 45,000						
10	Piping Modification	1	LS	$12,000.00	$ 12,000						
11	New Grit Pumps	2	EA	$35,000.00	$ 70,000						
12	Electrical Wiring & Connection	1	LS	$8,500.00	$ 8,500						
13	Misc. New Hardware	1	LS	$4,000.00	$ 4,000						
14	Misc. Parts/Repair	1	LS	$6,000.00	$ 6,000	PW	P	F	n	i	(1+i)^n
				Construction	**$ 326,050**	$278,194	$278,193.59	$326,050.00	10	0.016	1.172026
				Contingency	**$ 32,600**						
				Engineering	**$ 58,700**						
				Additional Consultant (Elec)	**$ 6,500**						
				Admin. / Legal / Easements	**$ 4,900**	PW	P	F	n	i	(1+i)^n
				TOTAL PROJECT COST	**$ 428,750**	$365,820	$365,819.67	$428,750.00	10	0.016	1.172026

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	(12)	$ 35	$ (420)						
5	Maintenance/Repair Labor - Annual	HRS	(30)	$ 35	$ (1,050)						
7	Elec. Power - Annual	KWH	0	0.09	$ -		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (1,400)**	**$ (12,843)**	-$12,842.92	-$1,400.00	10	0.016	1.172026
					10 Years Fut.	**$ (10,958)**	-$10,957.89	-$12,842.92	10	0.016	1.172026

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs after install	LS	1	$ 4,500	$ 4,500	$4,157	$4,156.65	$4,500.00	5	0.016	1.082601
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	1/2 value	LS	(1)	$ 214,375	$ (214,375)	-$182,910	-$182,909.83	-$214,375.00	10	0.016	1.172026
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$178,753**	P	F	n	i	(1+i)^n
					10 Years Fut.	**$ (152,516)**	-$152,516.45	-$178,753.18	10	0.016	1.172026

Table D

Life Cycle Cost Estimate for Alternative - 10 Yrs in Future

	Annual	PW
Initial Capital Cost		$365,820
Operations and Maintenance Cost	$ (1,400)	-$10,958
Other Costs Over Study Period		-$152,516
PRESENT WORTH COST OF ALTERNATIVE		**$202,345**

COST ESTIMATE - Prim. Cl. Rehab. - 10 Yr Future

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)						
1	Temp. Facilities and Control	1	LS	$4,800.00	$ 4,800						
2	Mobilization & Demob.	1	LS	$8,000.00	$ 8,000						
4	New Gears, Idelers, Flights	1	LS	$85,000.00	$ 85,000						
5	New Drive	1	LS	$60,000.00	$ 60,000						
6	Removal Labor	24	HRS	$65.00	$ 1,560						
7	Disposal Cost	1	LS	$1,000.00	$ 1,000						
8	Installation Labor	45	HRS	$65.00	$ 2,925						
9	Electrical Rewiring	1	LS	$4,500.00	$ 4,500						
10	Misc. New Hardware	1	LS	$3,000.00	$ 3,000						
11	Misc. Parts/Repair	1	LS	$2,000.00	$ 2,000	PW	P	F	n	i	(1+i)^n
				Construction	$ 172,785	$147,424	$147,424.26	$172,785.00	10	0.016	1.172026
				Contingency	$ 17,000						
				Engineering	$ 31,100						
				Additional Consultant (Elec)	$ 3,500						
				Admin. / Legal / Easements	$ 2,600	PW	P	F	n	i	(1+i)^n
				TOTAL PROJECT COST	$ 226,985	$193,669	$193,668.99	$226,985.00	10	0.016	1.172026

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(12)	$ 35	$ (420)						
7	Elec. Power - Annual	KWH	0	0.09	$ -		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				$ (420)	$ (3,853)	-$3,852.88	-$420.00	10	0.016	1.172026
					10 Years Fut.	$ (3,287)	-$3,287.37	-$3,852.88	10	0.016	1.172026

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs after install	LS	1	$ 3,000	$ 3,000	$2,771	$2,771.10	$3,000.00	5	0.016	1.082601
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	1/2 value	LS	(1)	$ 113,493	$ (113,493)	-$96,834	-$96,834.49	-$113,492.50	10	0.016	1.172026
		OTHER COSTS OVER STUDY PERIOD TOTAL				-$94,063	P	F	n	i	(1+i)^n
					10 Years Fut.	$ (80,257)	-$80,257.12	-$94,063.39	10	0.016	1.172026

Table D

Life Cycle Cost Estimate for Alternative - 10 Yrs in Future

	Annual	PW
Initial Capital Cost		$193,669
Operations and Maintenance Cost	$ (420)	-$3,287
Other Costs Over Study Period		-$80,257
PRESENT WORTH COST OF ALTERNATIVE		$110,125

COST ESTIMATE - TRICKLING FILTER REHAB. - Immediate

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$5,600.00	$ 5,600
2	Mobilization & Demob.	1	LS	$9,350.00	$ 9,350
3	Repair leak in Distributer Parts	1	LS	$4,500.00	$ 4,500
4	Repair leak in Distributer labor	20	LS	$60.00	$ 1,200
5	New 12" Bypass Line	200	LF	$300.00	$ 60,000
6	New 12" Mag Meter	1	EA	$11,000.00	$ 11,000
7	New Odor Control Blower Motor	1	EA	$23,000.00	$ 23,000
8	New VFD for Blower	1	EA	$3,800.00	$ 3,800
9	New Pumps	2	EA	$38,000.00	$ 76,000
10	Electrical Wiring & Connection	1	LS	$5,500.00	$ 5,500
11	Misc. New Hardware	1	LS	$1,000.00	$ 1,000
12	Misc. Parts/Repair	1	LS	$1,000.00	$ 1,000
				Construction	**$ 201,950**
				Contingency	**$ 20,200**
				Engineering	**$ 36,400**
				Additional Consultant (Elec)	**$ 4,000**
				Admin. / Legal / Easements	**$ 3,000**
				TOTAL PROJECT COST	**$ 265,550**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	A	n	i	(1+i)^n
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(10)	$ 35	$ (350)						
7	Elec. Power - Annual	KWH	(39,210)	0.09	$ (3,529)		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (3,879)**	**$ (65,943)**	-$65,943.18	-$3,878.88	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ 1,500	$ 1,500	$1,386	$1,385.55	$1,500.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ 2,000	$ 2,000	$1,706	$1,706.45	$2,000.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ 2,500	$ 2,500	$1,970	$1,970.31	$2,500.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$5,062**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$265,550
Operations and Maintenance Cost	$ (3,879)	-$65,943
Other Costs Over Study Period		$5,062
PRESENT WORTH COST OF ALTERNATIVE		**$204,669**

COST ESTIMATE - REAERATION SYSTEM REHAB. - Immediate

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$2,500.00	$ 2,500
2	Mobilization & Demob.	1	LS	$4,200.00	$ 4,200
3	Repair Roof/Remove AC Materials	1	LS	$10,500.00	$ 10,500
4	Repair Roof/Remove AC Labor	160	HR	$35.00	$ 5,600
5	Water Proof Masonary Walls	1200	SF	$3.70	$ 4,440
6	New Louver and Doors	1	LS	$6,600.00	$ 6,600
7	New Aeration Blower	1	EA	$38,000.00	$ 38,000
8	New VFD for Blower	1	EA	$3,800.00	$ 3,800
9	Labor to Remove and Install Blower	112	HR	$65.00	$ 7,280
10	Electrical Wiring & Connection	1	LS	$4,700.00	$ 4,700
11	Misc. New Hardware/Air Piping	1	LS	$2,200.00	$ 2,200
12	Misc. Parts/Repair	1	LS	$1,000.00	$ 1,000
				Construction	**$ 90,820**
				Contingency	**$ 9,100**
				Engineering	**$ 16,300**
				Additional Consultant (Elec)	**$ 1,800**
				Admin. / Legal / Easements	**$ 1,300**
				TOTAL PROJECT COST	**$ 119,320**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	1	$ 35	$ 35						
4	Operational Labor - Annual	HRS	(10)	$ 35	$ (350)						
5	Maintenance/Repair Labor - Annual	HRS	(16)	$ 35	$ (560)						
7	Elec. Power - Annual	KWH	(22,903)	0.09	$ (2,061)		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (2,866)**	**$ (48,728)**	-$48,728.28	-$2,866.27	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ 1,500	$ 1,500	$1,386	$1,385.55	$1,500.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ 3,500	$ 3,500	$2,986	$2,986.28	$3,500.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ 5,000	$ 5,000	$3,941	$3,940.62	$5,000.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$8,312**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$119,320
Operations and Maintenance Cost	$ (2,866)	-$48,728
Other Costs Over Study Period		$8,312
PRESENT WORTH COST OF ALTERNATIVE		**$78,904**

COST ESTIMATE - REAERATION SYSTEM REHAB. - 10 Year

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)						
1	Temp. Facilities and Control	1	LS	$1,700.00	$ 1,700						
2	Mobilization & Demob.	1	LS	$2,800.00	$ 2,800						
7	New Aeration Blower	1	EA	$38,000.00	$ 38,000						
8	New VFD for Blower	1	EA	$3,800.00	$ 3,800						
9	Labor to Remove and Install Blower	112	HR	$65.00	$ 7,280						
10	Electrical Wiring & Connection	1	LS	$4,700.00	$ 4,700						
11	Misc. New Hardware/Air Piping	1	LS	$2,200.00	$ 2,200						
12	Misc. Parts/Repair	1	LS	$1,000.00	$ 1,000	PW	P	F	n	i	(1+i)^n
				Construction	**$ 61,480**	$52,456	$52,456.19	$61,480.00	10	0.016	1.172026
				Contingency	**$ 6,100**						
				Engineering	**$ 11,000**						
				Additional Consultant (Elec)	**$ 1,200**						
				Admin. / Legal / Easements	**$ 900**	PW	P	F	n	i	(1+i)^n
				TOTAL PROJECT COST	**$ 80,680**	$68,838	$68,838.09	$80,680.00	10	0.016	1.172026

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	1	$ 35	$ 35						
4	Operational Labor - Annual	HRS	(10)	$ 35	$ (350)						
5	Maintenance/Repair Labor - Annual	HRS	(16)	$ 35	$ (560)						
7	Elec. Power - Annual	KWH	(22,903)	0.09	$ (2,061)		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (2,866)**	**$ (26,294)**	-$26,293.79	-$2,866.27	10	0.016	1.172026
					10 Years Fut.	**$ (22,434)**	-$22,434.49	-$26,293.79	10	0.016	1.172026

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs after install	LS	1	$ 1,500	$ 1,500	$1,386	$1,385.55	$1,500.00	5	0.016	1.082601
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	1/2 value	LS	(1)	$ 40,340	$ (40,340)	-$34,419	-$34,419.04	-$40,340.00	10	0.016	1.172026
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$33,033**	P	F	n	i	(1+i)^n
					10 Years Fut.	**$ (28,185)**	-$28,184.96	-$33,033.49	10	0.016	1.172026

Table D

Life Cycle Cost Estimate for Alternative - 10 Yrs in Future	Annual	PW
Initial Capital Cost		$68,838
Operations and Maintenance Cost	$ (2,866)	-$22,434
Other Costs Over Study Period		-$28,185
PRESENT WORTH COST OF ALTERNATIVE		**$18,219**

COST ESTIMATE - SEC. CLARIFIER, WAS,RAS,SCUM PUMPS - 5 YR

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,000.00	$ 4,000
2	Mobilization & Demob.	1	LS	$6,700.00	$ 6,700
3	New WAS Pump	1	EA	$25,000.00	$ 25,000
4	New RAS Pump	1	EA	$40,000.00	$ 40,000
5	New FRP Baffles, Weirs - 1 Clarifier	1	LS	$11,000.00	$ 11,000
6	Repair of Scrapper Arms - 1 Clarifier	1	LS	$6,000.00	$ 6,000
7	Drive Replacement - 1 Clarifier	1	EA	$40,000.00	$ 40,000
8	Electrical Wiring & Connection	1	LS	$5,000.00	$ 5,000
9	Misc. New Hardware	1	LS	$4,000.00	$ 4,000
10	Misc. Parts/Repair	1	LS	$2,500.00	$ 2,500
				Construction	**$ 144,200**
				Contingency	**$ 14,400**
				Engineering	**$ 26,000**
				Additional Consultant (Elec)	**$ 2,900**
				Admin. / Legal / Easements	**$ 2,200**
				TOTAL PROJECT COST	**$ 189,700**

PW	P	F	n	i	(1+i)^n
$133,198	$133,197.70	$144,200.00	5	0.016	1.082601

PW	P	F	n	i	(1+i)^n
$175,226	$175,226.10	$189,700.00	5	0.016	1.082601

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(12)	$ 35	$ (420)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (420)**	**$ (5,562)**
					5 Years Fut.	**$ (5,137)**

P	A	n	i	(1+i)^n
-$5,561.75	-$420.00	15	0.016	1.268836
-$5,137.40	-$5,561.75	5	0.016	1.082601

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs after install	LS	1	$ 1,500	$ 1,500	$1,386	$1,385.55	$1,500.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs after install	LS	1	$ 3,500	$ 3,500	$2,986	$2,986.28	$3,500.00	10	0.016	1.172026
	Salvage Values @ 15 Years						P	F	n	i	(1+i)^n
2	1/4 Value	LS	(1)	$ 47,425	$ (47,425)	-$37,377	-$37,376.77	-$47,425.00	15	0.016	1.268836
		OTHER COSTS OVER STUDY PERIOD TOTAL				**-$33,005**	P	F	n	i	(1+i)^n
					5 Years Fut.	**$ (30,487)**	-$30,486.69	-$33,004.93	5	0.016	1.082601

Table D

Life Cycle Cost Estimate for Alternative - 10 Yrs in Future

	Annual	PW
Initial Capital Cost		$175,226
Operations and Maintenance Cost	$ (420)	-$5,137
Other Costs Over Study Period		-$30,487
PRESENT WORTH COST OF ALTERNATIVE		**$139,602**

COST ESTIMATE - SEC. CLARIFIER, WAS,RAS,SCUM PUMPS - 10 YR

Table A

Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)						
1	Temp. Facilities and Control	1	LS	$4,000.00	$ 4,000						
2	Mobilization & Demob.	1	LS	$6,700.00	$ 6,700						
3	New WAS Pump	1	EA	$25,000.00	$ 25,000						
4	New RAS Pump	1	EA	$40,000.00	$ 40,000						
5	New FRP Baffles, Weirs - 1 Clarifier	1	LS	$11,000.00	$ 11,000						
6	Repair of Scrapper Arms - 1 Clarifier	1	LS	$6,000.00	$ 6,000						
7	Drive Replacement - 1 Clarifier	1	EA	$40,000.00	$ 40,000						
8	Electrical Wiring & Connection	1	LS	$5,000.00	$ 5,000						
9	Misc. New Hardware	1	LS	$4,000.00	$ 4,000						
10	Misc. Parts/Repair	1	LS	$2,500.00	$ 2,500	PW	P	F	n	i	(1+i)^n
				Construction	$ 144,200	$123,035	$123,034.86	$144,200.00	10	0.016	1.172026
				Contingency	$ 14,400						
				Engineering	$ 26,000						
				Additional Consultant (Elec)	$ 2,900						
				Admin. / Legal / Easements	$ 2,200	PW	P	F	n	i	(1+i)^n
				TOTAL PROJECT COST	$ 189,700	$161,857	$161,856.54	$189,700.00	10	0.016	1.172026

Table B

O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	0	$ 35	$ -						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance/Repair Labor - Annual	HRS	(12)	$ 35	$ (420)						
7	Elec. Power - Annual	KWH	0	0.09	$ -		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				$ (420)	$ (3,853)	-$3,852.88	-$420.00	10	0.016	1.172026
					5 Years Fut.	$ (3,287)	-$3,287.37	-$3,852.88	10	0.016	1.172026

Table C

Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs after install	LS	1	$ 1,500	$ 1,500	$1,386	$1,385.55	$1,500.00	5	0.016	1.082601
	Salvage Values @ 10 Years						P	F	n	i	(1+i)^n
2	1/2 Value	LS	(1)	$ 94,850	$ (94,850)	-$80,928	-$80,928.27	-$94,850.00	10	0.016	1.172026
		OTHER COSTS OVER STUDY PERIOD TOTAL				-$79,543	P	F	n	i	(1+i)^n
					5 Years Fut.	$ (67,868)	-$67,867.73	-$79,542.72	10	0.016	1.172026

Table D

Life Cycle Cost Estimate for Alternative - 10 Yrs in Future	Annual	PW
Initial Capital Cost		$161,857
Operations and Maintenance Cost	$ (420)	-$3,287
Other Costs Over Study Period		-$67,868
PRESENT WORTH COST OF ALTERNATIVE		$90,701

COST ESTIMATE - UV SYSTEM REPLACEMENT - Immediate

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$5,100.00	$ 5,100
2	Mobilization & Demob.	1	LS	$8,400.00	$ 8,400
3	Remove Existing System	1	LS	$9,000.00	$ 9,000
4	New UV Equipment	1	LS	$140,000.00	$ 140,000
5	Structural Modifications	1	LS	$12,000.00	$ 12,000
10	Electrical Wiring & Connection	1	LS	$5,000.00	$ 5,000
11	Misc. New Hardware	1	LS	$2,000.00	$ 2,000
12	Misc. Parts/Repair	1	LS	$800.00	$ 800
				Construction	**$ 182,300**
				Contingency	**$ 18,200**
				Engineering	**$ 32,800**
				Additional Consultant (Elec)	**$ 3,600**
				Admin. / Legal / Easements	**$ 2,700**
				TOTAL PROJECT COST	**$ 239,600**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	2	$ 35	$ 70						
2	Testing Labor - Annual	HRS	0	$ 35	$ -						
4	Operational Labor - Annual	HRS	0	$ 35	$ -						
5	Maintenance Labor Savings - Annual	HRS	(24)	$ 35	$ (840)						
7	Elec. Power Savings - Annual	KWH	(26,525)	0.09	$ (2,387)		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (3,157)**	**$ (53,676)**	-$53,675.51	-$3,157.28	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Repair Parts @ 5 Yrs	LS	1	$ 5,000	$ 5,000	$4,619	$4,618.51	$5,000.00	5	0.016	1.082601
	Repair Parts @ 10 Yrs	LS	1	$ 7,500	$ 7,500	$6,399	$6,399.18	$7,500.00	10	0.016	1.172026
	Repair Parts @ 15 Yrs	LS	1	$ 10,000	$ 10,000	$7,881	$7,881.24	$10,000.00	15	0.016	1.268836
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	(1)	$ -	$ -	$0	$0.00	$0.00	20	0.016	1.373644
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$18,899**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$239,600
Operations and Maintenance Cost	$ (3,157)	-$53,676
Other Costs Over Study Period		$18,899
PRESENT WORTH COST OF ALTERNATIVE		**$204,823**

COST ESTIMATE - REPLACE DIGESTER BURNER

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Mobilization	1	LS	$3,500	$ 3,500
2	New Burner - Equipment	1	LS	$25,000	$ 25,000
3	Old Burner. – Removal Labor	1	LS	$1,200	$ 1,200
4	New Burner – Install &Labor	1	LS	$2,000	$ 2,000
5	Training/Clean Up/Demobilization	1	LS	$900	$ 900
				Construction	**$ 32,600**
				Contingency	**$ 4,900**
				Engineering	**$ 5,900**
				Additional Consultant	**$ -**
				Admin. / Legal / Easements	**$ 250**
				TOTAL PROJECT COST	**$ 43,650**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	1	$ 35	$ 35	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor - Annual	HRS	(16)	$ 35	$ (560)	
6	Fuel Savings - Annual	GAL	100	$ (4)	$ (400)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (925)**	**$ (15,726)**

P	A	n	i	(1+i)^n
-$15,725.54	-$925.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Minor parts @ 15 yrs.	LS	1	$ 400	$ 400	$ 315
2	Major parts @ 10 yrs	LS	1	$ 2,000	$ 2,000	$ 1,706
3	Minor parts @ 5 yrs	LS	1	$ 400	$ 400	$ 369
	Salvage Values @ 20 Years					
4	None	LS	1	$ -	$ -	$ -
					OTHER COSTS OVER STUDY PERIOD TOTAL	**$ 2,391**

P	F	n	i	(1+i)^n
$315.25	$400.00	15	0.016	1.268836
$1,706.45	$2,000.00	10	0.016	1.172026
$369.48	$400.00	5	0.016	1.082601
P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

able D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 43,650
Operations and Maintenance Cost	$ (925)	$ (15,726)
Other Costs Over Study Period		$ 2,391
PRESENT WORTH COST OF ALTERNATIVE		**$ 30,316**

COST ESTIMATE - MODIFY OPER. LEVEL OF DIGESTER

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$4,200.00	$ 4,200
2	Mobilization & Demob.	1	LS	$1,500.00	$ 1,500
3	Conventional Labor	340	HRs	$65.00	$ 22,100
4	Ventilation Equipment Rental	2	WK	$1,600.00	$ 3,200
5	Lighting Equipment Rental	2	WK	$400.00	$ 800
6	Interior Scaffolding Rental	2	WK	$800.00	$ 1,600
7	Additional 10" Pipe and Connection	1	LS	$5,500.00	$ 5,500
8	Additional 12" Pipe and Connection	1	LS	$8,000.00	$ 8,000
9	Valves & Installation	2	EA	$5,500.00	$ 11,000
10	Tank Wall Core Drilling for new Pipe	1	LS	$2,000.00	$ 2,000
11	New Penetration Seal for Pipe	1	LS	$2,500.00	$ 2,500
12	Misc. New Hardware/Hangers	1	LS	$2,000.00	$ 2,000
13	Misc. Parts/Repair	1	LS	$1,500.00	$ 1,500
				Construction	**$ 65,900**
				Contingency	**$ 9,900**
				Engineering	**$ 13,200**
				Additional Consultant	**$ 1,000**
				Admin. / Legal / Easements	**$ 1,000**
				TOTAL PROJECT COST	**$ 91,000**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	0	$ 35	$ -	
2	Testing Labor - Annual	HRS	0	$ 35	$ -	
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -	
4	Operational Labor - Annual	HRS	0	$ 35	$ -	
5	Maintenance/Repair Labor Savings- Annual	HRS	(8)	$ 35	$ (280)	
6	Fuel Savings - Annual	GAL	1,733	$ (4)	$ (6,932)	
7	Elec. Power - Annual	KWH	0	0.09	$ -	
				OPERATIONS AND MAINTENANCE COST TOTAL	**$ (7,212)**	**$ (122,608)**

P	A	n	i	(1+i)^n
-$122,608.18	-$7,212.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	None	LS	1	$ -	$ -	$ -
	Salvage Values @ 20 Years					
2	None	LS	1	$ -	$ -	$ -
					OTHER COSTS OVER STUDY PERIOD TOTAL	**$ -**

P	F	n	i	(1+i)^n
$0.00	$0.00	15	0.016	1.268836

P	F	n	i	(1+i)^n
$0.00	$0.00	20	0.016	1.373644

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 91,000
Operations and Maintenance Cost	$ (7,212)	$ (122,608)
Other Costs Over Study Period		$ -
PRESENT WORTH COST OF ALTERNATIVE		**$ (31,608)**

COST ESTIMATE - TEMP. SLUDGE TREATMENT ST 1 & 2

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Temp. Facilities and Control	1	LS	$ 5,215	$ 5,215
2	Mobilization & Demob.	1	LS	$ 3,870	$ 3,870
3	Special CFR 40 Labor (Air Pak)	80	Man Hr	$ 170	$ 13,600
4	Rental for Air Packs/special Equipment	1	WK	$ 2,800	$ 2,800
5	Ventilation Equipment Rental	1	WK	$ 800	$ 800
6	Lighting Equipment Rental	1	WK	$ 175	$ 175
7	Conventional Contractor Labor	360	EA	$ 65	$ 23,400
8	Grit Removal/Vac. Equip. Rental	2	WK	$ 1,400	$ 2,800
9	Grit Removal hauling and Disposal	1	LS	$ 5,000	$ 5,000
10	Temp. Piping/hose Installation	200	LF	$ 45	$ 9,000
11	Connection Hardware/Valves/Parts	1	LS	$ 6,000	$ 6,000
12	Temp. Deodorizing Equip. for Tanks 1&2	1	LS	$ 10,000	$ 10,000
13	Replace Gaskets	1	LS	$ 900	$ 900
14	Instrumentation/Boiler Consultation	1	LS	$ 2,800	$ 2,800
				Construction	**$ 86,360**
				Contingency	**$ 12,950**
				Engineering	**$ 15,550**
				Additional Consultant	**$ -**
				Admin. / Legal / Easements	**$ 1,300**
				TOTAL PROJECT COST	**$ 116,160**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW	P	F	n	i	(1+i)^n
1	None - No long term operation	HRS	0	$ 35	$ -		$0.00	$0.00	20	0.003	1.061741
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ -**	**$ -**					

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	None	LS	1	$ -	$ -	$ -	$0.00	$0.00	15	0.035	1.675349
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
2	None	LS	1	$ -	$ -	$ -	$0.00	$0.00	20	0.035	1.989789
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$ -**					

Table D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 116,160
Operations and Maintenance Cost	$ -	$ -
Other Costs Over Study Period		$ -
PRESENT WORTH COST OF ALTERNATIVE		**$ 116,160**

COST ESTIMATE - INSTALL NEW BLOWER SLUDGE TANK 3

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Mobilization	1	LS	$6,900	$ 6,900
2	New Blower w/Controls - Equipment	1	EA	$44,000	$ 44,000
3	Labor to Install	1	LS	$20,000	$ 20,000
5	Electrical Labor & Equipment	1	LS	$3,000	$ 3,000
6	Training/Clean Up/Demobilization	1	LS	$1,100	$ 1,100
				Construction	**$ 75,000**
				Contingency	**$ 7,500**
				Engineering	**$ 15,000**
				Additional Consultant	**$ 300**
				Admin. / Legal / Easements	**$ 750**
				TOTAL PROJECT COST	**$ 98,550**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW
1	Training Labor - Annual	HRS	2	$ 35	$ 70	
2	Testing Labor - Annual	HRS	2	$ 35	$ 70	
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -	
4	Operational Labor - Annual	HRS	(4)	$ 35	$ (140)	
5	Maintenance/Repair Labor - Annual	HRS	(50)	$ 35	$ (1,750)	
6	Chemical - Annual	GAL	0	$ 10	$ -	
7	Elec. Power - Annual	KWH	(30,000)	0.09	$ (2,700)	
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ (4,450)**	**$ (75,653)**

P	A	n	i	(1+i)^n
-$75,652.58	-$4,450.00	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW
1	Minor parts @ 15 yrs.	LS	1	$ 4,000	$ 4,000	$ 3,152
2	Major parts @ 10 yrs	LS	(1)	$ 15,000	$ (15,000)	$ (12,798)
3	Minor parts @ 5 yrs	LS	(1)	$ 3,000	$ (3,000)	$ (2,771)
	Salvage Values @ 20 Years					
4	None	LS	1	$ -	$ -	$ -
		OTHER COSTS OVER STUDY PERIOD TOTAL				**$ (12,417)**

P	F	n	i	(1+i)^n
$3,152.49	$4,000.00	15	0.016	1.268836
-$12,798.36	-$15,000.00	10	0.016	1.172026
-$2,771.10	-$3,000.00	5	0.016	1.082601
P	**F**	**n**	**i**	**(1+i)^n**
$0.00	$0.00	20	0.016	1.373644

able D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 98,550
Operations and Maintenance Cost	$ (4,450)	$ (75,653)
Other Costs Over Study Period		$ (12,417)
PRESENT WORTH COST OF ALTERNATIVE		**$ 10,480**

COST ESTIMATE - INSTALL MIXER SLUDGE TANK 3

Table A
Capital Cost Estimate

No.	Item	Quantity	Unit	Unit Price ($)	Total Price ($)
1	Mobilization	1	LS	$59,200	$ 59,200
2	New Pluger Style Mixers w/Controls - Equipment	4	EA	$125,000	$ 500,000
3	Labor to Install	1	LS	$60,000	$ 60,000
4	Labor to Empty & Clean Tank	480	HR	$35	$ 16,800
5	Electrical Labor & Equipment	1	LS	$9,000	$ 9,000
6	Training/Clean Up/Demobilization	1	LS	$6,700	$ 6,700
				Construction	**$ 651,700**
				Contingency	**$ 65,200**
				Engineering	**$ 130,300**
				Additional Consultant	**$ 13,000**
				Admin. / Legal / Easements	**$ 6,500**
				TOTAL PROJECT COST	**$ 866,700**

Table B
O&M ESTIMATE

Item	Description	Unit	Qty	Unit Cost	Annual Cost	PW					
1	Training Labor - Annual	HRS	6	$ 35	$ 210						
2	Testing Labor - Annual	HRS	4	$ 35	$ 140						
3	Vehicle Operation Miles - Annual	MILE	0	$ 1.50	$ -						
4	Operational Labor - Annual	HRS	55	$ 35	$ 1,925						
5	Maintenance/Repair Labor - Annual	HRS	50	$ 35	$ 1,750						
6	Chemical - Annual	GAL	0	$ 10	$ -						
7	Elec. Power - Annual	KWH	(14,171)	0.09	$ (1,275)		P	A	n	i	(1+i)^n
	OPERATIONS AND MAINTENANCE COST TOTAL				**$ 2,750**	**$ 46,745**	$46,744.90	$2,749.61	20	0.016	1.373644

Table C
Periodic Expenses & Replacement Parts

Item	Description	Unit	Qty	Unit Cost	Perodic Cost	PW	P	F	n	i	(1+i)^n
1	Minor parts @ 15 yrs.	LS	1	$ 4,000	$ 4,000	$ 3,152	$3,152.49	$4,000.00	15	0.016	1.268836
2	Major parts @ 10 yrs	LS	1	$ 15,000	$ 15,000	$ 12,798	$12,798.36	$15,000.00	10	0.016	1.172026
3	Minor parts @ 5 yrs	LS	1	$ 3,000	$ 3,000	$ 2,771	$2,771.10	$3,000.00	5	0.016	1.082601
	Salvage Values @ 20 Years						P	F	n	i	(1+i)^n
4	None	LS	1	$ -	$ -	$ -	$0.00	$0.00	20	0.016	1.373644
					OTHER COSTS OVER STUDY PERIOD TOTAL	**$ 18,722**					

ıble D
Life Cycle Cost Estimate for Alternative

	Annual	PW
Initial Capital Cost		$ 866,700
Operations and Maintenance Cost	$ 2,750	$ 46,745
Other Costs Over Study Period		$ 18,722
PRESENT WORTH COST OF ALTERNATIVE		**$ 932,167**

ONE-STOP PROJECT SUMMARY

Date	November 3, 2015
Client Name	City of Brookings, OR
Name of Project	Wastewater Improvement Projects

Project Description

The City is currently not under an MAO. However improvements must be made to the system to meet the requirements of the NPDES permit and provide wastewater infrastructure for the next 20 years.

Project Solution

The project consists of constructing additional sewer lines and a pump station to serve the Northwern Portion of the City, construction of a relief sewer to convey flow from Harbor, existing sewer line replacements or rehabilitations throughout the City, pump station and wastewater treatment plant equipment replacements and improvements. All equipment is to be sized to meet year 2035 project flows and loads.

Project Background	
Type of Project	Sewer
Compliance Issue	No
Business Commitment	No
# Jobs Created/Retained	None

Project Financing	
Estimated Project Cost	$12,142,475
Local Contribution	$0
Assistance Requested	$12,142,475
Source of Loan Repayment	User Fees

Water and Sewer Only	
Projected OM&R [1]	$3,478,024
Current OM&R [2]	$3,526,819
Existing DS [3]	$950,932
Current Avg Monthly OM&R + DS per EDU	$68.52
Current Avg Monthly User Rate per EDU	$62.64
Property Tax applied to Utility	$0.00

Demographics	
EDU's	5,446
Connections	4,148
Population	6332
Unemployment Rate	10.90%
Community MHI	$43,389
Statewide MHI	$50,229
Percentage of Statewide MHI	86.38%
LMI %	56.30%
Distressed Index	Distressed
County	Curry County
Affordability Rate	$45.20

Term Key	
EDU	Equivalent Dwelling Unit
MHI	Median Household Income
LMI	Low/Moderate Income
OM&R	Operations, Maintenance, Repair
DS	Debt Service

[1] Projected OM&R is based of current OM&R and projected O&M expense reduction of $48,795 due to inprovements to correct on-going O&M issues.

[2] Current OM&R is based on wastewater expeditures less Harbor SD contribution, transfer to Gen. Fund and Debt Service. It also includes SRF expenses of $1,300,000 less $37,380 for storm loan fund

[3] Existing DS is based on the WW loan Fund expenditure less Harbor SD contribution for debt service

ONE-STOP SCENARIO #1

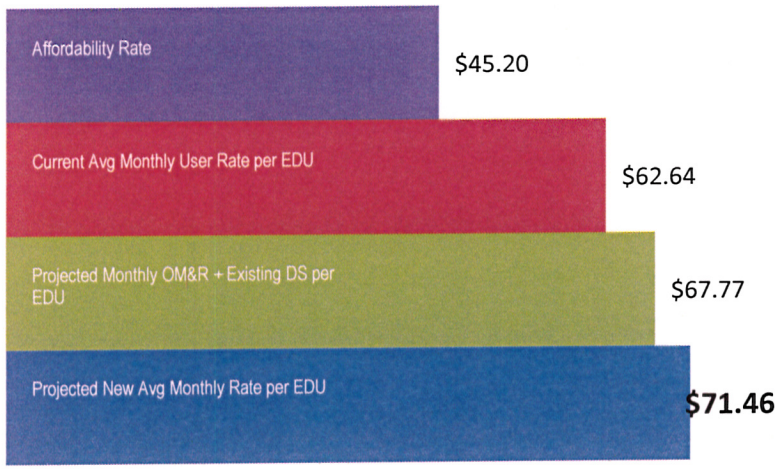
Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

Projected Monthly OM&R + Existing DS per EDU	$67.77
Monthly New DS per EDU	$3.69
Projected New Avg Monthly Rate per EDU	**$71.46**

					Financing Terms		
Partner	Program	Total Financing	Grant Amount	Loan Amount	Loan Repayment Term (yrs)	Estimated Interest Rate	Annual Debt Payment
IFA	CDBG	$2,221,000	$2,221,000	$0		0.000%	
IFA	WW	$5,625,000	$650,000	$4,975,000	25	1.540%	$241,269

Total Financed	**$7,846,000**	Financing Gap	**$4,296,475**	Annual Debt Service	**$241,269**

Impact per EDU



Notes	
CDBG	Must be > 51% LMI and meet affordability criteria.
WW	

ONE-STOP SCENARIO #2

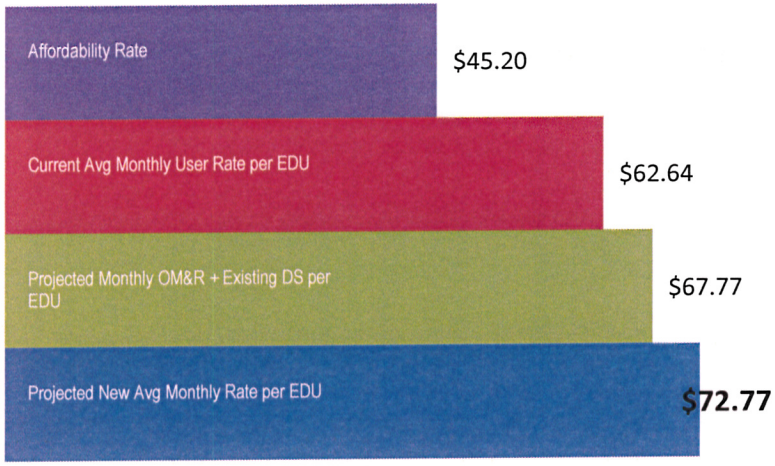
Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

Projected Monthly OM&R + Existing DS per EDU	$67.77
Monthly New DS per EDU	$5.00
Projected New Avg Monthly Rate per EDU	**$72.77**

					Financing Terms		
Partner	Program	Total Financing	Grant Amount	Loan Amount	Loan Repayment Term (yrs)	Estimated Interest Rate	Annual Debt Payment
DEQ	CWSRF	$7,846,000	$500,000	$7,346,000	30	1.970%	$326,647

Total Financed	**$7,846,000**	Financing Gap	**$4,296,475**	Annual Debt Service	**$326,647**

Impact per EDU



Notes	
CWSRF	DEQ Rate is "Effective rate" which includes .5% fee. DEQ will require a Debt Service Reserve be established. Fiscal Sustainability Plan and Cost and Effectivenss analysis (both may already be included in the facility plan). Environmental report (requires 30 day public comment

ONE-STOP SCENARIO #3

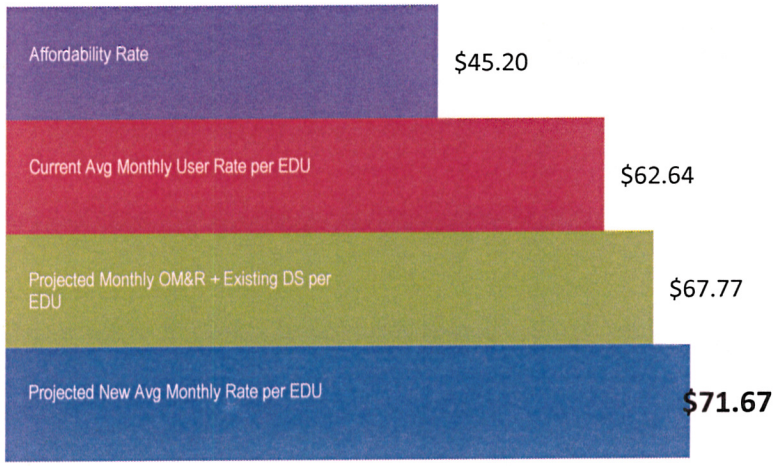
Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

Projected Monthly OM&R + Existing DS per EDU	$67.77
Monthly New DS per EDU	$3.90
Projected New Avg Monthly Rate per EDU	**$71.67**

					Financing Terms		
Partner	Program	Total Financing	Grant Amount	Loan Amount	Loan Repayment Term (yrs)	Estimated Interest Rate	Annual Debt Payment
USDA	RUS	$6,450,000	$1,290,000	$5,160,000	40	2.875%	$218,746
IFA	WW	$1,396,000	$650,000	$746,000	25	1.540%	$36,178

Total Financed	**$7,846,000**	Financing Gap	**$4,296,475**	Annual Debt Service	**$254,924**

Impact per EDU



Notes	
RUS	G.O. or Revenue Bond. USDA/RUS will require 10% Annual Debt Service Reserve be established. Interim financing will be required. Up to 45% grants. Environmental report with cultural study. Short lived assets reserve.
WW	Must meet affordability criteria for subisidized interest rate and grant eligibility. Interest rates set quarterly; Oregon Bond Bank rates are set at time of the Bond Sale. IFA Board approval required for grant >$500,000 or loan >$3MM.

ONE-STOP SCENARIO #4

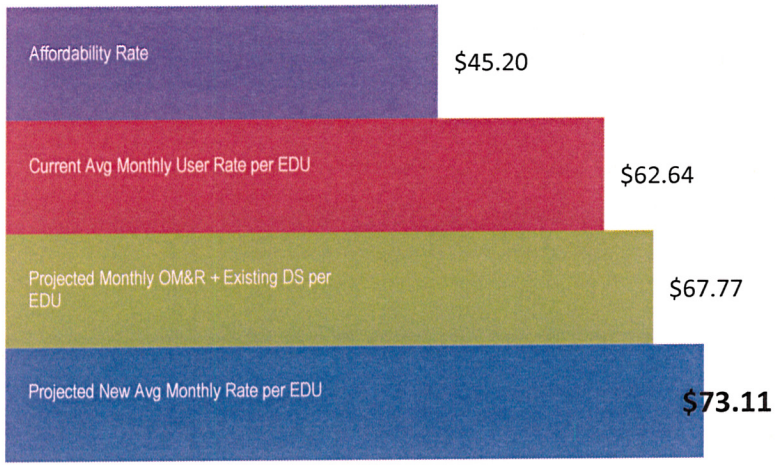
Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

Projected Monthly OM&R + Existing DS per EDU	$67.77
Monthly New DS per EDU	$5.34
Projected New Avg Monthly Rate per EDU	**$73.11**

					Financing Terms		
Partner	Program	Total Financing	Grant Amount	Loan Amount	Loan Repayment Term (yrs)	Estimated Interest Rate	Annual Debt Payment
IFA	WW	$7,846,000	$650,000	$7,196,000	25	1.540%	$348,980

Total Financed	**$7,846,000**	Financing Gap	**$4,296,475**	Annual Debt Service	**$348,980**

Impact per EDU



Notes	
WW	Must meet affordability criteria for subisidized interest rate and grant eligibility. Interest rates set quarterly; Oregon Bond Bank rates are set at time of the Bond Sale. IFA Board approval required for grant >$500,000 or loan >$3MM.

ONE-STOP SCENARIO #5

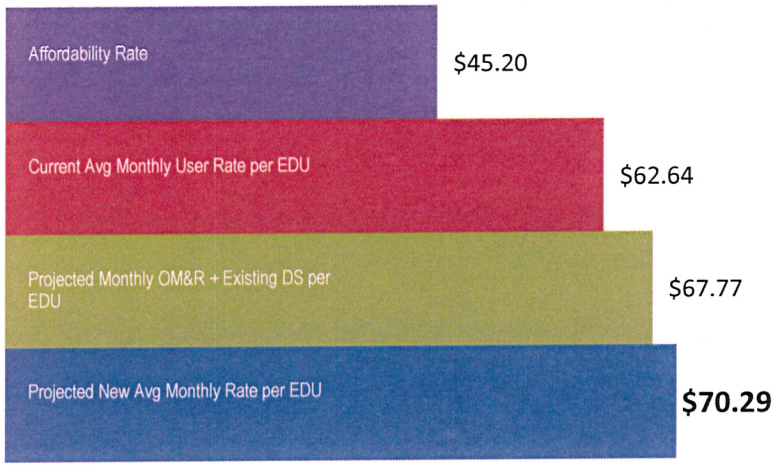
Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

Projected Monthly OM&R + Existing DS per EDU	$67.77
Monthly New DS per EDU	$2.52
Projected New Avg Monthly Rate per EDU	**$70.29**

					Financing Terms		
Partner	Program	Total Financing	Grant Amount	Loan Amount	Loan Repayment Term (yrs)	Estimated Interest Rate	Annual Debt Payment
IFA	CDBG	$2,221,000	$2,221,000	$0			
IFA	WW	$1,300,000	$650,000	$650,000	25	1.540%	$31,523
DEQ	CWSRF	$1,000,000	$500,000	$500,000	30	1.970%	$22,233
USDA	RUS	$3,325,000	$708,000	$2,617,000	40	2.875%	$110,941

Total Financed	**$7,846,000**	Financing Gap	**$4,296,475**	Annual Debt Service	**$164,697**

Impact per EDU



Notes	
CDBG	Must be > 51% LMI and meet affordability criteria.
WW	Must meet affordability criteria for subisidized interest rate and grant eligibility. Interest rates set quarterly; Oregon Bond Bank rates are set at time of the Bond Sale. IFA Board approval required for grant >$500,000 or loan >$3MM.
CWSRF	DEQ Rate is "Effective rate" which includes .5% fee. DEQ will require a Debt Service Reserve be established. Fiscal Sustainability Plan and Cost and Effectivenss analysis (both may already be included in the facility plan). Environmental report (requires 30 day public comment
RUS	G.O. or Revenue Bond. USDA/RUS will require 10% Annual Debt Service Reserve be established. Interim financing will be required. Up to 45% grants. Environmental report with cultural study. Short lived assets reserve.

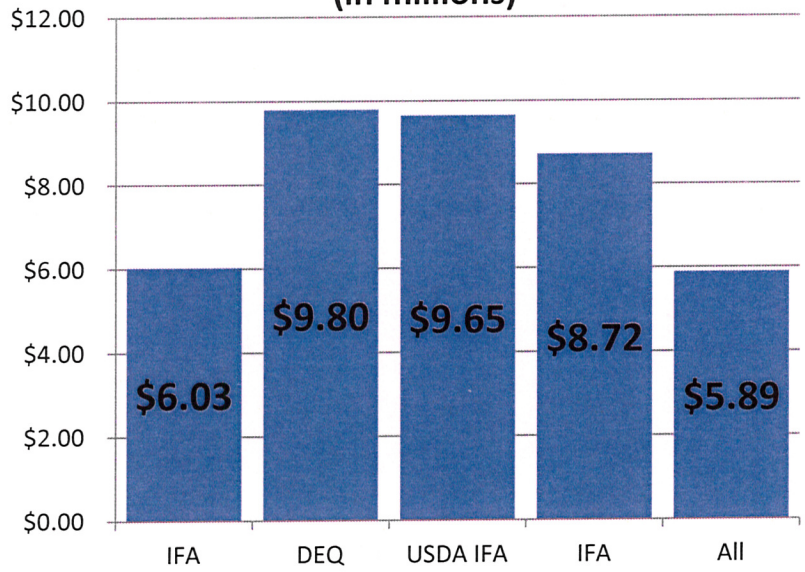
ONE-STOP SCENARIO COMPARISONS

Estimated Project Cost	**$12,142,475**
Local Contribution	**$0**
Assistance Requested	**$12,142,475**

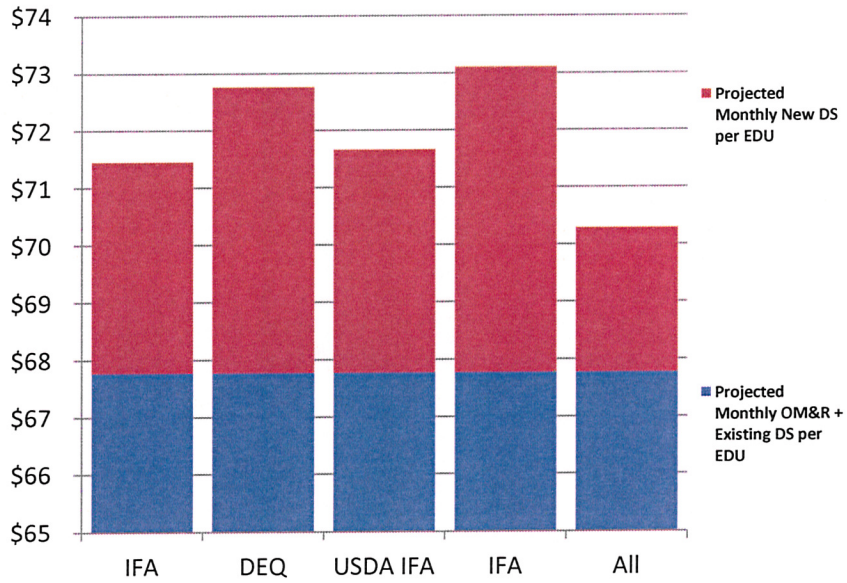
Current Avg Monthly User Rate per EDU	$62.64
Projected Monthly OM&R + Existing DS per EDU	$67.77

Scenario	Total Financing	Grant Amount	Loan Amount	Annual Debt Payment	Total Payments over Life of Loan	Projected Monthly New DS per EDU	Projected New Avg Monthly Rate per EDU	# of Funding Partners
IFA	$7,846,000	$2,871,000	$4,975,000	$241,269	$6,031,733	$3.69	$71.46	2
DEQ	$7,846,000	$500,000	$7,346,000	$326,647	$9,799,406	$5.00	$72.77	1
USDA IFA	$7,846,000	$1,940,000	$5,906,000	$254,924	$9,654,280	$3.90	$71.67	2
IFA	$7,846,000	$650,000	$7,196,000	$348,980	$8,724,492	$5.34	$73.11	1
All	$7,846,000	$4,079,000	$3,767,000	$164,697	$5,892,707	$2.52	$70.29	4

Total Payments over Life of Loan (in millions)



Projected New Avg Monthly Rate per EDU



APPENDIX D: **MISCELLANEOUS REPORTS AND STUDIES**

Population Forecast

2000 Oregon Population Report

Monthly Water & Sewer Rates - Brookings

Brookings Budget

Endangered Species Lists

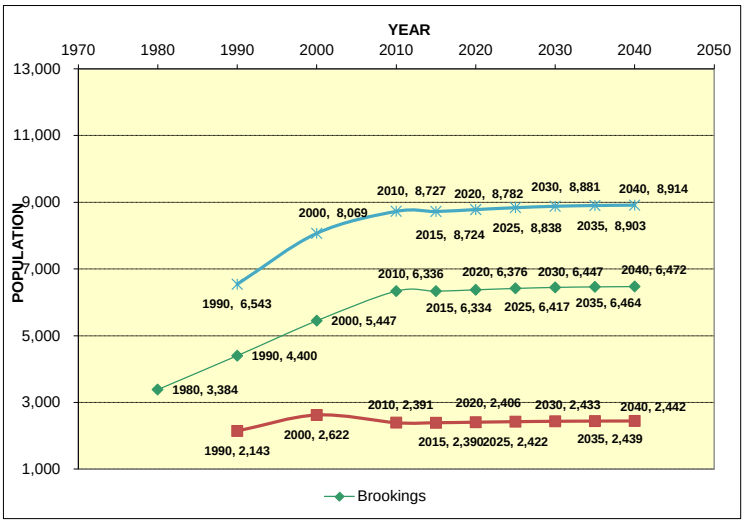
Smoke Testing Report, October 2014 (under separate cover)

Population Forecast based on Historic Growth Rate

based Safe Harbor method

Date: 25-Sep-14

1. Historic population and forecasted estimate population graph



2. Historical Population Growth Table

Year	Curry County	City of Brookings	Community of Harbor	Combined Brookings and Harbor	Estimated Annual Growth Rate
1980	16,992	3,384	-	-	-
1990	19,327	4,400	2,143	6,543	-
2000	21,137	5,447	2,622	8,069	-
2010	22,364	6,336	2,391	8,727	-
2015	22,321	6,334	2,390	8,724	-0.03%
2020	23,087	6,376	2,406	8,782	0.66%
2025	23,854	6,417	2,422	8,838	0.64%
2030	24,440	6,447	2,433	8,881	0.48%
2035	24,751	6,464	2,439	8,903	0.25%
2040	24,912	6,472	2,442	8,914	0.13%

2. Calculations

	Curry County			City of Brookings			City of Harbor			Combined Brookings + Harbor		
Year	Pop	Increase	nnual Rate	Pop	Increase	\nnual Rate	Pop	Increase	Annual Rate	Pop	Increase	Annual Rate
1980	16,992			3,384			-			-		
1990	19,327	2,335	1.21%	4,400	1,016	2.31%	2,143			6,543		
2000	21,137	1,810	0.86%	5,447	1,047	1.92%	2,622	479	1.83%	8,069	1,526	1.89%
2010	22,364	1,227	0.50%	6,336	889	1.40%	2,391	-231	0.80%	8,727	658	0.80%
2015	22,321	-43	-0.04%	6,334	-2	-0.03%	2,390	-1	-0.03%	8,724	-3	-0.03%
2020	23,087	766	0.66%	6,376	42	0.66%	2,406	16	0.66%	8,782	58	0.66%
2025	23,854	767	0.64%	6,417	41	0.64%	2,422	15	0.64%	8,838	56	0.64%
2030	24,440	586	0.48%	6,447	31	0.48%	2,433	12	0.48%	8,881	42	0.48%
2035	24,751	311	0.25%	6,464	16	0.25%	2,439	6	0.25%	8,903	22	0.25%
2040	24,912	161	0.13%	6,472	8	0.13%	2,442	3	0.13%	8,914	12	0.13%

Notes:

1 Curry County 1980 thru 2050 population is taken from the Office of Economic Analysis, Department of Administration Services, State of Oregon, Release Date April 15, 2014

2 City of Brookings population from 1980 to 2010 was prepared by the Population Research Center, PSU April 2014

2000 Oregon Population Report

- **Growth in Oregon, 1990 to 2000**
- **Population Estimates for Oregon, July 1, 2000**

Population Research Center
College of Urban and Public Affairs
Portland State University
Portland, OR 97207-0751

2000 Oregon Population Report

• Growth in Oregon, 1990 to 2000

• Population Estimates for Oregon, July 1, 2000

By

Qian Cai

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Population Growth in Oregon, 1990 to 2000

Oregon's population reached a total of 3,421,399 on April 1, 2000, according to the decennial census. It is a growth of 579,078 people, or 20 percent increase since the 1990 census, when the state had a population of 2,842,321.

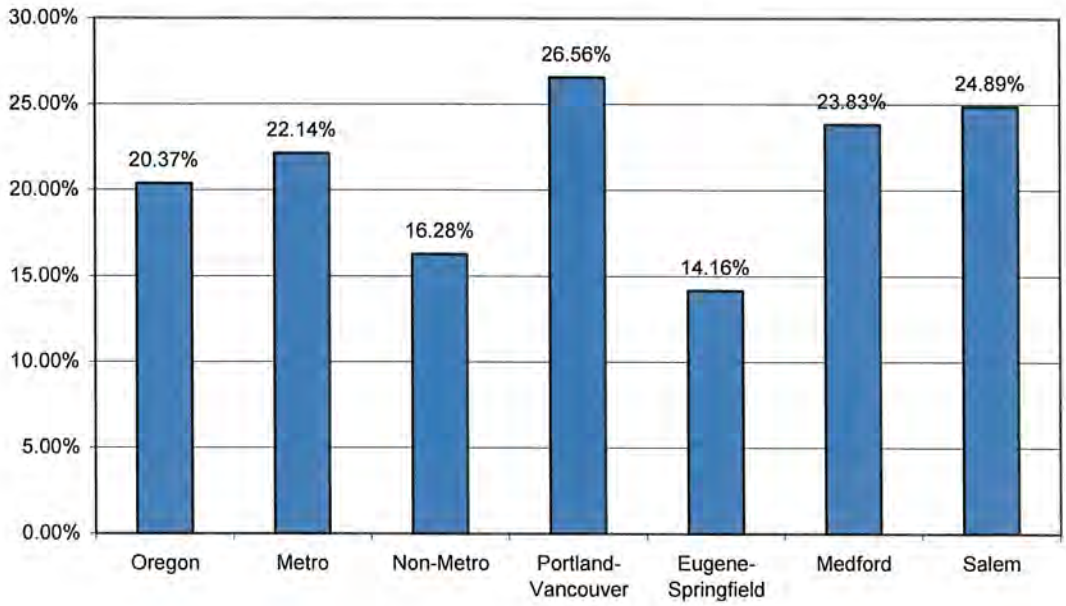
The population change between the two censuses reflects a two-fold story: the first is population growth, which consists of natural increase (births minus deaths) and net migration (people moving into the state minus people leaving the state). During the ten-year period, Oregon had a natural increase of 157,605, accounting for only about 27 percent of the total increase; net in-migration, on the other hand, contributed most of the remaining population growth. Second, the Census Bureau indicates that the 2000 census has a better coverage than the 1990 census. Therefore, part of the growth is not "growth" in a strict sense. Some people who were missed in the 1990 census were counted in the 2000 census. Since it is difficult to tell how much of the increase is due to the better coverage, the following discussion on population growth for different geographic levels refers to the absolute change during the past decade.

Metropolitan Growth

While many people both inside and outside Oregon retain the image of the state as a place of coastal beaches, mountain forests, and high desert plains, the state's population is mainly urban and has been increasingly so. According to the 2000 census, population living in Oregon's incorporated areas accounted for about 67 percent of the total population, which indicates a five-percentage point increase over the 1990 census. In fact, more than 2.5 million population live in metropolitan counties, which include Benton, Clackamas, Columbia, Jackson, Lane, Marion, Multnomah, Polk, Washington, and Yamhill.

The metropolitan areas have been growing faster than the state, with a growth rate of 22 percent for the last decade. Not all metropolitan areas, however, are growing at equal rates. Portland, Medford and Salem metropolitan areas have been growing faster than the state as a whole. The Eugene-Springfield metropolitan area has been growing at a slower rate than the state average.

Growth Rates for Oregon's Metropolitan Areas, 1990-2000



Nonmetropolitan counties also witnessed a population increase in the past ten years. The population grew about 16 percent since 1990, six percentage points short of their metropolitan counterparts.

According to the Office of Management and Budget in Washington, D.C., Corvallis became Oregon's fifth metropolitan statistical area as of June 30, 1999. Based on population growth in the 1990s, it is likely that Bend will shortly be designated as Oregon's newest metropolitan area, once 2000 census results are tabulated and reviewed. Bend will become Oregon's sixth metropolitan area and the state's only metropolitan area east of the Cascades.

County Growth

During the 1990s, Oregon counties experiencing the fastest growth rates are located along the I-5 corridor and in central Oregon. Among the 36 counties in the state, Deschutes is the fastest growing county with a growth rate of 54 percent from 1990 to 2000, followed by Morrow (44 percent), Washington (43 percent), Jefferson (39 percent) and Crook (36 percent). While 13 counties were growing faster than the state average, the remaining 23 experienced slower growth, with Sherman, Grant, Lake, Union and Coos being the five slowest growing counties.

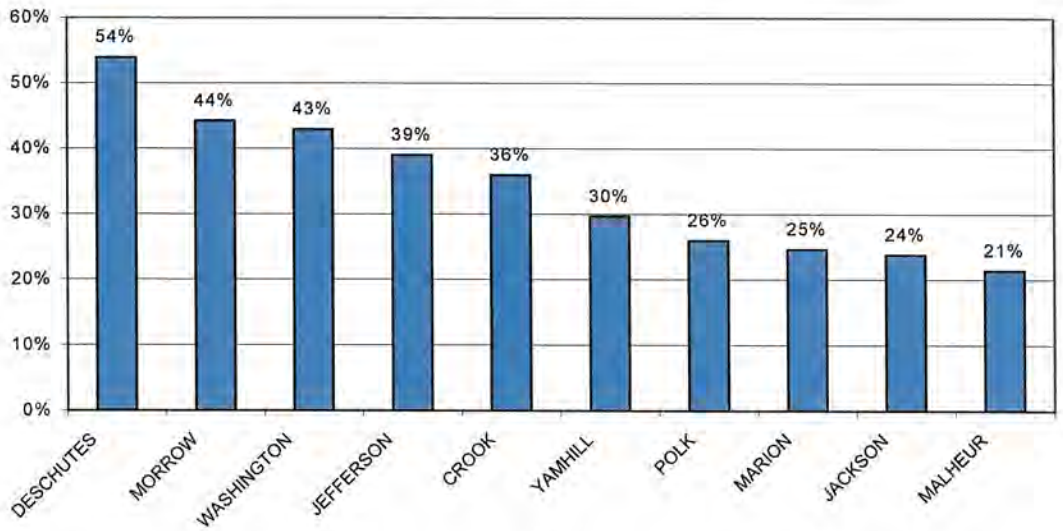
In terms of the absolute number of growth, Washington County is the largest gainer, with a total increase of 133,788, followed by Multnomah (76,599) and Clackamas (59,541), Marion (56,351), and Deschutes (40,409). Among the top ten counties which had the largest gain, Deschutes and Josephine are the only two non-metropolitan counties. The metropolitan county of Columbia falls behind as the 15th largest in growth.

City Growth

For many years, the localities outside the central cities of metropolitan areas were the fastest-growing localities, and most of them still have above average annual growth rates. A substantial number of these older localities, however, have now grown to a size that they have become major urban areas. With more economic development moving to these localities, residential growth has been moving out to further towns in metropolitan areas. This trend is especially evident in the metropolitan Portland area, where growth rates for Canby, Happy Valley, Oregon City, and Wilsonville in Clackamas County; Beaverton, Forest Grove, Hillsboro, Sherwood, Tigard, and Tualatin in Washington County; Fairview, Gresham, and Troutdale in Multnomah County; and Lafayette, McMinnville and Newberg in Yamhill County well outstrip those for Portland. Evidence of the trend is found in other Oregon metropolitan areas: Keizer, Central Point, and Florence are all examples of localities that are growing more rapidly than the central cities of their metropolitan areas.

Some cities in non-metropolitan areas also show considerable growth. For instance, Bend and

Oregon's 10 Fastest Growing Counties, 1990-2000



Redmond in Deschutes County, Irrigon and Boardman in Morrow County, are among the top 20 fastest growing cities in Oregon.

Unincorporated Areas Growth

While the incorporated areas experienced a growth rate of 29 percent in the ten-year period, the population of unincorporated areas grew from 1,080,325 in 1990 to 1,143,783 in 2000, a percentage increase of almost 6 percent. Among the 36 counties, thirty-one of them had positive changes in their unincorporated areas, including five counties with growth rates higher than 20 percent. They are: Jefferson (36 percent), Crook (35 percent), Washington (28 percent), Morrow (26 percent) and Malheur (26 percent). Five counties lost population in their unincorporated areas during 1990-2000 period. Multnomah County declined by about 74 percent, followed by Benton (-15 percent), Gilliam (-6 percent), Sherman (-3 percent) and Union (-1 percent). Some of the population losses are due to annexations by cities within these counties.

Population Estimates for Oregon, July 1, 2000

This report presents the population estimates for Oregon and its counties and incorporated cities for July 1, 2000, based on the April 1, 2000 census information. The ten tables in this report show current 2000 population estimates as well as historical data.

- Table 1 presents the components of population change for the state of Oregon, from 1960 to 2000.
- Table 2 shows the population by area types and the population for specific metropolitan areas during April 1, 1990 to July 1, 2000.
- Table 3 shows the components of population change for Oregon's counties, from 1990 to 2000.
- Table 4 shows the population size for the state of Oregon and its counties and incorporated cities, from 1990 to 2000.
- Table 5 shows population information on Oregon's incorporated cities that are located in more than one county.
- Table 6 presents the rank of Oregon's incorporated cities by their July 1, 2000 population size.
- Table 7 offers an alphabetical listing of Oregon's incorporated cities with their estimate of population size on July 1, 2000 and the change between 1990-2000.
- Table 8 presents information on the population added to incorporated cities due to annexation during April 1, 1990 to July 1, 2000.
- Table 9 displays estimates for the population by age and sex for the state of Oregon and its counties for July 1, 2000.
- Table 10 shows estimates for the population by selected age groups (birth to 17 years of age, 18 to 64 years of age, and 65 years of age and older) for the state of Oregon and its counties for July 1, 2000.

State Requirements for Population Estimates

Oregon law (Oregon Regulatory Statutes 190.510 to 190.610) mandates the Population Research Center, Portland State University, acting on behalf of the State Board of Higher Education, to prepare annual population estimates for each county and incorporated city in the state of Oregon. The principal purpose of the population estimates is for the allocation of selected tax revenues to cities and counties.

The Population Research Center had its origin in 1956, when the state government organized a State Census Office in Portland. The purpose of the State Census Office was to oversee and certify special censuses that rapidly growing towns conducted in order to document their population figures. The State Census Office eventually expanded its role to include the certification of the population added by annexations and the preparation of annual population estimates for counties.

Administrative responsibilities for population estimates were transferred to Portland State University in 1965, when the unit changed its name to the present one. The Population Research Center is located within the College of Urban and Public Affairs.

Duties of the Population Center

In addition to preparing population estimates and projections, the Center houses the Oregon State Data Center, the lead agency in Oregon for contact and collaboration with the U.S. Bureau of the Census and for dissemination of census data and documents. This information includes current and past census data for Oregon as well as results from Census Bureau surveys.

The Population Center provides a research and teaching focus for the investigation of the causes and consequences of demographic change in current society. Typical research activities include enrollment forecasts for school districts, survey research on population issues, social and economic factors affecting demographic change, population distribution and migration, population geography, and demographic methods. Population staff regularly assist city, county, and state governments on examination of population issues.

Staff in the Population Center teach in the School of Urban Studies and Planning, College of Urban and Public Affairs. The School of Urban Studies and Planning offers a graduate certificate program in applied demography, an applied demography curriculum in the Master of Urban Studies degree program, and a graduate concentration within applied demography in the Ph.D. program.

Methods for Population Estimates

We include all residents in cities, counties, and the state in the population estimates. Residents include people living in their own homes, rental homes or apartments, mobile homes, or in college dormitories, nursing homes, jails and prisons, and other group quarters. We consider college students to be residents of the place where they live while attending college. We count seasonal residents as living at the place that they consider to be their usual residence.

We have developed methods for Oregon's population estimates to be as accurate as possible. Toward this goal, we work closely with state, county, and city officials, requesting information from them and inviting their review of our methods and estimates.

For estimates for the state population, we rely on the observed registration of births and deaths for an estimate of natural increase (the excess of births minus deaths). For the second component of population, migration, we rely on school enrollments data for an estimate of net migration for the population under 18 years, non-farm payroll information for the population aged 18 to 64, and Medicare data for the population aged 65 and older.

We base county population estimates on a method called ratio correlation. The ratio correlation method relates changes since the last census to changes in state tax returns, school enrollments, births, and voter registration -- all for county populations. We track changes in each of these types of administrative data since the last census to make an estimate of the current county populations. We also examine changes in the housing stock for counties as a check on the accuracy of the county estimates.

We determine city population estimates based on changes in the housing stock. City officials report each year on the changes in their city's housing stock (for single family units, multi-unit residents, and mobile homes) and the number of persons residing in group quarters. We also take into account any population changes that have been due to annexations. We separately estimate possible changes due to the number of people per housing unit and use this information to prepare the city's final population estimate.

We monitor city annexations throughout the year. We are informed about annexations by the office of the Secretary of State. When an annexation occurs, we contact city officials to find out the number of residential housing units and population, if any, involved in the annexation. If the annexation added people to the city's population, then we certify an updated city population on a quarterly basis, in a special report to the Secretary of State's office.

Acknowledgement

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Table 1. Components of Population Change for Oregon: 1960 to 2000

Date	Population	Population change	Births	Deaths	Natural Increase	Net Migration
April 1, 1960	1,768,687					
July 1, 1961	1,798,000	29,313	31,660	14,060	17,600	11,713
July 1, 1962	1,828,000	30,000	36,535	16,735	19,800	10,200
July 1, 1963	1,856,000	28,000	32,971	16,171	16,800	11,200
July 1, 1964	1,884,000	28,000	32,687	17,287	15,400	12,600
July 1, 1965	1,912,000	28,000	32,585	17,785	14,800	13,200
July 1, 1966	1,947,200	35,200	31,210	17,710	13,500	21,700
July 1, 1967	1,980,000	32,800	30,711	18,211	12,500	20,300
July 1, 1968	2,018,900	38,900	32,464	19,364	13,100	25,800
July 1, 1969	2,057,000	38,100	34,423	20,123	14,300	23,800
April 1, 1970	2,091,533	34,533	27,345	15,445	11,900	22,633
July 1, 1971	2,129,900	38,367	45,357	26,157	19,200	19,167
July 1, 1972	2,167,000	37,100	31,332	19,532	11,800	25,300
July 1, 1973	2,217,600	50,600	30,939	20,439	10,500	40,100
July 1, 1974	2,271,900	54,300	31,123	20,223	10,900	43,400
July 1, 1975	2,326,200	54,300	32,934	20,234	12,700	41,600
July 1, 1976	2,386,700	60,500	33,613	20,013	13,600	46,900
July 1, 1977	2,451,900	65,200	37,546	21,246	16,300	48,900
July 1, 1978	2,521,900	70,000	37,231	20,131	17,100	52,900
July 1, 1979	2,584,300	62,400	41,271	21,471	19,800	42,600
April 1, 1980	2,633,156	48,856	30,554	15,554	15,000	33,856
July 1, 1981	2,660,735	27,579	53,879	27,279	26,600	979
July 1, 1982	2,656,185	-4,550	42,261	21,548	20,713	-25,263
July 1, 1983	2,635,000	-21,185	40,378	22,039	18,339	-39,524
July 1, 1984	2,660,000	25,000	39,611	22,702	16,909	8,091
July 1, 1985	2,675,800	15,800	39,296	23,531	15,765	35
July 1, 1986	2,661,500	-14,300	39,332	23,403	15,929	-30,229
July 1, 1987	2,690,000	28,500	38,702	23,695	15,007	13,493
July 1, 1988	2,741,000	51,000	39,120	24,752	14,368	36,632
July 1, 1989	2,791,000	50,000	40,648	24,705	15,943	34,057
April 1, 1990	2,842,321	51,321	42,008	24,763	17,245	34,076
July 1, 1991	2,925,100	82,779	42,682	24,944	17,738	65,041
July 1, 1992	2,986,000	60,900	42,427	25,166	17,261	43,639
July 1, 1993	3,053,300	67,300	41,442	26,543	14,899	52,401
July 1, 1994	3,111,800	58,500	41,487	27,564	13,923	44,577
July 1, 1995	3,171,900	60,100	42,426	27,552	14,874	45,226
July 1, 1996	3,231,500	59,600	43,083	28,628	14,455	45,145
July 1, 1997	3,284,600	53,100	43,138	27,906	15,232	37,868
July 1, 1998	3,326,700	42,100	44,564	28,173	16,391	25,709
July 1, 1999	3,363,600	36,900	44,361	28,774	15,587	21,313
April 1, 2000	3,421,399	57,799	45,168	27,870	17,298	40,501

Note: The state population estimates for 1991-99 have been revised based on the 1990 and 2000 census figures, assuming the same migration pattern as Census Bureau's estimates.

Table 2. Population Estimates of Oregon by Area Type and Specific Metropolitan Areas, 1990-2000

	State	Incorporated	Unincorporated	Metropolitan	Nonmetropolitan
April 1, 1990	2,842,321	1,761,996	1,080,325	1,984,724	857,597
July 1, 1991	2,930,000	1,827,098	1,102,902	2,052,200	877,800
July 1, 1992	2,979,000	1,855,813	1,123,187	2,088,600	890,400
July 1, 1993	3,038,000	1,897,483	1,140,517	2,133,700	904,300
July 1, 1994	3,082,000	1,958,298	1,123,702	2,164,400	917,600
July 1, 1995	3,132,000	2,002,883	1,129,117	2,199,100	932,900
July 1, 1996	3,181,000	2,059,823	1,121,177	2,236,200	944,800
July 1, 1997	3,217,000	2,113,398	1,103,602	2,265,300	951,700
July 1, 1998	3,267,550	2,162,728	1,104,822	2,304,500	963,050
July 1, 1999	3,300,800	2,213,693	1,087,107	2,406,900	893,900
April 1, 2000	3,421,399	2,277,616	1,143,783	2,502,366	919,033
July 1, 2000	3,436,750	2,291,870	1,144,880	2,514,300	922,450

Specific Metropolitan Areas

	Portland-Vancouver*	Eugene-Springfield	Medford	Salem	Corvallis
April 1, 1990	1,515,452	282,912	146,389	278,024	
July 1, 1991	1,573,200	290,900	151,400	287,900	
July 1, 1992	1,605,000	293,700	152,900	294,500	
July 1, 1993	1,647,200	298,000	157,000	301,000	
July 1, 1994	1,678,000	300,000	160,000	307,200	
July 1, 1995	1,710,400	301,900	164,400	313,400	
July 1, 1996	1,746,800	305,800	168,000	319,100	
July 1, 1997	1,779,200	308,500	169,300	325,100	
July 1, 1998	1,815,300	313,000	172,800	331,400	
July 1, 1999	1,841,200	315,700	174,550	335,350	77,100
April 1, 2000	1,918,009	322,959	181,269	347,214	78,153
July 1, 2000	1,926,100	323,950	182,200	349,000	78,300

* based on 1993 definition
Portland-Vancouver PMSA consists of Clackamas, Columbia, Multnomah, Washington, Yamhill and Clark Counties
Eugene-Springfield MSA consists of Lane County
Medford MSA consists of Jackson County
Salem PMSA consists of Marion and Polk Counties
Corvallis MSA consists of Benton County, and it became a metropolitan area in June 30, 1999

Table 3. Components of Population Change for Oregon's Counties: April 1990 to Apirl 1, 2000

	July 1, 2000 Population Estimates	April 1, 2000 Census Population	April 1, 1990 Census Population	Inter-Censal Population Change	Inter-Censal Percentage Change	Inter-Censal Births	Inter-Censal Deaths	Inter-Censal Natural Increase	Inter-Censal Net Migration
STATE	3,436,750	3,421,399	2,842,321	579,078	20.4	430,949	273,323	157,626	421,452
BAKER	16,750	16,741	15,317	1,424	9.3	1,791	1,890	-99	1,523
BENTON	78,300	78,153	70,811	7,342	10.4	8,160	4,232	3,928	3,414
CLACKAMAS	340,000	338,391	278,850	59,541	21.4	40,009	23,244	16,765	42,776
CLATSOP	35,700	35,630	33,301	2,329	7.0	4,106	3,736	370	1,959
COLUMBIA	43,700	43,560	37,557	6,003	16.0	4,857	3,154	1,703	4,300
COOS	62,800	62,779	60,273	2,506	4.2	6,713	7,534	-821	3,327
CROOK	19,300	19,182	14,111	5,071	35.9	2,147	1,635	512	4,559
CURRY	21,200	21,137	19,327	1,810	9.4	1,793	2,559	-766	2,576
DESCHUTES	116,600	115,367	74,958	40,409	53.9	12,101	7,388	4,713	35,696
DOUGLAS	100,500	100,399	94,649	5,750	6.1	11,614	10,672	942	4,808
GILLIAM	1,900	1,915	1,717	198	11.5	160	173	-13	211
GRANT	7,950	7,935	7,853	82	1.0	947	795	152	-70
HARNEY	7,600	7,609	7,060	549	7.8	851	738	113	436
HOOD RIVER	20,500	20,411	16,903	3,508	20.8	3,002	1,521	1,481	2,027
JACKSON	182,200	181,269	146,389	34,880	23.8	20,503	16,093	4,410	30,470
JEFFERSON	19,150	19,009	13,676	5,333	39.0	2,907	1,302	1,605	3,728
JOSEPHINE	76,050	75,726	62,649	13,077	20.9	7,976	8,745	-769	13,846
KLAMATH	63,900	63,775	57,702	6,073	10.5	8,430	6,002	2,428	3,645
LAKE	7,450	7,422	7,186	236	3.3	861	763	98	138
LANE	323,950	322,959	282,912	40,047	14.2	36,633	25,683	10,950	29,097
LINCOLN	44,600	44,479	38,889	5,590	14.4	4,486	4,992	-506	6,096
LINN	103,350	103,069	91,227	11,842	13.0	13,647	9,252	4,395	7,447
MALHEUR	31,750	31,615	26,038	5,577	21.4	4,941	2,647	2,294	3,283
MARION	286,300	284,834	228,483	56,351	24.7	41,955	22,777	19,178	37,173
MORROW	11,100	10,995	7,625	3,370	44.2	1,412	668	744	2,626
MULTNOMAH	662,400	660,486	583,887	76,599	13.1	91,434	57,331	34,103	42,496
POLK	62,700	62,380	49,541	12,839	25.9	6,653	4,706	1,947	10,892
SHERMAN	1,950	1,934	1,918	16	0.8	186	194	-8	24
TILLAMOOK	24,300	24,262	21,570	2,692	12.5	2,430	2,709	-279	2,971
UMATILLA	70,850	70,548	59,249	11,299	19.1	9,847	5,359	4,488	6,811
UNION	24,550	24,530	23,598	932	3.9	3,002	2,241	761	171
WALLOWA	7,250	7,226	6,911	315	4.6	678	783	-105	420
WASCO	23,850	23,791	21,683	2,108	9.7	2,911	2,577	334	1,774
WASHINGTON	449,250	445,342	311,554	133,788	42.9	61,163	23,141	38,022	95,766
WHEELER	1,550	1,547	1,396	151	10.8	129	185	-56	207
YAMHILL	85,500	84,992	65,551	19,441	29.7	10,514	5,902	4,612	14,829

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000

County and City	July 1 Population Estimates 2000	U.S. Census Count 4/1/00	July 1 Population Estimates 1999	1998	1997	1996	1995	1994	1993	U.S. Census Count 4/1/90
STATE	3,436,750	3,421,399	3,300,800	3,267,550	3,217,000	3,181,000	3,132,000	3,082,000	3,038,000	2,842,321
BAKER	16,750	16,741	16,700	16,700	16,500	16,500	16,500	16,300	16,100	15,317
Baker City	9,880	9,860	10,155	10,160	9,960	9,870	9,730	9,585	9,450	9,140
Greenhorn	0	0	3	3	3	3	3	3	3	
Haines	425	426	480	470	455	440	420	410	430	405
Halfway	340	337	345	350	360	355	345	340	335	311
Huntington	515	515	575	580	575	575	565	560	555	522
Richland	150	147	175	180	185	185	185	180	175	161
Sumpter	175	171	175	175	175	175	175	165	160	119
Unity	130	131	155	145	110	110	115	110	105	87
Uninc.	5,135	5,154	4,637	4,637	4,677	4,787	4,962	4,947	4,887	4,572
BENTON	78,300	78,153	77,100	76,600	76,700	76,000	75,500	75,400	73,300	70,811
Adair Village	535	536	570	570	570	565	565	565	565	554
Corvallis	49,440	49,322	50,880	49,630	51,145	49,275	47,485	46,195	46,260	44,757
Monroe	610	607	550	555	530	495	495	485	480	448
Philomath	3,880	3,838	3,890	3,770	3,380	3,300	3,315	3,195	3,030	2,983
Uninc.	18,695	18,746	16,230	17,335	16,535	18,015	19,440	20,885	18,990	22,054
CLACKAMAS	340,000	338,391	326,850	323,600	317,700	313,200	308,600	305,500	302,000	278,850
Barlow	140	140	125	125	125	125	130	130	130	118
Canby	12,910	12,790	12,595	12,465	11,725	11,430	10,855	10,405	9,815	8,990
Estacada	2,380	2,371	2,200	2,190	2,100	2,065	2,060	2,045	2,025	2,016
Gladstone	11,470	11,438	11,695	11,745	11,680	11,605	11,475	11,325	10,975	10,152
Happy Valley	4,650	4,519	3,965	3,540	3,125	2,825	2,660	2,365	2,060	1,519
Johnson City	635	634	615	625	625	625	615	620	615	586
Lake Oswego*	35,415	35,278	34,110	34,280	34,065	34,005	33,145	32,940	32,555	30,576
Milwaukie	20,540	20,490	20,075	20,220	20,055	20,065	20,015	19,930	19,955	18,670
Molalla	5,710	5,647	5,670	5,395	4,920	4,505	4,045	3,915	3,820	3,637
Oregon City	26,200	25,754	23,405	22,560	21,895	20,410	18,980	17,545	17,315	14,698
Rivergrove*	325	324	310	300	300	300	300	300	300	294
Sandy	5,425	5,385	5,300	5,135	5,030	4,895	4,685	4,520	4,370	4,154
West Linn	22,440	22,261	22,835	21,405	20,415	19,960	19,370	18,860	18,165	16,389
Wilsonville*	14,365	13,991	12,985	12,290	10,940	10,600	9,765	9,680	9,580	7,106
Uninc.	176,290	176,288	170,330	170,669	170,049	169,147	169,879	170,379	169,874	160,128
CLATSOP	35,700	35,630	34,750	34,700	34,500	34,600	34,300	33,900	33,700	33,301
Astoria	9,815	9,813	9,990	10,090	10,110	10,130	10,100	10,050	10,000	10,069
Cannon Beach	1,600	1,588	1,425	1,425	1,425	1,395	1,365	1,330	1,310	1,221
Gearhart	985	995	1,245	1,230	1,215	1,205	1,170	1,125	1,055	1,027
Seaside	5,915	5,900	6,130	6,170	6,005	5,860	5,750	5,655	5,580	5,359
Warrenton	4,140	4,096	4,205	4,175	4,040	3,940	3,845	3,820	3,575	2,681
Uninc.	13,245	13,238	11,755	11,610	11,705	12,070	12,070	11,920	12,180	12,355

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

County and City	July 1 Population Estimates 2000	U.S. Census Count 4/1/00	July 1 Population Estimates 1999	1998	1997	1996	1995	1994	1993	U.S. Census Count 4/1/90
COLUMBIA	43,700	43,560	42,650	42,300	41,500	40,100	39,700	39,400	38,800	37,557
Clatskanie	1,530	1,528	1,870	1,870	1,880	1,875	1,885	1,870	1,855	1,629
Columbia City	1,595	1,571	1,665	1,635	1,550	1,465	1,385	1,240	1,120	1,003
Prescott	70	72	60	60	60	60	60	60	65	63
Rainier	1,690	1,687	1,810	1,800	1,780	1,755	1,720	1,700	1,690	1,674
St. Helens	10,100	10,019	9,300	9,060	8,555	8,300	8,080	7,945	7,800	7,535
Scappoose	5,025	4,976	4,970	4,855	4,650	4,130	3,845	3,705	3,635	3,529
Vernonia	2,240	2,228	2,420	2,425	2,345	2,180	2,110	2,035	1,910	1,808
Uninc.	21,450	21,479	20,555	20,595	20,680	20,335	20,615	20,845	20,725	20,316
COOS	62,800	62,779	61,350	61,400	61,400	61,700	62,100	62,800	62,500	60,273
Bandon	2,860	2,833	2,875	2,820	2,790	2,760	2,610	2,430	2,425	2,224
Coos Bay	15,380	15,374	15,630	15,615	15,635	15,520	15,430	15,450	15,170	15,076
Coquille	4,185	4,184	4,300	4,235	4,235	4,225	4,230	4,195	4,185	4,121
Lakeside	1,370	1,371	1,680	1,675	1,675	1,630	1,630	1,615	1,530	1,437
Myrtle Point	2,445	2,451	2,695	2,725	2,725	2,730	2,740	2,740	2,740	2,712
North Bend	9,540	9,544	9,995	9,910	9,885	9,885	9,855	9,840	9,800	9,614
Powers	735	734	720	665	695	695	680	680	685	682
Uninc.	26,285	26,288	23,455	23,755	23,760	24,255	24,925	25,850	25,965	24,407
CROOK	19,300	19,182	16,800	16,650	16,250	15,900	15,700	15,700	15,300	14,111
Prineville	7,410	7,356	7,255	6,920	6,560	6,230	6,095	5,945	5,800	5,355
Uninc.	11,890	11,826	9,545	9,730	9,690	9,670	9,605	9,755	9,500	8,756
CURRY	21,200	21,137	22,050	22,000	22,200	22,000	22,200	22,000	21,300	19,327
Brookings	5,475	5,447	5,620	5,510	5,440	5,400	5,220	5,100	4,970	4,400
Gold Beach	1,900	1,897	2,200	2,150	2,160	2,115	2,080	1,655	1,650	1,546
Port Orford	1,155	1,153	1,040	1,055	1,065	1,050	1,050	1,035	1,025	1,025
Uninc.	12,670	12,640	13,190	13,285	13,535	13,435	13,850	14,210	13,655	12,356
DESCHUTES	116,600	115,367	106,700	104,900	101,200	98,000	94,100	89,500	86,800	74,958
Bend	52,800	52,029	50,650	35,635	33,740	32,220	30,630	29,425	27,555	20,447
Redmond	13,770	13,481	12,810	12,435	11,990	11,175	10,585	9,650	8,955	7,165
Sisters	975	959	840	850	805	775	775	765	765	708
Uninc.	49,055	48,898	42,400	55,980	54,665	53,830	52,110	49,660	49,525	46,638
DOUGLAS	100,500	100,399	100,850	100,300	99,100	98,600	97,700	97,100	96,400	94,649
Canyonville	1,295	1,293	1,350	1,340	1,285	1,265	1,235	1,245	1,230	1,219
Drain	1,020	1,021	1,155	1,145	1,140	1,115	1,110	1,100	1,105	1,086
Elkton	145	147	180	180	180	180	180	180	180	172
Glendale	860	855	770	770	765	730	730	725	715	707
Myrtle Creek	3,430	3,419	3,670	3,600	3,475	3,410	3,290	3,190	3,105	3,063
Oakland	955	954	875	870	870	870	870	860	860	844
Reedsport	4,370	4,378	4,855	4,860	4,835	4,860	4,860	4,865	4,875	4,796
Riddle	1,015	1,014	1,220	1,220	1,210	1,170	1,160	1,165	1,155	1,143
Roseburg	20,125	20,017	20,490	20,215	19,810	19,720	19,220	18,910	18,610	17,069
Sutherlin	6,720	6,669	6,930	6,690	6,360	5,995	5,830	5,690	5,315	5,020
Winston	4,640	4,613	4,655	4,480	4,265	4,170	4,075	3,985	3,885	3,773
Yoncalla	1,055	1,052	1,090	1,065	1,020	980	960	955	935	919
Uninc.	54,870	54,967	53,610	53,865	53,885	54,135	54,180	54,230	54,430	54,838

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

	July 1 Population Estimates	U.S. Census Count	July 1 Population Estimates							U.S. Census Count
County and City	**2000**	**4/1/00**	**1999**	**1998**	**1997**	**1996**	**1995**	**1994**	**1993**	**4/1/90**
GILLIAM	1,900	1,915	2,100	2,100	1,950	1,900	1,750	1,750	1,750	1,717
Arlington	525	524	535	530	500	485	460	460	475	425
Condon	760	759	835	830	800	790	760	735	725	635
Lonerock	25	24	25	25	25	25	25	20	15	11
Uninc.	590	608	705	715	625	600	505	535	535	646
GRANT	7,950	7,935	8,000	8,000	7,950	8,100	7,950	7,900	7,900	7,853
Canyon City	670	669	725	725	720	705	685	660	650	648
Dayville	140	138	185	185	185	185	185	170	165	144
Granite	25	24	25	25	25	25	20	15	10	8
John Day	1,820	1,821	2,010	2,015	1,930	1,940	1,900	1,900	1,905	1,857
Long Creek	230	228	235	260	240	240	235	240	245	249
Monument	150	151	160	165	185	185	180	175	175	162
Mt. Vernon	595	595	670	650	645	645	645	625	585	549
Prairie City	1,080	1,080	1,205	1,195	1,175	1,180	1,170	1,160	1,150	1,117
Seneca	225	223	215	230	230	230	230	215	205	191
Uninc.	3,015	3,006	2,570	2,550	2,615	2,765	2,700	2,740	2,810	2,928
HARNEY	7,600	7,609	7,600	7,600	7,500	7,500	7,050	6,900	6,900	7,060
Burns	3,070	3,064	2,945	3,015	2,975	2,935	2,890	2,870	2,870	2,913
Hines	1,630	1,623	1,535	1,550	1,505	1,480	1,445	1,445	1,435	1,452
Uninc.	2,900	2,922	3,120	3,035	3,020	3,085	2,715	2,585	2,595	2,695
HOOD RIVER	20,500	20,411	19,700	19,500	19,200	19,000	18,700	18,400	17,900	16,903
Cascade Locks	1,120	1,115	1,085	1,095	1,075	1,050	1,045	1,035	1,025	930
Hood River	5,920	5,831	5,135	5,130	5,065	5,110	4,940	4,875	4,725	4,632
Uninc.	13,460	13,465	13,480	13,275	13,060	12,840	12,715	12,490	12,150	11,341
JACKSON	182,200	181,269	174,550	172,800	169,300	168,000	164,400	160,000	157,000	146,389
Ashland	19,610	19,522	19,490	19,220	18,560	18,360	17,985	17,725	17,445	16,252
Butte Falls	445	439	440	425	420	415	410	410	410	252
Central Point	12,665	12,493	11,700	11,255	10,750	10,295	9,620	8,930	8,540	7,512
Eagle Point	4,850	4,797	4,665	4,325	3,850	3,605	3,415	3,325	3,155	3,022
Gold Hill	1,075	1,073	1,225	1,240	1,230	1,240	1,235	1,235	1,225	980
Jacksonville	2,245	2,235	2,190	2,090	2,050	2,025	2,010	2,005	2,010	1,896
Medford	63,720	63,154	59,990	58,895	57,610	57,155	55,090	53,280	51,215	47,021
Phoenix	4,085	4,060	3,970	3,905	3,770	3,730	3,615	3,440	3,230	3,239
Rogue River	1,850	1,847	1,940	1,960	1,955	1,965	1,950	1,830	1,820	1,759
Shady Cove	2,340	2,307	2,345	2,315	2,205	2,135	1,950	1,715	1,555	1,351
Talent	5,670	5,589	5,065	5,050	5,010	4,765	4,530	4,205	4,010	3,274
Uninc.	63,645	63,753	61,530	62,120	61,890	62,310	62,590	61,900	62,385	59,831
JEFFERSON	19,150	19,009	17,650	17,400	17,100	16,900	16,100	15,400	14,900	13,676
Culver	805	802	835	850	835	795	715	660	640	570
Madras	5,130	5,078	5,080	5,005	4,940	4,770	4,675	4,290	4,020	3,443
Metolius	640	635	715	690	695	640	630	570	505	450
Uninc.	12,575	12,494	11,020	10,855	10,630	10,695	10,080	9,880	9,735	9,213
JOSEPHINE	76,050	75,726	73,400	73,000	73,000	72,000	71,100	68,100	66,600	62,649
Cave Junction	1,370	1,363	1,415	1,425	1,435	1,300	1,265	1,225	1,200	1,126
Grants Pass	23,170	23,003	20,935	20,590	20,535	20,255	19,660	18,830	18,435	17,503
Uninc.	51,510	51,360	51,050	50,985	51,030	50,445	50,175	48,045	46,965	44,020

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

County and City	July 1 Population Estimates 2000	U.S. Census Count 4/1/00	July 1 Population Estimates 1999	1998	1997	1996	1995	1994	1993	U.S. Census Count 4/1/90
KLAMATH	63,900	63,775	62,300	62,000	61,600	61,600	61,600	60,500	60,300	57,702
Bonanza	420	415	380	380	375	370	365	355	350	323
Chiloquin	715	715	795	795	775	755	710	700	690	673
Klamath Falls	19,510	19,462	19,060	18,940	18,830	18,765	18,680	18,405	18,230	17,737
Malin	635	638	760	760	755	750	755	740	740	725
Merrill	900	897	850	850	835	835	835	835	835	837
Uninc.	41,720	41,648	40,455	40,275	40,030	40,125	40,255	39,465	39,455	37,407
LAKE	7,450	7,422	7,400	7,400	7,400	7,550	7,550	7,400	7,350	7,186
Lakeview	2,475	2,474	2,625	2,640	2,645	2,655	2,645	2,575	2,555	2,526
Paisley	245	247	365	365	360	345	345	345	345	350
Uninc.	4,730	4,701	4,410	4,395	4,395	4,550	4,560	4,480	4,450	4,310
LANE	323,950	322,959	315,700	313,000	308,500	305,800	301,900	300,000	298,000	282,912
Coburg	975	969	795	790	785	775	770	760	755	763
Cottage Grove	8,475	8,445	8,315	8,190	8,005	7,870	7,745	7,655	7,595	7,403
Creswell	3,625	3,579	3,280	3,150	2,875	2,715	2,610	2,560	2,460	2,431
Dunes City	1,245	1,241	1,290	1,265	1,255	1,240	1,220	1,200	1,185	1,081
Eugene	138,615	137,893	136,490	133,460	129,300	126,325	121,905	120,560	119,235	112,733
Florence	7,340	7,263	6,865	6,715	6,570	6,400	6,185	6,005	5,705	5,171
Junction City	4,750	4,721	4,570	4,400	4,285	4,115	4,090	3,845	3,780	3,692
Lowell	860	857	1,095	1,075	1,010	955	955	840	815	785
Oakridge	3,150	3,148	3,365	3,260	3,240	3,200	3,175	3,195	3,165	3,063
Springfield	53,215	52,864	52,945	51,700	50,670	50,140	49,005	47,740	46,715	44,664
Veneta	2,760	2,755	2,935	2,950	2,870	2,845	2,785	2,660	2,605	2,519
Westfir	275	276	290	280	280	280	280	280	280	278
Uninc.	98,665	98,948	93,465	95,765	97,355	98,940	101,175	102,700	103,705	98,329
LINCOLN	44,600	44,479	43,350	43,200	42,500	42,200	41,800	41,000	40,000	38,889
Depoe Bay	1,180	1,174	1,150	1,100	1,060	1,045	1,025	985	940	870
Lincoln City	7,480	7,437	6,890	6,855	6,785	6,665	6,570	6,335	6,195	5,903
Newport	9,565	9,532	10,290	10,240	9,960	9,785	9,495	9,075	8,885	8,437
Siletz	1,135	1,133	1,190	1,200	1,180	1,170	1,110	1,085	1,060	992
Toledo	3,480	3,472	3,605	3,590	3,495	3,465	3,400	3,340	3,310	3,174
Waldport	2,065	2,050	1,885	1,845	1,805	1,750	1,705	1,700	1,700	1,595
Yachats	620	617	695	685	665	655	645	625	600	533
Uninc.	19,075	19,064	17,645	17,685	17,550	17,665	17,850	17,855	17,310	17,385
LINN	103,350	103,069	103,000	102,200	100,700	100,000	98,100	96,300	96,100	91,227
Albany*	41,145	40,852	40,010	38,925	37,830	37,095	36,205	35,020	34,350	33,523
Brownsville	1,455	1,449	1,495	1,445	1,430	1,415	1,390	1,385	1,345	1,281
Halsey	725	724	765	760	750	730	725	700	680	667
Harrisburg	2,820	2,795	2,715	2,535	2,310	2,205	2,130	2,030	1,990	1,939
Lebanon	13,010	12,950	12,610	12,480	12,190	11,995	11,780	11,450	11,250	10,950
Lyons	1,010	1,008	1,125	1,060	1,025	1,010	950	950	975	938
Mill City*	1,540	1,537	1,650	1,650	1,640	1,640	1,610	1,615	1,600	1,555
Millersburg	650	651	730	730	735	740	725	730	720	715
Scio	695	695	655	655	685	665	655	650	645	623
Sodaville	295	290	275	280	265	260	245	240	220	192
Sweet Home	8,050	8,016	7,970	7,815	7,545	7,450	7,350	7,235	7,090	6,850
Tangent	945	933	1,060	1,045	960	850	695	665	660	556
Waterloo	240	239	270	240	220	220	220	190	190	191
Uninc.	36,090	36,219	36,780	37,470	37,806	38,226	37,774	37,675	38,517	35,400

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

	July 1 Population Estimates	U.S. Census Count	July 1 Population Estimates							U.S. Census Count
County and City	**2000**	**4/1/00**	**1999**	**1998**	**1997**	**1996**	**1995**	**1994**	**1993**	**4/1/90**
MALHEUR	31,750	31,615	30,700	29,200	28,700	28,700	28,200	28,100	27,500	26,038
Adrian	150	147	155	145	145	135	130	135	135	131
Jordan Valley	240	239	340	390	390	385	380	375	380	364
Nyssa	3,185	3,163	3,065	3,045	3,000	2,970	2,885	2,675	2,655	2,629
Ontario	11,030	10,985	10,910	10,680	10,510	10,290	9,980	9,830	9,680	9,394
Vale	1,990	1,976	1,655	1,505	1,515	1,510	1,495	1,495	1,495	1,491
Uninc.	15,155	15,105	14,575	13,435	13,140	13,410	13,330	13,590	13,155	12,029
MARION	286,300	284,834	275,250	271,900	267,700	262,800	258,000	252,800	247,400	228,483
Aumsville	3,050	3,003	2,965	2,875	2,820	2,585	2,285	1,975	1,840	1,650
Aurora	660	655	695	695	675	675	650	630	630	567
Detroit	260	262	375	380	380	370	365	360	345	331
Donald	620	608	720	700	630	580	480	425	410	316
Gates*	470	471	540	535	535	530	525	490	500	499
Gervais	2,045	2,009	1,535	1,370	1,220	1,080	995	1,000	1,025	992
Hubbard	2,500	2,483	2,255	2,210	2,205	2,185	2,045	2,015	1,965	1,881
Idanha*	230	232	370	300	300	315	290	290	300	289
Jefferson	2,505	2,487	2,380	2,335	2,300	2,145	2,020	1,870	1,835	1,805
Keizer	32,515	32,203	30,260	29,235	28,340	27,450	26,320	25,275	24,100	21,884
Mt. Angel	3,130	3,121	3,010	3,015	3,020	3,010	3,010	2,990	2,950	2,778
St. Paul	355	354	350	350	350	355	355	345	345	322
Salem*	137,785	136,924	128,595	126,635	124,190	120,835	118,355	116,950	113,325	107,793
Scotts Mills	315	312	315	315	315	310	310	310	300	283
Silverton	7,470	7,414	6,745	6,740	6,675	6,565	6,405	6,170	6,080	5,635
Stayton	6,870	6,816	6,710	6,655	6,290	6,035	5,905	5,630	5,490	5,011
Sublimity	2,170	2,148	2,490	2,400	2,145	1,985	1,915	1,800	1,715	1,491
Turner	1,200	1,199	1,345	1,330	1,330	1,330	1,320	1,320	1,315	1,281
Woodburn	20,310	20,100	16,850	16,585	16,150	15,780	15,475	15,235	14,375	13,404
Uninc.	79,655	79,732	82,775	82,865	82,914	83,264	83,111	81,585	82,073	72,919
MORROW	11,100	10,995	9,550	9,400	9,050	9,000	8,700	8,600	8,450	7,625
Boardman	2,910	2,855	3,070	2,795	2,685	2,580	2,550	2,145	2,000	1,387
Heppner	1,395	1,395	1,525	1,500	1,465	1,480	1,480	1,465	1,440	1,412
Ione	325	321	335	275	250	250	265	250	245	255
Irrigon	1,740	1,702	1,540	1,330	1,245	1,090	1,080	890	875	737
Lexington	265	263	335	305	295	295	290	285	285	286
Uninc.	4,465	4,459	2,745	3,195	3,110	3,305	3,035	3,565	3,605	3,548
MULTNOMAH	662,400	660,486	646,850	641,900	639,000	636,000	626,500	620,000	615,000	583,887
Fairview	8,055	7,561	6,270	5,910	5,200	4,670	4,245	3,740	3,735	2,391
Gresham	90,835	90,205	85,435	83,595	81,865	79,350	77,240	74,625	73,185	68,249
Maywood Park	780	777	780	790	795	795	790	780	780	781
Portland*	531,600	529,121	512,395	509,610	508,500	503,000	497,600	495,090	471,325	438,802
Troutdale	13,975	13,777	14,175	14,040	13,880	12,750	11,450	10,495	9,410	7,852
Wood Village	2,860	2,860	2,930	3,030	3,000	2,995	2,965	2,950	2,920	2,814
Uninc.	14,155	16,046	24,540	24,575	25,425	32,097	31,860	31,975	53,300	62,649
POLK	62,700	62,380	60,100	59,500	57,400	56,300	55,400	54,400	53,600	49,541
Dallas	12,550	12,459	12,870	12,530	12,020	11,360	10,850	10,545	10,045	9,422
Falls City	970	966	1,025	1,020	955	935	890	830	830	818
Independence	6,080	6,035	6,195	5,815	5,405	4,985	4,875	4,620	4,620	4,425
Monmouth	7,780	7,741	8,310	7,980	7,590	7,385	7,225	6,995	6,830	6,288
Uninc.	16,610	16,579	14,960	15,820	15,637	16,344	16,714	16,830	17,046	15,231

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

County and City	July 1 Population Estimates 2000	U.S. Census Count 4/1/00	July 1 Population Estimates 1999	1998	1997	1996	1995	1994	1993	U.S. Census Count 4/1/90
SHERMAN	1,950	1,934	1,900	1,900	1,900	1,900	1,900	1,900	1,850	1,918
Grass Valley	170	171	185	185	185	180	170	165	165	160
Moro	340	337	340	340	295	295	290	295	290	292
Rufus	270	268	310	310	290	290	295	290	290	295
Wasco	380	381	415	420	385	390	385	385	375	374
Uninc.	790	777	650	645	745	745	760	765	730	797
TILLAMOOK	24,300	24,262	24,100	24,000	23,800	23,800	23,300	22,900	22,900	21,570
Bay City	1,150	1,149	1,170	1,155	1,145	1,130	1,100	1,075	1,055	1,027
Garibaldi	900	899	990	970	980	960	950	935	930	886
Manzanita	565	564	800	795	785	755	715	690	650	513
Nehalem	205	203	230	230	235	235	235	230	235	232
Rockaway Beach	1,275	1,267	1,260	1,235	1,205	1,195	1,160	1,140	1,105	970
Tillamook	4,360	4,352	4,270	4,310	4,340	4,275	4,245	4,190	4,190	4,006
Wheeler	395	391	380	385	390	375	360	355	340	335
Uninc.	15,450	15,437	15,000	14,920	14,720	14,875	14,535	14,285	14,395	13,601
UMATILLA	70,850	70,548	68,000	67,100	65,500	65,500	65,200	64,000	63,000	59,249
Adams	300	297	275	275	265	260	260	250	240	223
Athena	1,225	1,221	1,280	1,200	1,120	1,105	1,080	1,050	1,025	997
Echo	655	650	675	640	605	590	585	560	550	500
Helix	185	183	190	190	190	185	170	160	160	150
Hermiston	13,260	13,154	12,165	11,960	11,340	11,050	10,605	10,330	10,215	10,047
Milton-Freewater	6,495	6,470	6,720	6,500	6,200	6,055	5,985	5,865	5,765	5,533
Pendleton	16,385	16,354	17,175	16,915	16,180	15,900	15,930	15,715	15,520	15,142
Pilot Rock	1,535	1,532	1,675	1,640	1,585	1,570	1,560	1,540	1,510	1,478
Stanfield	1,990	1,979	1,875	1,820	1,770	1,755	1,700	1,640	1,605	1,568
Ukiah	255	255	245	245	240	240	245	245	250	250
Umatilla	5,035	4,978	3,625	3,515	3,375	3,310	3,250	3,180	3,125	3,046
Weston	720	717	690	690	680	680	655	640	625	606
Uninc.	22,810	22,758	21,410	21,510	21,950	22,800	23,175	22,825	22,410	19,709
UNION	24,550	24,530	24,500	24,400	24,500	24,500	24,400	24,500	24,300	23,598
Cove	595	594	675	625	610	600	585	570	555	507
Elgin	1,655	1,654	1,785	1,770	1,745	1,715	1,680	1,655	1,635	1,586
Imbler	285	284	330	325	310	310	310	310	305	299
Island City	925	916	940	920	895	865	830	825	815	696
La Grande	12,340	12,327	12,885	12,795	12,700	12,415	12,370	12,195	12,050	11,766
North Powder	490	489	560	560	565	555	530	515	480	448
Summerville	115	117	150	150	150	150	150	150	145	142
Union	1,930	1,926	2,025	1,990	1,980	1,955	1,920	1,915	1,895	1,847
Uninc.	6,215	6,223	5,150	5,265	5,545	5,935	6,025	6,365	6,420	6,307
WALLOWA	7,250	7,226	7,200	7,200	7,300	7,250	7,250	7,200	7,200	6,911
Enterprise	1,895	1,895	2,050	2,050	2,035	2,020	2,010	1,990	1,965	1,905
Joseph	1,055	1,054	1,270	1,260	1,270	1,255	1,190	1,165	1,130	1,073
Lostine	265	263	230	230	235	235	230	230	230	231
Wallowa	870	869	830	745	755	755	755	755	760	748
Uninc.	3,165	3,145	2,820	2,915	3,005	2,985	3,065	3,060	3,115	2,954

Table 4. Population of Oregon and Its Counties and Incorporated Cities: April 1, 1990 to July 1, 2000 (continued)

	July 1 Population Estimates	U.S. Census Count	July 1 Population Estimates							U.S. Census Count
County and City	**2000**	**4/1/00**	**1999**	**1998**	**1997**	**1996**	**1995**	**1994**	**1993**	**4/1/90**
WASCO	23,850	23,791	22,650	22,600	22,600	22,500	22,600	22,500	22,500	21,683
Antelope	60	59	65	65	65	65	65	55	45	34
Dufur	590	588	625	620	620	605	600	580	565	527
Maupin	410	411	490	490	490	495	490	485	475	456
Mosier	415	410	360	335	305	290	290	275	250	244
Shaniko	25	26	30	30	30	30	30	30	25	26
The Dalles	12,185	12,156	11,880	11,765	11,600	11,460	11,355	11,325	11,325	11,021
Uninc.	10,165	10,141	9,200	9,295	9,490	9,555	9,770	9,750	9,815	9,375
WASHINGTON	449,250	445,342	404,750	397,600	385,000	376,500	370,000	359,500	351,000	311,554
Banks	1,310	1,286	1,310	845	625	570	575	570	570	563
Beaverton	77,050	76,129	68,010	68,050	66,225	63,145	61,720	61,085	60,000	53,307
Cornelius	9,760	9,652	8,490	8,170	7,845	7,475	7,220	6,750	6,550	6,148
Durham	1,400	1,382	1,535	1,555	1,565	1,575	1,510	1,270	800	748
Forest Grove	17,830	17,708	16,275	16,170	15,965	15,370	14,755	14,295	14,175	13,559
Gaston	600	600	605	615	620	620	625	610	605	563
Hillsboro	71,455	70,186	69,670	65,110	58,365	52,105	46,160	44,045	42,280	37,598
King City	1,945	1,949	2,095	2,125	2,140	2,155	2,170	2,155	2,085	2,060
North Plains	1,625	1,605	1,755	1,760	1,655	1,470	1,245	1,160	1,080	972
Sherwood	12,230	11,791	9,855	9,600	8,625	6,600	5,320	4,615	4,040	3,093
Tigard	42,260	41,223	37,670	37,200	36,680	35,925	35,000	33,730	32,145	29,435
Tualatin*	23,065	22,791	21,345	21,405	20,405	20,040	18,750	17,450	16,805	14,664
Uninc.	189,965	190,260	167,095	166,001	165,271	170,431	175,921	172,651	170,656	149,010
WHEELER	1,550	1,547	1,600	1,600	1,600	1,600	1,550	1,550	1,500	1,396
Fossil	470	469	545	530	500	515	485	470	465	399
Mitchell	170	170	200	200	185	180	175	165	165	163
Spray	140	140	165	165	160	160	165	155	155	149
Uninc.	770	768	690	705	755	745	725	760	715	685
YAMHILL	85,500	84,992	83,100	81,900	79,200	77,500	74,600	72,800	70,900	65,551
Amity	1,485	1,478	1,325	1,315	1,195	1,195	1,190	1,195	1,170	1,175
Carlton	1,520	1,514	1,555	1,525	1,500	1,470	1,400	1,345	1,340	1,289
Dayton	2,135	2,119	1,930	1,920	1,850	1,745	1,705	1,675	1,605	1,526
Dundee	2,625	2,598	2,880	2,735	2,620	2,500	2,300	2,135	1,890	1,663
Lafayette	2,630	2,586	2,240	2,140	1,945	1,795	1,445	1,370	1,325	1,292
McMinnville	26,760	26,499	24,420	24,265	23,485	22,880	22,140	20,995	20,070	17,894
Newberg	18,220	18,064	17,650	17,355	16,765	16,160	15,285	14,700	14,065	13,086
Sheridan	5,250	3,570	5,260	5,330	4,930	4,800	4,615	4,615	4,615	3,979
Willamina*	1,845	1,844	1,880	1,810	1,790	1,790	1,775	1,755	1,750	1,748
Yamhill	795	794	980	975	970	960	940	905	885	867
Uninc.	22,950	24,642	23,560	23,090	22,708	22,761	22,361	22,665	22,739	21,586

* Indicates city has population in more than one county

Table 5. Population Information on Incorporated Cities Located in More than One County

	July 1 estimates	Census Count	July 1 Population Estimates							Census Count
County and City	**2000**	**4/1/00**	**1999**	**1998**	**1997**	**1996**	**1995**	**1994**	**1993**	**4/1/90**
Albany	41,145	40,852	40,010	38,925	37,830	37,095	36,205	35,020	34,350	29,540
in Benton	5,140	5,104	4,980	4,740	4,540	4,350	4,200	4,075	3,975	15
in Linn	36,005	35,748	35,030	34,185	33,290	32,745	32,005	30,945	30,375	29,525
Gates	470	471	540	535	535	530	525	490	500	499
in Linn	40	42	45	45	45	44	44	40	41	41
in Marion	430	429	495	490	490	486	481	450	459	458
Idanha	230	232	370	300	300	315	290	290	300	289
in Linn	85	85	135	115	114	115	112	110	112	112
in Marion	145	147	235	185	186	200	178	180	188	177
Lake Oswego	35,415	35,278	34,110	34,280	34,065	34,005	33,145	32,940	32,555	30,576
in Clackamas	33,115	32,989	31,790	31,959	31,744	31,689	30,829	30,634	30,254	28,317
in Multnomah	2,285	2,274	2,315	2,315	2,315	2,310	2,310	2,300	2,295	2,253
in Washington	15	15	5	6	6	6	6	6	6	6
Mill City	1,540	1,527	1,650	1,650	1,640	1,640	1,610	1,615	1,600	1,555
in Linn	1,235	1,225	1,340	1,340	1,330	1,330	1,300	1,305	1,290	1,247
in Marion	305	312	310	310	310	310	310	310	310	308
Portland	531,600	529,121	512,395	509,610	508,500	503,000	497,600	495,090	471,325	438,802
in Clackamas	750	747	720	715	715	712	710	710	710	707
in Multnomah	529,455	526,986	510,405	507,645	506,520	501,033	495,640	493,135	469,375	436,898
in Washington	1,395	1,388	1,270	1,250	1,265	1,255	1,250	1,245	1,240	1,197
Rivergrove	325	324	310	300	300	300	300	300	300	294
in Clackamas	290	287	280	272	272	272	272	272	272	267
in Washington	35	37	30	28	28	28	28	28	28	27
Salem	137,785	136,924	128,595	126,635	124,190	120,835	118,355	116,950	113,325	107,793
in Marion	119,790	119,040	112,435	110,860	108,955	106,100	104,065	102,925	99,650	94,990
in Polk	17,995	17,884	16,160	15,775	15,235	14,735	14,290	14,025	13,675	12,803
Tualatin	23,065	22,791	21,345	21,405	20,405	20,040	18,750	17,450	16,805	14,664
in Clackamas	2,695	2,664	2,280	2,305	2,300	2,285	2,270	2,180	2,080	1,406
in Washington	20,370	20,127	19,065	19,100	18,105	17,755	16,480	15,270	14,725	13,258
Willamina	1,845	1,844	1,880	1,810	1,790	1,790	1,775	1,755	1,750	1,748
in Polk	715	716	580	560	558	556	556	555	554	554
in Yamhill	1,130	1,128	1,300	1,250	1,232	1,234	1,219	1,200	1,196	1,194
Wilsonville	14,365	13,991	12,985	12,290	10,940	10,600	9,765	9,680	9,580	7,106
in Clackamas	14,360	13,987	12,970	12,275	10,925	10,585	9,750	9,665	9,565	7,096
in Washington	5	4	15	15	15	15	15	15	15	10

Table 6. Rank of Incorporated Cities by July 1, 2000 Population Size

Portland	531,600	Monmouth	7,780	Jacksonville	2,245	Gearhart	985	Halfway	340
Eugene	138,615	Lincoln City	7,480	Vernonia	2,240	Sisters	975	Moro	340
Salem	137,785	Silverton	7,470	Sublimity	2,170	Coburg	975	Ione	325
Gresham	90,835	Prineville	7,410	Dayton	2,135	Falls City	970	Rivergrove	325
Beaverton	77,050	Florence	7,340	Waldport	2,065	Oakland	955	Scotts Mills	315
Hillsboro	71,455	Stayton	6,870	Gervais	2,045	Tangent	945	Adams	300
Medford	63,720	Sutherlin	6,720	Vale	1,990	Island City	925	Sodaville	295
Springfield	53,215	Milton-Freewater	6,495	Stanfield	1,990	Garibaldi	900	Imbler	285
Bend	52,800	Independence	6,080	King City	1,945	Merrill	900	Westfir	275
Corvallis	49,440	Hood River	5,920	Union	1,930	Wallowa	870	Rufus	270
Tigard	42,260	Seaside	5,915	Gold Beach	1,900	Glendale	860	Lexington	265
Albany	41,145	Molalla	5,710	Enterprise	1,895	Lowell	860	Lostine	265
Lake Oswego	35,415	Talent	5,670	Rogue River	1,850	Culver	805	Detroit	260
Keizer	32,515	Brookings	5,475	Willamina	1,845	Yamhill	795	Ukiah	255
McMinnville	26,760	Sandy	5,425	John Day	1,820	Maywood Park	780	Paisley	245
Oregon City	26,200	Sheridan	5,250	Irrigon	1,740	Condon	760	Waterloo	240
Grants Pass	23,170	Madras	5,130	Rainier	1,690	Powers	735	Jordan Valley	240
Tualatin	23,065	Umatilla	5,035	Elgin	1,655	Halsey	725	Idanha	230
West Linn	22,440	Scappoose	5,025	Hines	1,630	Weston	720	Long Creek	230
Milwaukie	20,540	Eagle Point	4,850	North Plains	1,625	Chiloquin	715	Seneca	225
Woodburn	20,310	Junction City	4,750	Cannon Beach	1,600	Scio	695	Nehalem	205
Roseburg	20,125	Happy Valley	4,650	Columbia City	1,595	Canyon City	670	Helix	185
Ashland	19,610	Winston	4,640	Mill City	1,540	Aurora	660	Sumpter	175
Klamath Falls	19,510	Reedsport	4,370	Pilot Rock	1,535	Echo	655	Mitchell	170
Newberg	18,220	Tillamook	4,360	Clatskanie	1,530	Millersburg	650	Grass Valley	170
Forest Grove	17,830	Coquille	4,185	Carlton	1,520	Metolius	640	Adrian	150
Pendleton	16,385	Warrenton	4,140	Amity	1,485	Johnson City	635	Monument	150
Coos Bay	15,380	Phoenix	4,085	Brownsville	1,455	Malin	635	Richland	150
Wilsonville	14,365	Philomath	3,880	Durham	1,400	Donald	620	Elkton	145
Troutdale	13,975	Creswell	3,625	Heppner	1,395	Yachats	620	Barlow	140
Redmond	13,770	Toledo	3,480	Cave Junction	1,370	Monroe	610	Dayville	140
Hermiston	13,260	Myrtle Creek	3,430	Lakeside	1,370	Gaston	600	Spray	140
Lebanon	13,010	Nyssa	3,185	Banks	1,310	Cove	595	Unity	130
Canby	12,910	Oakridge	3,150	Canyonville	1,295	Mt. Vernon	595	Summerville	115
Central Point	12,665	Mt. Angel	3,130	Rockaway Beach	1,275	Dufur	590	Prescott	70
Dallas	12,550	Burns	3,070	Dunes City	1,245	Manzanita	565	Antelope	60
La Grande	12,340	Aumsville	3,050	Athena	1,225	Adair Village	535	Lonerock	25
Sherwood	12,230	Boardman	2,910	Turner	1,200	Arlington	525	Shaniko	25
The Dalles	12,185	Bandon	2,860	Depoe Bay	1,180	Huntington	515	Granite	25
Gladstone	11,470	Wood Village	2,860	Port Orford	1,155	North Powder	490	Greenhorn	0
Ontario	11,030	Harrisburg	2,820	Bay City	1,150	Gates	470		
St. Helens	10,100	Veneta	2,760	Siletz	1,135	Fossil	470		
Baker City	9,880	Lafayette	2,630	Cascade Locks	1,120	Butte Falls	445		
Astoria	9,815	Dundee	2,625	Prairie City	1,080	Haines	425		
Cornelius	9,760	Jefferson	2,505	Gold Hill	1,075	Bonanza	420		
Newport	9,565	Hubbard	2,500	Joseph	1,055	Mosier	415		
North Bend	9,540	Lakeview	2,475	Yoncalla	1,055	Maupin	410		
Cottage Grove	8,475	Myrtle Point	2,445	Drain	1,020	Wheeler	395		
Fairview	8,055	Estacada	2,380	Riddle	1,015	Wasco	380		
Sweet Home	8,050	Shady Cove	2,340	Lyons	1,010	St. Paul	355		

Table 7. Alphabetical Listing of Incorporated Cities with Population for July1, 2000

	Certified Population Estimate July 1, 2000	Census Count April 1, 1990	Population Change 1990-2000	Percentage Change 1990-2000
Adair Village	535	554	-19	-3.4
Adams	300	223	77	34.5
Adrian	150	131	19	14.5
Albany	41,145	33,523	7,622	22.7
Amity	1,485	1,175	310	26.4
Antelope	60	34	26	75.9
Arlington	525	425	100	23.5
Ashland	19,610	16,252	3,358	20.7
Astoria	9,815	10,069	-254	-2.5
Athena	1,225	997	228	22.9
Aumsville	3,050	1,650	1,400	84.8
Aurora	660	567	93	16.4
Baker City	9,880	9,140	740	8.1
Bandon	2,860	2,224	636	28.6
Banks	1,310	563	747	132.7
Barlow	140	118	22	18.6
Bay City	1,150	1,027	123	12.0
Beaverton	77,050	53,307	23,743	44.5
Bend	52,800	20,447	32,353	158.2
Boardman	2,910	1,387	1,523	109.8
Bonanza	420	323	97	30.0
Brookings	5,475	4,400	1,075	24.4
Brownsville	1,455	1,281	174	13.6
Burns	3,070	2,913	157	5.4
Butte Falls	445	252	193	76.6
Canby	12,910	8,990	3,920	43.6
Cannon Beach	1,600	1,221	379	31.0
Canyon City	670	648	22	3.3
Canyonville	1,295	1,219	76	6.2
Carlton	1,520	1,289	231	17.9
Cascade Locks	1,120	930	190	20.4
Cave Junction	1,370	1,126	244	21.7
Central Point	12,665	7,512	5,153	68.6
Chiloquin	715	673	42	6.2
Clatskanie	1,530	1,629	-99	-6.1
Coburg	975	763	212	27.8
Columbia City	1,595	1,003	592	59.0
Condon	760	635	125	19.7
Coos Bay	15,380	15,076	304	2.0
Coquille	4,185	4,121	64	1.6
Cornelius	9,760	6,148	3,612	58.8
Corvallis	49,440	44,757	4,683	10.5
Cottage Grove	8,475	7,403	1,072	14.5
Cove	595	507	88	17.4
Creswell	3,625	2,431	1,194	49.1
Culver	805	570	235	41.2
Dallas	12,550	9,422	3,128	33.2
Dayton	2,135	1,526	609	39.9
Dayville	140	144	-4	-2.8
Depoe Bay	1,180	870	310	35.6
Detroit	260	331	-71	-21.3
Donald	620	316	304	96.2
Drain	1,020	1,086	-66	-6.1
Dufur	590	527	63	11.9
Dundee	2,625	1,663	962	57.8
Dunes City	1,245	1,081	164	15.2
Durham	1,400	748	652	87.2
Eagle Point	4,850	3,022	1,828	60.5
Echo	655	500	155	31.0
Elgin	1,655	1,586	69	4.4
Elkton	145	172	-27	-15.7
Enterprise	1,895	1,905	-10	-0.5
Estacada	2,380	2,016	364	18.1
Eugene	138,615	112,733	25,882	23.0
Fairview	8,055	2,391	5,664	236.9
Falls City	970	818	152	18.6
Florence	7,340	5,171	2,169	41.9
Forest Grove	17,830	13,559	4,271	31.5
Fossil	470	399	71	17.8
Garibaldi	900	886	14	1.6
Gaston	600	563	37	6.6
Gates	470	499	-29	-5.7
Gearhart	985	1,027	-42	-4.1
Gervais	2,045	992	1,053	106.1
Gladstone	11,470	10,152	1,318	13.0
Glendale	860	707	153	21.6
Gold Beach	1,900	1,546	354	22.9
Gold Hill	1,075	980	95	9.7
Granite	25	8	17	208.4
Grants Pass	23,170	17,503	5,667	32.4
Grass Valley	170	160	10	6.3
Greenhorn	0	N/A	N/A	N/A
Gresham	90,835	68,249	22,586	33.1
Haines	425	405	20	4.9
Halfway	340	311	29	9.3
Halsey	725	667	58	8.8
Happy Valley	4,650	1,519	3,131	206.1
Harrisburg	2,820	1,939	881	45.4
Helix	185	150	35	23.3
Heppner	1,395	1,412	-17	-1.2
Hermiston	13,260	10,047	3,213	32.0
Hillsboro	71,455	37,598	33,857	90.1
Hines	1,630	1,452	178	12.3
Hood River	5,920	4,632	1,288	27.8
Hubbard	2,500	1,881	619	32.9
Huntington	515	522	-7	-1.4
Idanha	230	289	-59	-20.4
Imbler	285	299	-14	-4.7
Independence	6,080	4,425	1,655	37.4
Ione	325	255	70	27.5
Irrigon	1,740	737	1,003	136.1
Island City	925	696	229	32.9
Jacksonville	2,245	1,896	349	18.4
Jefferson	2,505	1,805	700	38.8
John Day	1,820	1,857	-37	-2.0
Johnson City	635	586	49	8.4
Jordan Valley	240	364	-124	-34.1
Joseph	1,055	1,073	-18	-1.7
Junction City	4,750	3,692	1,058	28.7
Keizer	32,515	21,884	10,631	48.6
King City	1,945	2,060	-115	-5.6
Klamath Falls	19,510	17,737	1,773	10.0
La Grande	12,340	11,766	574	4.9
Lafayette	2,630	1,292	1,338	103.6
Lake Oswego	35,415	30,576	4,839	15.8
Lakeside	1,370	1,437	-67	-4.7
Lakeview	2,475	2,526	-51	-2.0
Lebanon	13,010	10,950	2,060	18.8
Lexington	265	286	-21	-7.3
Lincoln City	7,480	5,903	1,577	26.7

Table 7. Alphabetical Listing of Incorporated Cities with Population for July 1, 2000 (continued)

	Certified Population Estimate July 1, 2000	U.S. Census Count April 1, 1990	Population Change 1990-2000	Percentage Change 1990-2000
Lonerock	25	11	14	127.3
Long Creek	230	249	-19	-7.6
Lostine	265	231	34	14.7
Lowell	860	785	75	9.6
Lyons	1,010	938	72	7.7
Madras	5,130	3,443	1,687	49.0
Malin	635	725	-90	-12.4
Manzanita	565	513	52	10.1
Maupin	410	456	-46	-10.1
Maywood Park	780	781	-1	-0.1
McMinnville	26,760	17,894	8,866	49.5
Medford	63,720	47,021	16,699	35.5
Merrill	900	837	63	7.5
Metolius	640	450	190	42.2
Mill City	1,540	1,555	-15	-1.0
Millersburg	650	715	-65	-9.1
Milton-Freewater	6,495	5,533	962	17.4
Milwaukie	20,540	18,670	1,870	10.0
Mitchell	170	163	7	4.4
Molalla	5,710	3,637	2,073	57.0
Monmouth	7,780	6,288	1,492	23.7
Monroe	610	448	162	36.2
Monument	150	162	-12	-7.4
Moro	340	292	48	16.4
Mosier	415	244	171	70.2
Mt. Angel	3,130	2,778	352	12.7
Mt. Vernon	595	549	46	8.4
Myrtle Creek	3,430	3,063	367	12.0
Myrtle Point	2,445	2,712	-267	-9.9
Nehalem	205	232	-27	-11.6
Newberg	18,220	13,086	5,134	39.2
Newport	9,565	8,437	1,128	13.4
North Bend	9,540	9,614	-74	-0.8
North Plains	1,625	972	653	67.2
North Powder	490	448	42	9.4
Nyssa	3,185	2,629	556	21.1
Oakland	955	844	111	13.2
Oakridge	3,150	3,063	87	2.8
Ontario	11,030	9,394	1,636	17.4
Oregon City	26,200	14,698	11,502	78.3
Paisley	245	350	-105	-30.0
Pendleton	16,385	15,142	1,243	8.2
Philomath	3,880	2,983	897	30.1
Phoenix	4,085	3,239	846	26.1
Pilot Rock	1,535	1,478	57	3.9
Port Orford	1,155	1,025	130	12.7
Portland	531,600	438,802	92,798	21.1
Powers	735	682	53	7.8
Prairie City	1,080	1,117	-37	-3.3
Prescott	70	63	7	11.1
Prineville	7,410	5,355	2,055	38.4
Rainier	1,690	1,674	16	1.0
Redmond	13,770	7,165	6,605	92.2
Reedsport	4,370	4,796	-426	-8.9
Richland	150	161	-11	-6.8
Riddle	1,015	1,143	-128	-11.2
Rivergrove	325	294	31	10.5
Rockaway Beach	1,275	970	305	31.5
Rogue River	1,850	1,759	91	5.2
Roseburg	20,125	17,069	3,056	17.9
Rufus	270	295	-25	-8.5
Salem	137,785	107,793	29,992	27.8
Sandy	5,425	4,154	1,271	30.6
Scappoose	5,025	3,529	1,496	42.4
Scio	695	623	72	11.6
Scotts Mills	315	283	32	11.3
Seaside	5,915	5,359	556	10.4
Seneca	225	191	34	17.8
Shady Cove	2,340	1,351	989	73.2
Shaniko	25	26	-1	-3.8
Sheridan	5,250	3,979	1,271	31.9
Sherwood	12,230	3,093	9,137	295.4
Siletz	1,135	992	143	14.4
Silverton	7,470	5,635	1,835	32.6
Sisters	975	708	267	37.7
Sodaville	295	192	103	53.6
Spray	140	149	-9	-6.3
Springfield	53,215	44,664	8,551	19.1
St. Helens	10,100	7,535	2,565	34.0
St. Paul	355	322	33	10.2
Stanfield	1,990	1,568	422	26.9
Stayton	6,870	5,011	1,859	37.1
Sublimity	2,170	1,491	679	45.5
Summerville	115	142	-27	-19.0
Sumpter	175	119	56	47.1
Sutherlin	6,720	5,020	1,700	33.9
Sweet Home	8,050	6,850	1,200	17.5
Talent	5,670	3,274	2,396	73.2
Tangent	945	556	389	70.0
The Dalles	12,185	11,021	1,164	10.6
Tigard	42,260	29,435	12,825	43.6
Tillamook	4,360	4,006	354	8.8
Toledo	3,480	3,174	306	9.6
Troutdale	13,975	7,852	6,123	78.0
Tualatin	23,065	14,664	8,401	57.3
Turner	1,200	1,281	-81	-6.3
Ukiah	255	250	5	2.1
Umatilla	5,035	3,046	1,989	65.3
Union	1,930	1,847	83	4.5
Unity	130	87	43	49.4
Vale	1,990	1,491	499	33.5
Veneta	2,760	2,519	241	9.6
Vernonia	2,240	1,808	432	23.9
Waldport	2,065	1,595	470	29.5
Wallowa	870	748	122	16.3
Warrenton	4,140	2,681	1,459	54.4
Wasco	380	374	6	1.6
Waterloo	240	191	49	25.8
West Linn	22,440	16,389	6,051	36.9
Westfir	275	278	-3	-1.1
Weston	720	606	114	18.8
Wheeler	395	335	60	17.9
Willamina	1,845	1,748	97	5.5
Wilsonville	14,365	7,106	7,259	102.2
Winston	4,640	3,773	867	23.0
Wood Village	2,860	2,814	46	1.6
Woodburn	20,310	13,404	6,906	51.5
Yachats	620	533	87	16.3
Yamhill	795	867	-72	-8.3
Yoncalla	1,055	919	136	14.8

Table 8. Population Added to Incorporated Cities Due to Annexations: April 1, 1990 to July 1, 2000

Adair Village	3	Detroit	0	Ione	0	Nehalem	0	Springfield	459
Adams	0	Donald	0	Irrigon	3	Newberg	79	Stanfield	0
Adrian	0	Drain	15	Island City	36	Newport	72	Stayton	21
Albany	3,897	Dufur	0	Jacksonville	0	North Bend	0	Sublimity	0
Amity	0	Dundee	0	Jefferson	0	North Plains	0	Summerville	0
Antelope	0	Dunes City	0	John Day	0	North Powder	0	Sumpter	0
Arlington	0	Durham	0	Johnson City	0	Nyssa	235	Sutherlin	38
Ashland	2	Eagle Point	3	Jordan Valley	0	Oakland	0	Sweet Home	0
Astoria	5	Echo	0	Joseph	16	Oakridge	19	Talent	16
Athena	0	Elgin	0	Junction City	7	Ontario	40	Tangent	0
Aumsville	1	Elkton	0	Keizer	0	Oregon City	284	The Dalles	81
Aurora	47	Enterprise	0	King City	0	Paisley	0	Tigard	1,205
Baker	2	Estacada	3	Klamath Falls	149	Pendleton	0	Tillamook	14
Bandon	115	Eugene	333	La Grande	89	Philomath	330	Toledo	23
Banks	0	Fairview	378	Lafayette	0	Phoenix	50	Troutdale	6
Barlow	0	Falls City	0	Lake Oswego	281	Pilot Rock	17	Tualatin	101
Bay City	0	Florence	89	Lakeside	0	Port Orford	0	Turner	2
Beaverton	2,468	Forest Grove	47	Lakeview	0	Portland	47,227	Ukiah	0
Bend	17,040	Fossil	0	Lebanon	104	Powers	0	Umatilla	736
Boardman	6	Garibaldi	4	Lexington	0	Prairie City	0	Union	0
Bonanza	0	Gaston	8	Lincoln City	0	Prescott	0	Unity	0
Brookings	3	Gates	0	Lonerock	0	Prineville	324	Vale	1
Brownsville	0	Gearhart	111	Long Creek	0	Rainier	12	Veneta	0
Burns	0	Gervais	0	Lostine	0	Redmond	224	Vernonia	0
Butte Falls	0	Gladstone	18	Lowell	0	Reedsport	0	Waldport	4
Canby	45	Glendale	0	Lyons	3	Richland	2	Wallowa	0
Cannon Beach	1	Gold Beach	437	Madras	2	Riddle	4	Warrenton	0
Canyon City	1	Gold Hill	0	Malin	0	Rivergrove	0	Wasco	0
Canyonville	2	Granite	0	Manzanita	45	Rockaway Beach	0	Waterloo	0
Carlton	0	Grants Pass	90	Maupin	0	Rogue River	2	West Linn	41
Cascade Locks	0	Grass Valley	0	Maywood Park	0	Roseburg	1,363	Westfir	0
Cave Junction	16	Greenhorn	0	McMinnville	7	Rufus	0	Weston	0
Central Point	40	Gresham	2	Medford	784	St. Helens	74	Wheeler	0
Chiloquin	0	Haines	93	Merrill	0	St. Paul	0	Willamina	1
Clatskanie	1	Halfway	6	Metolius	6	Salem	403	Wilsonville	375
Coburg	0	Halsey	0	Mill City	0	Sandy	37	Winston	70
Columbia City	34	Hammond	0	Millersburg	0	Scappoose	49	Wood Village	3
Condon	0	Happy Valley	523	Milton-Freewater	6	Scio	13	Woodburn	21
Coos Bay	0	Harrisburg	6	Milwaukie	27	Scotts Mills	0	Yachats	0
Coquille	11	Helix	0	Mitchell	0	Seaside	132	Yamhill	0
Cornelius	6	Heppner	0	Molalla	8	Seneca	0	Yoncalla	2
Corvallis	15	Hermiston	173	Monmouth	11	Shady Cove	0		
Cottage Grove	38	Hillsboro	635	Monroe	0	Shaniko	0		
Cove	0	Hines	0	Monument	0	Sheridan	0		
Creswell	63	Hood River	95	Moro	0	Sherwood	39		
Culver	0	Hubbard	0	Mosier	0	Siletz	0		
Dallas	38	Huntington	0	Mt. Angel	0	Silverton	53		
Dayton	0	Idanha	0	Mt. Vernon	0	Sisters	111		
Dayville	0	Imbler	0	Myrtle Creek	19	Sodaville	0		
Depoe Bay	0	Independence	4	Myrtle Point	2	Spray	2		

Table 9. Population by Age and Sex for Oregon and Its Counties: July 1, 2000

	Total Population																			
	0-4	5-9	10-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	All Ages
OREGON	**224,027**	**235,548**	**243,199**	**147,312**	**98,208**	**231,425**	**234,926**	**237,938**	**256,938**	**272,054**	**272,524**	**236,889**	**173,773**	**131,949**	**113,094**	**107,180**	**95,462**	**66,626**	**57,676**	**3,436,750**
Baker	888	1,030	1,308	722	481	604	662	852	1,124	1,315	1,341	1,197	1,054	974	840	792	631	487	442	16,750
Benton	4,012	4,426	5,034	4,822	3,214	11,042	5,468	4,650	5,026	5,783	6,165	4,967	3,345	2,320	2,056	1,922	1,739	1,244	1,064	78,300
Clackamas	22,004	24,858	26,522	14,477	9,651	18,695	19,478	21,785	26,486	29,868	29,865	26,553	19,331	12,815	9,923	9,083	8,187	5,513	4,908	340,000
Clatsop	2,014	2,181	2,526	1,730	1,153	2,017	1,826	1,940	2,474	2,786	3,150	2,689	1,985	1,678	1,474	1,385	1,161	825	706	35,700
Columbia	2,794	3,267	3,700	1,929	1,286	2,038	2,256	2,831	3,444	3,745	3,713	3,268	2,560	1,789	1,438	1,287	1,067	749	539	43,700
Coos	3,053	3,579	4,345	2,672	1,781	2,798	2,845	3,197	4,133	4,887	5,130	4,770	4,020	3,566	3,268	3,035	2,488	1,735	1,499	62,800
Crook	1,267	1,382	1,493	853	569	1,022	1,081	1,107	1,261	1,466	1,391	1,429	1,126	1,019	827	762	546	402	298	19,300
Curry	865	1,086	1,332	688	459	649	682	862	1,197	1,502	1,635	1,581	1,512	1,502	1,495	1,521	1,328	746	558	21,200
Deschutes	7,149	7,941	8,720	4,752	3,168	6,306	7,182	7,603	8,782	9,775	9,750	8,540	6,403	5,276	4,426	3,964	3,149	2,036	1,680	116,600
Douglas	5,629	6,402	7,438	4,332	2,888	4,968	4,781	5,337	6,545	7,680	7,902	7,377	6,019	5,291	5,068	4,581	3,788	2,532	1,943	100,500
Gilliam	86	120	143	77	52	67	85	100	128	175	156	134	105	109	91	90	92	42	47	1,900
Grant	450	568	597	368	245	258	354	388	535	636	657	604	509	447	374	313	240	210	196	7,950
Harney	436	556	639	307	205	320	363	422	585	648	603	543	433	403	358	274	225	159	121	7,600
Hood River	1,503	1,622	1,626	896	597	1,175	1,341	1,398	1,598	1,692	1,598	1,215	908	697	670	610	539	412	403	20,500
Jackson	10,926	12,283	13,164	7,831	5,220	10,885	9,981	10,442	12,260	13,808	14,668	13,447	10,261	7,884	7,296	7,058	6,494	4,484	3,808	182,200
Jefferson	1,470	1,599	1,716	823	548	1,031	1,178	1,259	1,373	1,323	1,268	1,192	1,020	968	792	656	401	302	233	19,150
Josephine	4,055	4,816	5,448	2,985	1,990	3,154	3,396	3,891	4,787	5,543	5,903	5,709	4,907	4,164	4,018	3,745	3,519	2,178	1,842	76,050
Klamath	4,122	4,616	4,904	2,742	1,828	3,756	3,642	3,640	4,336	4,672	5,012	4,546	3,539	2,999	2,748	2,455	1,982	1,300	1,061	63,900
Lake	375	488	598	309	206	255	349	355	482	619	633	561	474	427	387	339	281	170	141	7,450
Lane	18,624	20,064	21,816	14,807	9,872	27,644	21,658	20,499	22,460	24,510	26,549	23,168	16,602	12,598	10,704	10,616	9,598	6,601	5,560	323,950
Lincoln	2,179	2,463	2,972	1,762	1,175	1,904	1,919	2,284	2,839	3,442	3,867	3,610	2,875	2,596	2,542	2,232	1,867	1,216	855	44,600
Linn	7,050	7,353	7,751	4,522	3,015	5,849	6,176	6,558	7,415	7,761	7,794	7,024	5,662	4,425	3,810	3,637	3,259	2,328	1,960	103,350
Malheur	2,393	2,451	2,414	1,508	1,005	2,354	2,025	2,114	2,266	2,210	2,187	1,772	1,484	1,222	1,095	1,071	883	695	599	31,750
Marion	22,005	21,812	21,268	13,285	8,857	20,636	20,361	20,102	20,836	20,947	20,127	17,618	12,985	10,081	8,782	8,459	7,804	5,449	4,886	286,300
Morrow	949	985	913	541	361	659	696	665	773	891	809	684	548	449	387	312	231	131	116	11,100
Multnomah	42,420	41,419	39,904	25,174	16,783	50,053	59,577	56,545	54,117	53,822	53,530	44,612	29,600	21,020	17,245	17,361	16,325	12,083	10,812	662,400
Polk	3,943	4,322	4,758	3,130	2,087	4,980	3,366	3,547	4,075	4,508	4,870	4,256	3,180	2,387	2,220	2,042	2,013	1,428	1,585	62,700
Sherman	100	127	187	88	58	72	64	84	138	167	156	136	118	100	89	111	73	45	38	1,950
Tillamook	1,156	1,493	1,644	989	659	1,033	1,081	1,234	1,544	1,854	1,945	1,884	1,558	1,422	1,377	1,346	974	623	484	24,300
Umatilla	5,305	5,546	5,375	3,319	2,213	4,613	4,731	4,713	5,289	5,295	5,267	4,380	3,340	2,746	2,221	2,192	1,897	1,319	1,090	70,850
Union	1,458	1,584	1,812	1,298	865	2,015	1,294	1,203	1,481	1,788	2,005	1,757	1,300	1,070	966	826	690	563	576	24,550
Wallowa	355	419	611	308	205	219	264	275	465	574	736	571	473	405	369	358	279	204	161	7,250
Wasco	1,560	1,629	1,750	1,010	674	1,202	1,225	1,326	1,584	1,867	1,856	1,776	1,309	1,110	991	953	907	600	519	23,850
Washington	35,419	34,615	32,009	17,873	11,916	30,505	38,202	38,879	38,514	37,581	33,833	28,043	19,122	13,030	10,153	9,241	8,565	6,213	5,539	449,250
Wheeler	72	77	110	67	45	31	50	75	84	88	124	108	139	121	109	101	71	40	35	1,550
Yamhill	5,941	6,368	6,650	4,318	2,879	6,618	5,287	5,776	6,503	6,825	6,329	5,167	3,964	2,837	2,486	2,451	2,168	1,561	1,373	85,500

Table 9. Population by Age and Sex for Oregon and Its Counties: July 1, 2000 (continued)

Male Population

	0-4	5-9	10-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	All Ages
OREGON	**114,639**	**120,759**	**124,797**	**75,593**	**50,395**	**118,645**	**121,654**	**122,658**	**129,741**	**134,653**	**135,302**	**117,969**	**85,653**	**64,559**	**53,382**	**48,739**	**40,472**	**26,198**	**17,854**	**1,703,661**
Baker	455	528	671	371	247	310	343	439	568	651	666	596	520	477	397	360	268	192	137	8,194
Benton	2,053	2,269	2,583	2,474	1,649	5,661	2,832	2,397	2,538	2,862	3,061	2,474	1,649	1,135	970	874	737	489	329	39,038
Clackamas	11,260	12,744	13,610	7,429	4,952	9,584	10,086	11,230	13,374	14,783	14,827	13,223	9,528	6,270	4,684	4,130	3,471	2,168	1,519	168,873
Clatsop	1,031	1,118	1,296	888	592	1,034	945	1,000	1,249	1,379	1,564	1,339	978	821	696	630	492	324	219	17,595
Columbia	1,430	1,675	1,899	990	660	1,045	1,168	1,459	1,739	1,854	1,843	1,628	1,262	875	679	585	453	295	167	21,704
Coos	1,562	1,835	2,229	1,371	914	1,434	1,473	1,648	2,087	2,419	2,547	2,375	1,982	1,745	1,543	1,380	1,055	682	464	30,745
Crook	648	709	766	438	292	524	560	571	637	726	690	711	555	499	390	346	232	158	92	9,543
Curry	442	557	683	353	236	333	353	444	604	744	812	787	746	735	706	691	563	293	173	10,255
Deschutes	3,658	4,071	4,475	2,438	1,626	3,233	3,719	3,919	4,434	4,838	4,841	4,253	3,156	2,581	2,089	1,802	1,335	801	520	57,790
Douglas	2,880	3,282	3,817	2,223	1,482	2,547	2,476	2,751	3,305	3,801	3,923	3,674	2,967	2,589	2,392	2,083	1,606	995	601	49,395
Gilliam	44	62	73	40	26	35	44	52	65	86	77	67	52	53	43	41	39	16	14	930
Grant	230	291	306	189	126	133	183	200	270	315	326	301	251	219	176	142	102	83	61	3,904
Harney	223	285	328	157	105	164	188	218	296	321	300	271	214	197	169	124	95	62	37	3,754
Hood River	769	832	834	460	307	602	694	721	807	838	793	605	448	341	316	277	229	162	125	10,159
Jackson	5,591	6,297	6,755	4,018	2,679	5,580	5,169	5,383	6,191	6,834	7,282	6,696	5,057	3,858	3,444	3,210	2,753	1,763	1,179	89,740
Jefferson	752	820	880	422	281	528	610	649	693	655	630	593	503	474	374	298	170	119	72	9,523
Josephine	2,075	2,469	2,796	1,531	1,021	1,617	1,759	2,006	2,417	2,743	2,931	2,843	2,419	2,037	1,897	1,703	1,492	857	570	37,182
Klamath	2,109	2,366	2,516	1,407	938	1,926	1,886	1,876	2,190	2,312	2,488	2,264	1,744	1,468	1,297	1,117	840	511	329	31,584
Lake	192	250	307	159	106	131	181	183	243	307	314	279	234	209	183	154	119	67	44	3,661
Lane	9,530	10,286	11,195	7,598	5,066	14,172	11,215	10,567	11,341	12,131	13,181	11,538	8,183	6,164	5,052	4,827	4,069	2,596	1,721	160,434
Lincoln	1,115	1,263	1,525	904	603	976	994	1,178	1,433	1,704	1,920	1,798	1,417	1,270	1,200	1,015	792	478	265	21,849
Linn	3,608	3,770	3,977	2,320	1,547	2,999	3,198	3,381	3,744	3,841	3,870	3,498	2,791	2,165	1,799	1,654	1,382	916	607	51,065
Malheur	1,225	1,257	1,239	774	516	1,207	1,049	1,090	1,144	1,094	1,086	882	731	598	517	487	375	273	185	15,728
Marion	11,260	11,182	10,914	6,817	4,545	10,579	10,544	10,363	10,521	10,368	9,993	8,774	6,401	4,932	4,145	3,847	3,309	2,143	1,512	142,148
Morrow	486	505	469	278	185	338	360	343	390	441	402	341	270	220	183	142	98	52	36	5,536
Multnomah	21,707	21,234	20,477	12,918	8,612	25,660	30,851	29,149	27,326	26,639	26,576	22,217	14,590	10,284	8,140	7,895	6,921	4,751	3,347	329,295
Polk	2,018	2,216	2,442	1,606	1,071	2,553	1,743	1,829	2,058	2,231	2,418	2,119	1,568	1,168	1,048	929	854	562	491	30,922
Sherman	51	65	96	45	30	37	33	43	70	83	78	68	58	49	42	50	31	18	12	957
Tillamook	591	766	843	508	338	529	560	636	780	918	966	938	768	696	650	612	413	245	150	11,906
Umatilla	2,715	2,843	2,758	1,703	1,135	2,365	2,450	2,430	2,671	2,621	2,615	2,181	1,646	1,343	1,048	997	804	519	337	35,182
Union	746	812	930	666	444	1,033	670	620	748	885	995	875	641	524	456	376	292	221	178	12,112
Wallowa	182	215	314	158	105	112	137	142	235	284	366	284	233	198	174	163	118	80	50	3,549
Wasco	798	835	898	519	346	616	634	684	800	924	921	885	645	543	468	434	385	236	161	11,731
Washington	18,125	17,746	16,425	9,172	6,114	15,639	19,783	20,042	19,448	18,601	16,797	13,965	9,425	6,375	4,792	4,202	3,631	2,443	1,715	224,440
Wheeler	37	40	57	35	23	16	26	39	42	44	62	54	69	59	52	46	30	16	11	755
Yamhill	3,040	3,265	3,413	2,216	1,477	3,393	2,738	2,978	3,283	3,378	3,142	2,573	1,954	1,388	1,173	1,114	919	614	425	42,483

Table 9. Population by Age and Sex for Oregon and Its Counties: July 1, 2000 (continued)

Female Population

	0-4	5-9	10-14	15-17	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	All Ages
OREGON	**109,388**	**114,790**	**118,403**	**71,720**	**47,813**	**112,780**	**113,272**	**115,280**	**127,197**	**137,401**	**137,223**	**118,920**	**88,120**	**67,390**	**59,712**	**58,440**	**54,990**	**40,429**	**39,822**	**1,733,089**
Baker	434	502	637	352	234	294	319	413	557	664	675	601	535	498	444	432	364	296	305	8,556
Benton	1,959	2,157	2,451	2,347	1,565	5,381	2,637	2,253	2,488	2,921	3,104	2,494	1,696	1,185	1,085	1,048	1,002	755	735	39,262
Clackamas	10,744	12,114	12,912	7,048	4,699	9,111	9,391	10,555	13,112	15,085	15,038	13,330	9,803	6,545	5,239	4,952	4,716	3,345	3,389	171,127
Clatsop	983	1,063	1,230	842	561	983	880	940	1,225	1,407	1,586	1,350	1,007	857	778	755	669	500	488	18,105
Columbia	1,364	1,592	1,801	939	626	993	1,088	1,372	1,705	1,891	1,870	1,641	1,298	914	759	702	615	455	372	21,996
Coos	1,491	1,744	2,115	1,301	867	1,364	1,372	1,549	2,046	2,468	2,583	2,394	2,039	1,821	1,726	1,655	1,433	1,053	1,035	32,055
Crook	619	674	727	415	277	498	521	536	624	740	700	717	571	521	437	415	315	244	206	9,757
Curry	422	529	648	335	223	316	329	417	592	759	823	794	767	767	790	829	765	453	385	10,945
Deschutes	3,491	3,870	4,245	2,313	1,542	3,073	3,463	3,684	4,347	4,937	4,909	4,287	3,247	2,694	2,337	2,161	1,814	1,235	1,160	58,810
Douglas	2,748	3,120	3,621	2,109	1,406	2,421	2,305	2,586	3,240	3,879	3,979	3,704	3,052	2,702	2,676	2,498	2,182	1,536	1,342	51,105
Gilliam	42	59	70	38	25	33	41	49	63	88	78	67	53	56	48	49	53	25	32	970
Grant	220	277	291	179	119	126	171	188	265	321	331	303	258	228	197	170	139	128	136	4,046
Harney	213	271	311	149	100	156	175	205	290	327	304	273	220	206	189	149	129	96	83	3,846
Hood River	734	790	792	436	291	573	646	677	791	855	805	610	460	356	354	332	311	250	278	10,341
Jackson	5,335	5,986	6,409	3,812	2,542	5,304	4,813	5,059	6,069	6,974	7,386	6,750	5,203	4,027	3,852	3,849	3,741	2,721	2,629	92,460
Jefferson	718	779	835	401	267	502	568	610	680	668	639	598	517	494	418	358	231	183	161	9,627
Josephine	1,980	2,347	2,652	1,453	969	1,537	1,638	1,885	2,370	2,799	2,972	2,866	2,488	2,127	2,121	2,042	2,027	1,322	1,272	38,868
Klamath	2,013	2,249	2,387	1,335	890	1,830	1,756	1,763	2,147	2,360	2,524	2,282	1,794	1,532	1,451	1,339	1,142	789	733	32,316
Lake	183	238	291	150	100	124	168	172	239	313	319	282	240	218	205	185	162	103	97	3,789
Lane	9,094	9,778	10,621	7,209	4,806	13,472	10,442	9,932	11,119	12,379	13,368	11,631	8,419	6,434	5,652	5,788	5,529	4,006	3,839	163,516
Lincoln	1,064	1,200	1,447	858	572	928	925	1,107	1,405	1,739	1,947	1,812	1,458	1,326	1,342	1,217	1,075	738	591	22,751
Linn	3,442	3,583	3,774	2,202	1,468	2,850	2,978	3,177	3,671	3,920	3,925	3,526	2,871	2,260	2,012	1,983	1,877	1,413	1,354	52,285
Malheur	1,169	1,195	1,175	734	490	1,147	977	1,024	1,122	1,116	1,101	890	752	624	578	584	509	421	414	16,022
Marion	10,744	10,629	10,354	6,468	4,312	10,056	9,817	9,739	10,315	10,579	10,134	8,844	6,585	5,148	4,637	4,612	4,495	3,306	3,374	144,152
Morrow	464	480	445	263	176	321	336	322	383	450	407	343	278	230	204	170	133	80	80	5,564
Multnomah	20,713	20,185	19,428	12,256	8,171	24,392	28,726	27,396	26,790	27,183	26,954	22,396	15,010	10,735	9,105	9,466	9,404	7,332	7,465	333,105
Polk	1,925	2,106	2,317	1,524	1,016	2,427	1,623	1,719	2,017	2,277	2,452	2,136	1,613	1,219	1,172	1,114	1,160	867	1,094	31,778
Sherman	49	62	91	43	28	35	31	41	68	85	79	68	60	51	47	60	42	28	26	993
Tillamook	564	728	800	482	321	503	521	598	765	936	979	946	790	726	727	734	561	378	334	12,394
Umatilla	2,590	2,703	2,617	1,616	1,077	2,248	2,281	2,284	2,618	2,674	2,652	2,199	1,694	1,402	1,172	1,195	1,093	800	752	35,668
Union	712	772	882	632	421	982	624	583	733	903	1,010	882	659	546	510	450	397	341	397	12,438
Wallowa	173	204	297	150	100	107	127	133	230	290	371	287	240	207	195	195	161	124	111	3,701
Wasco	762	794	852	492	328	586	591	643	784	943	934	892	664	567	523	520	523	364	359	12,119
Washington	17,294	16,869	15,584	8,702	5,801	14,866	18,420	18,837	19,066	18,980	17,036	14,078	9,697	6,655	5,360	5,038	4,934	3,770	3,825	224,810
Wheeler	35	38	54	33	22	15	24	36	42	45	63	54	71	62	58	55	41	24	24	795
Yamhill	2,901	3,103	3,238	2,102	1,401	3,225	2,549	2,799	3,219	3,447	3,187	2,594	2,010	1,449	1,312	1,336	1,249	947	948	43,017

Table 10. Population by Age Groups (Less than 18 Years of Age, 18 to 64 Years of Age, and 65 Years of Age and Older) for Oregon and Its Counties: July 1, 2000

	Ages 0-17		Ages 18-64		Ages 65+		
	Population	% of County	Population	% of County	Population	% of County	Total Population
OREGON	**850,087**	**24.7%**	**2,146,625**	**62.5%**	**440,038**	**12.8%**	**3,436,750**
Baker	3,949	23.6%	9,608	57.4%	3,193	19.1%	16,750
Benton	18,294	23.4%	51,981	66.4%	8,025	10.2%	78,300
Clackamas	87,860	25.8%	214,526	63.1%	37,613	11.1%	340,000
Clatsop	8,451	23.7%	21,698	60.8%	5,551	15.5%	35,700
Columbia	11,690	26.8%	26,930	61.6%	5,080	11.6%	43,700
Coos	13,648	21.7%	37,127	59.1%	12,024	19.1%	62,800
Crook	4,995	25.9%	11,469	59.4%	2,835	14.7%	19,300
Curry	3,971	18.7%	11,581	54.6%	5,648	26.6%	21,200
Deschutes	28,561	24.5%	72,785	62.4%	15,254	13.1%	116,600
Douglas	23,801	23.7%	58,788	58.5%	17,911	17.8%	100,500
Gilliam	427	22.5%	1,111	58.5%	362	19.1%	1,900
Grant	1,983	24.9%	4,634	58.3%	1,334	16.8%	7,950
Harney	1,939	25.5%	4,525	59.5%	1,136	14.9%	7,600
Hood River	5,647	27.5%	12,220	59.6%	2,633	12.8%	20,500
Jackson	44,204	24.3%	108,856	59.7%	29,140	16.0%	182,200
Jefferson	5,607	29.3%	11,160	58.3%	2,384	12.4%	19,150
Josephine	17,304	22.8%	43,444	57.1%	15,302	20.1%	76,050
Klamath	16,383	25.6%	37,970	59.4%	9,547	14.9%	63,900
Lake	1,770	23.8%	4,362	58.5%	1,318	17.7%	7,450
Lane	75,312	23.2%	205,560	63.5%	43,079	13.3%	323,950
Lincoln	9,376	21.0%	26,512	59.4%	8,713	19.5%	44,600
Linn	26,676	25.8%	61,679	59.7%	14,995	14.5%	103,350
Malheur	8,767	27.6%	18,640	58.7%	4,343	13.7%	31,750
Marion	78,370	27.4%	172,550	60.3%	35,380	12.4%	286,300
Morrow	3,388	30.5%	6,534	58.9%	1,178	10.6%	11,100
Multnomah	148,917	22.5%	439,658	66.4%	73,826	11.1%	662,400
Polk	16,154	25.8%	37,256	59.4%	9,290	14.8%	62,700
Sherman	501	25.7%	1,093	56.0%	356	18.3%	1,950
Tillamook	5,282	21.7%	14,215	58.5%	4,804	19.8%	24,300
Umatilla	19,545	27.6%	42,587	60.1%	8,719	12.3%	70,850
Union	6,152	25.1%	14,779	60.2%	3,620	14.7%	24,550
Wallowa	1,693	23.4%	4,186	57.7%	1,371	18.9%	7,250
Wasco	5,950	24.9%	13,928	58.4%	3,972	16.7%	23,850
Washington	119,916	26.7%	289,623	64.5%	39,710	8.8%	449,250
Wheeler	327	21.1%	866	55.9%	357	23.0%	1,550
Yamhill	23,277	27.2%	52,184	61.0%	10,039	11.7%	85,500

CITY OF BROOKINGS
MONTHLY WATER & SEWER RATES

Effective 7/1/14 Basic Monthly Rate $84.18 OCL $33.05 Meter Reading (Usage) = cubic feet 7.48 gallons = one cubic foot

Type	Location	Monthly Service Charge	Water	Sewer	SRF-Water	SRF-Sewer	SRF-Streets	SRF-Stormwater
Single Family	ICL	NONE	$11.51 + $2.49 per 100 cu ft	$58.88	$2.94	$3.76	$2.98	$4.11
Multi Family	ICL	NONE	$11.51 + $2.49 per 100 cu ft	$58.88 per unit	$2.94/unit	$3.76/unit	$2.98/unit	$4.11/unit
Single Family	OCL	NONE	$23.02 + $4.98 per 100 cu ft	**not provided**	$2.94	$0.00	$2.98	$4.11
Multi Family	OCL	NONE	$23.02 + $4.98 per 100 cu ft	**not provided**	$2.94/unit	$0.00	$2.98/unit	$4.11/unit
Gen Comm.	ICL	$3.32	$11.51 + $2.49 per 100 cu ft	$6.45 per 100 cu ft of water usage	$2.94*	$3.76*	$2.98*	$4.11*
Restaurant	ICL	$3.32	$11.51 + $2.49 per 100 cu ft	$7.33 per 100 cu ft of water usage	$2.94*	$3.76*	$2.98*	$4.11*
Industrial (Mill)	ICL	$3.32	$11.51 + $2.49 per 100 cu ft	$11.44 per 100 cu ft of water usage	$2.94*	$3.76*	$2.98*	$4.11*
Schools	ICL	$3.32	$11.51 + $2.49 per 100 cu ft	$3.83 per 100 cu ft of water usage	$2.94*	$3.76*	$2.98*	$4.11*
Churches	ICL	$3.32	$11.51 + $2.49 per 100 cu ft	$3.72 per 100 cu ft of water usage	$2.94*	$3.76*	$2.98*	$4.11*
Commercial	OCL	$3.32	$23.02 + $4.98 per 100 cu ft	**not provided**	$2.94*	$0.00	$2.98*	$4.11*
					*Equivalent Dwelling Unit			

Service Deposit Fees:

Owner - Single Family Home or Single Business

Renter - Single Family Home or Single Business

LATE FEE $15.00
SHUT OFF FEE $35.00

Water

$0.00 **PER UNIT Low Risk**
$200.00 **PER UNIT Medium Risk**
$300.00 **PER UNIT High Risk**

$0.00 **PER UNIT Low Risk**
$200.00 **PER UNIT Medium Risk**
$300.00 **PER UNIT High Risk**

Sewer Service
Account Setup Fee
$20.00 nonrefundable

$20.00 nonrefundable

Vacation Rates

Inside City Limits $35.00 Turn Off/On

Outside City Limits $45.00 Turn Off/On

Fire Hydrant $4.98/100 cu ft
Cleaning Water $35.00/14 calendar days water service

T:\Accounts Receivable\Utility AR\Monthly Water and Sewer Rates

CITY OF BROOKINGS
WASTEWATER FUND

RESOURCES

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION RESOURCES & REQUIREMENTS	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
0	0	568,000	NET WORKING CAPITAL	25-09-4910	815,000	815,000	844,000
2,026,564	2,140,237	2,266,500	UTILITY USER FEES	25-04-4160	2,410,000	2,410,000	2,410,000
6,016	10,902	9,000	UTILITY CONNECTION FEES	25-04-4165	9,000	9,000	9,000
292,734	294,709	323,000	HSD CHARGES FOR SERVICES	25-04-4170	317,000	317,000	317,000
52,790	47,997	52,000	HSD CHARGES FOR DEBT	25-04-4180	55,000	55,000	55,000
2,738	39,595	0	HSD CHARGES WW LOAN DEBT	25-04-4190	40,000	40,000	40,000
4,533	9,178	3,000	INTEREST INCOME	25-06-4115	1,000	1,000	1,000
2,049	0	0	OTHER REVENUE	25-06-4140	0	0	0
2,387,424	2,542,618	3,221,500	SUBTOTAL		3,647,000	3,647,000	3,676,000
2,387,424	2,542,618	3,221,500	TOTAL RESOURCES		3,647,000	3,647,000	3,676,000

CITY OF BROOKINGS
WASTEWATER FUND

EXPENDITURE SUMMARY

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION EXPENDITURES	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
			PERSONAL SERVICES:				
343,314	362,407	426,141	WASTEWATER COLLECTION		475,680	475,680	475,680
389,443	376,388	436,275	WASTEWATER TREATMENT		446,888	446,888	446,888
732,757	738,796	862,416	TOTAL PERSONAL SERVICES		922,568	922,568	922,568
			MATERIALS AND SERVICES:				
190,846	188,121	250,100	WASTEWATER COLLECTION		228,150	228,150	257,150
640,370	513,457	466,600	WASTEWATER TREATMENT		509,000	509,000	509,000
831,216	701,578	716,700	TOTAL MATERIAL AND SERVICES		737,150	737,150	766,150
			CAPITAL OUTLAY:				
28,547	126,135	24,900	WASTEWATER COLLECTION		36,900	36,900	36,900
187,424	1,462,948	302,400	WASTEWATER TREATMENT		636,900	636,900	636,900
215,971	1,589,083	327,300	TOTAL CAPITAL OUTLAY		673,800	673,800	673,800
			TRANSFERS OUT:				
231,806	146,328	30,647	TRANSFER OUT-GENERAL FUND	25-32-8505	35,299	35,299	35,299
20,000	0	0	TRANSFER OUT-GENERAL RESERVE	25-32-8560	0	0	0
737,323	964,926	1,032,488	TRANSFER OUT-WW LOAN FUND	25-32-8575	1,046,932	1,046,932	1,046,932
0	12,570	12,570	TRANSFER OUT - TECHNOLOGY FUND	25-32-8585	12,570	12,570	12,570
989,129	1,123,824	1,075,705	TOTAL TRANSFERS OUT		1,094,801	1,094,801	1,094,801
			CONTINGENCIES & RESERVES:				
0	0	239,379	WASTEWATER TREATMENT		218,681	218,681	218,681
0	0	239,379	TOTAL CONTINGENCIES & RESERVES		218,681	218,681	218,681
2,769,074	4,153,280	3,221,500	TOTAL FUND EXPENDITURES		3,647,000	3,647,000	3,676,000

CITY OF BROOKINGS
WASTEWATER FUND

WASTEWATER COLLECTION
EXPENDITURES

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION EXPENDITURES	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
			WASTEWATER COLLECTION				
			PERSONAL SERVICES:				
215,002	209,099	255,757	SALARIES & WAGES	25-31-5005	277,674	277,674	277,674
1,989	1,881	7,404	OVERTIME	25-31-5010	8,529	8,529	8,529
24,702	35,145	46,410	PERS	25-31-5015	63,838	63,838	63,838
16,866	17,308	20,130	FICA	25-31-5020	22,614	22,614	22,614
75,141	88,509	80,550	HEALTH INSURANCE	25-31-5025	85,795	85,795	85,795
9,402	10,294	15,523	WORKERS' COMPENSATION	25-31-5030	16,816	16,816	16,816
212	171	367	UNEMPLOYMENT	25-31-5035	414	414	414
343,314	362,407	426,141	TOTAL PERSONAL SERVICES		475,680	475,680	475,680
			MATERIALS AND SERVICES:				
4,662	6,133	7,500	OFFICE SUPPLIES	25-31-6005	7,500	7,500	7,500
0	268	3,000	EQUIPMENT MAINTENANCE	25-31-6015	5,000	5,000	5,000
1,776	1,834	2,400	UNIFORM ALLOWANCE	25-31-6025	2,400	2,400	2,400
41,553	48,647	42,000	OPERATING SUPPLIES	25-31-6030	40,000	40,000	40,000
6,146	1,542	6,500	MISC SAFETY SUPPLIES	25-31-6036	3,300	3,300	3,300
283	2,817	1,000	BUILDING MAINTENANCE	25-31-6040	1,000	1,000	1,000
0	0	5,000	PUMP STATION MAINTENANCE	25-31-6045	0	0	0
0	0	25,000	I/I PROGRAM	25-31-6050	25,000	25,000	49,000
0	0	17,000	GIS UPDATE/MAINTENANCE	25-31-6055	15,250	15,250	20,250
940	19,318	0	ENGINEERING SERVICES	25-31-6075	0	0	0
95,910	59,711	90,000	CONTRACT SERVICES	25-31-6090	70,000	70,000	70,000
27	126	500	ACCOUNT COLLECTION EXPENSE	25-31-6100	500	500	500
0	0	0	BANK FEES	25-31-6101	12,000	12,000	12,000
12,811	10,476	19,000	INSURANCE/BONDS	25-31-6115	15,000	15,000	15,000
2,226	1,991	2,500	TRAINING/TRAVEL	25-31-6120	2,500	2,500	2,500
21,895	34,826	28,000	UTILITIES	25-31-6130	28,000	28,000	28,000
618	433	700	COMMUNICATIONS	25-31-6135	700	700	700
190,846	188,121	250,100	TOTAL MATERIAL AND SERVICES		228,150	228,150	257,150
			CAPITAL OUTLAY:				
0	96,367	0	IMPROVEMENTS	25-31-7005	0	0	0
22,457	22,413	22,500	VEHICLE	25-31-7015	12,500	12,500	12,500
3,705	4,970	0	EQUIPMENT	25-31-7020	12,000	12,000	12,000
0	0	0	EMERGENCY REPAIRS	25-31-7030	10,000	10,000	10,000
2,384	2,384	2,400	TOWER LEASE	25-31-7036	2,400	2,400	2,400
28,547	126,135	24,900	TOTAL CAPITAL OUTLAY		36,900	36,900	36,900
562,707	676,663	701,141	TOTAL WASTEWATER COLLECTION		740,730	740,730	769,730

CITY OF BROOKINGS
WASTEWATER FUND

WASTEWATER TREATMENT
EXPENDITURES

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION EXPENDITURES	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
			WASTEWATER TREATMENT				
			PERSONAL SERVICES:				
251,997	227,080	276,469	SALARIES & WAGES	25-32-5005	269,998	269,998	269,998
2,806	3,581	7,202	OVERTIME	25-32-5010	7,152	7,152	7,152
35,164	45,850	55,976	PERS	25-32-5015	66,048	66,048	66,048
18,042	18,394	21,698	FICA	25-32-5020	21,208	21,208	21,208
74,430	73,955	65,359	HEALTH INSURANCE	25-32-5025	72,831	72,831	72,831
6,771	7,365	9,177	WORKERS' COMPENSATION	25-32-5030	9,262	9,262	9,262
234	163	394	UNEMPLOYMENT	25-32-5035	389	389	389
389,443	376,388	436,275	TOTAL PERSONAL SERVICES		446,888	446,888	446,888
			MATERIALS AND SERVICES:				
751	890	600	OFFICE SUPPLIES	25-32-6005	800	800	800
0	0	8,000	PERMITS	25-32-6010	8,000	8,000	8,000
0	0	10,000	EQUIPMENT OPERATION	25-32-6015	10,000	10,000	10,000
0	0	0	LABORATORY SUPPLIES	25-32-6020	10,000	10,000	10,000
2,515	2,377	2,000	UNIFORM ALLOWANCE	25-32-6025	2,000	2,000	2,000
78,839	97,610	72,000	OPERATING SUPPLIES	25-32-6030	65,000	65,000	65,000
3,389	3,360	5,000	SAFETY	25-32-6035	8,200	8,200	8,200
164	847	20,000	BUILDING MAINTENANCE	25-32-6040	10,000	10,000	10,000
0	0	0	PUMP MAINTENANCE	25-32-6045	15,000	15,000	15,000
277,052	192,772	100,000	CONTRACT SERVICES	25-32-6090	50,000	50,000	50,000
0	0	0	BIOSOLIDS DISPOSAL	25-32-6092	60,000	60,000	60,000
77,751	0	0	DEWATERING ENGINEERING	25-32-6095	0	0	0
10,406	26,585	15,000	CHEMICALS	25-32-6110	60,000	60,000	60,000
16,149	13,225	21,000	INSURANCE/BONDS	25-32-6115	18,000	18,000	18,000
1,310	3,253	4,500	TRAINING/TRAVEL	25-32-6120	4,500	4,500	4,500
166,542	166,306	201,000	UTILITIES	25-32-6130	180,000	180,000	180,000
5,501	6,233	7,500	COMMUNICATIONS	25-32-6135	7,500	7,500	7,500
640,370	513,457	466,600	TOTAL MATERIAL AND SERVICES		509,000	509,000	509,000
			CAPITAL OUTLAY:				
180,795	1,415,590	300,000	IMPROVEMENTS	25-32-7005	597,000	597,000	597,000
0	0	0	VEHICLE	25-32-7015	12,500	12,500	12,500
4,245	44,973	0	EQUIPMENT	25-32-7020	15,000	15,000	15,000
0	0	0	EMERGENCY REPAIRS	25-32-7030	10,000	10,000	10,000
2,384	2,384	2,400	TOWER LEASE	25-32-7036	2,400	2,400	2,400
187,424	1,462,948	302,400	TOTAL CAPITAL OUTLAY		636,900	636,900	636,900

CITY OF BROOKINGS
WASTEWATER FUND

WASTEWATER TREATMENT
EXPENDITURES

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION EXPENDITURES	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
			TRANSFERS OUT:				
231,806	146,328	30,647	TRANSFER OUT-GENERAL FUND	25-32-8505	35,299	35,299	35,299
20,000	0	0	TRANSFER OUT-GENERAL RESERVE	25-32-8560	0	0	0
737,323	964,926	1,032,488	TRANSFER OUT-WW LOAN FUND	25-32-8575	1,046,932	1,046,932	1,046,932
0	12,570	12,570	TRANSFER OUT - TECHNOLOGY FUND	25-32-8585	12,570	12,570	12,570
989,129	1,123,824	1,075,705	TOTAL TRANSFERS OUT		1,094,801	1,094,801	1,094,801
			CONTINGENCIES & RESERVES:				
0	0	239,379	CONTINGENCY	25-32-9200	218,681	218,681	218,681
0	0	239,379	TOTAL CONTINGENCIES & RESERVES		218,681	218,681	218,681
2,206,367	3,476,617	2,520,359	TOTAL WASTEWATER TREATMENT		2,906,270	2,906,270	2,906,270
2,769,074	4,153,280	3,221,500	TOTAL FUND EXPENDITURES		3,647,000	3,647,000	3,676,000

CITY OF BROOKINGS
WASTEWATER LOAN FUND

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION RESOURCES & REQUIREMENTS	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
0	0	1,003,000	NET WORKING CAPITAL	47-09-4910	1,123,000	1,123,000	1,123,000
5,397	909	3,000	INTEREST INCOME	47-06-4115	500	500	500
5,397	909	1,006,000	SUBTOTAL		1,123,500	1,123,500	1,123,500
			FUND TRANSFER IN:				
737,323	964,926	1,032,488	TRANSFER IN-WASTEWATER FUND	47-09-4520	1,046,932	1,046,932	1,046,932
227,960	300,000	200,000	TRANSFER IN-WASTEWATER SYS DEV	47-09-4590	75,000	75,000	75,000
965,283	1,264,926	1,232,488	TOTAL TRANSFERS IN		1,121,932	1,121,932	1,121,932
970,680	1,265,835	2,238,488	TOTAL RESOURCES		2,245,432	2,245,432	2,245,432
			EXPENDITURES				
			MATERIALS AND SERVICES:				
43,307	39,861	0	LEGAL/ADMINISTRATIVE SERVICES	47-10-6065	0	0	0
43,307	39,861	0	TOTAL MATERIAL AND SERVICES		0	0	0
			DEBT SERVICE:				
676,696	821,896	994,000	PRINCIPAL PAYMENTS	47-10-8005	900,681	900,681	900,681
325,792	358,680	242,000	INTEREST PAYMENTS	47-10-8010	222,035	222,035	222,035
1,002,488	1,180,576	1,236,000	TOTAL DEBT SERVICE		1,122,716	1,122,716	1,122,716
			CONTINGENCIES/UNAPPROPRIATED:				
0	0	1,002,488	DEQ RESERVE	47-10-9100	1,122,716	1,122,716	1,122,716
0	0	1,002,488	TOTAL CONTINGENCIES/UNAPPROPRIATE		1,122,716	1,122,716	1,122,716
1,045,795	1,220,437	2,238,488	TOTAL EXPENDITURES		2,245,432	2,245,432	2,245,432
1,045,795	1,220,437	2,238,488	TOTAL FUND EXPENDITURES		2,245,432	2,245,432	2,245,432

CITY OF BROOKINGS
WASTEWATER SYSTEM REPLACE FUND

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION RESOURCES & REQUIREMENTS	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
0	0	895,000	NET WORKING CAPITAL	53-09-4910	1,150,000	1,150,000	1,150,000
4,173	3,962	2,000	INTEREST INCOME	53-03-4115	500	500	500
106,194	108,918	108,000	SYSTEM REPLACEMENT FEES	53-03-4195	145,000	145,000	145,000
4,500	9,644	4,500	HSD INTERCEPTOR LINE REVENUE	53-03-4580	4,500	4,500	4,500
114,867	122,523	1,009,500	SUBTOTAL		1,300,000	1,300,000	1,300,000
114,867	122,523	1,009,500	TOTAL RESOURCES		1,300,000	1,300,000	1,300,000
			WASTEWATER SYSTEM REPLACEMENT				
			CAPITAL OUTLAY:				
0	0	106,229	B-H INTERCEPTOR LINE	53-43-7024	110,729	110,729	110,729
7,168	168,926	903,271	CONSTRUCTION	53-43-7025	851,891	851,891	851,891
0	0	0	EMERGENCY REPAIRS/IMPROVEMENTS	53-43-7030	300,000	300,000	300,000
7,168	168,926	1,009,500	TOTAL CAPITAL OUTLAY		1,262,620	1,262,620	1,262,620
			TRANSFERS OUT:				
0	0	0	TRANSFER OUT - STORM LOAN FUND	53-43-8550	37,380	37,380	37,380
0	0	0	TOTAL TRANSFERS OUT		37,380	37,380	37,380
7,168	168,926	1,009,500	TOTAL WASTEWATER SYSTEM REPLACEM		1,300,000	1,300,000	1,300,000
7,168	168,926	1,009,500	TOTAL FUND EXPENDITURES		1,300,000	1,300,000	1,300,000

CITY OF BROOKINGS
WASTEWATER SYSTEM DEVELOPMENT

SECOND PRECEDING YR 2010-11	FIRST PRECEDING YR 2011-12	ADOPTED BUDGET YR 2012-13	DESCRIPTION RESOURCES & REQUIREMENTS	ACCOUNT #	BUDGET FOR NEXT YEAR 2013-14 PROPOSED BY OFFICER	APPROVED BY COMMITTEE	ADOPTED BY GOVERNING BODY
0	0	490,000	NET WORKING CAPITAL	57-09-4910	990,000	990,000	990,000
16,184	12,449	2,000	INTEREST INCOME	57-03-4115	2,000	2,000	2,000
821	11,541	5,000	HSD SYSTEM DEVELOPMENT CHARGES	57-03-4200	5,000	5,000	5,000
67,558	27,559	10,000	IMPROVEMENT FEES	57-03-4205	10,000	10,000	10,000
23,834	18,344	1,000	INTEREST INCOME	57-04-4115	1,000	1,000	1,000
3,659	0	5,000	HSD SYSTEM REIMBURSEMENT FEES	57-04-4200	5,000	5,000	5,000
143,844	52,675	10,000	REIMBURSEMENT FEES	57-04-4205	10,000	10,000	10,000
255,900	122,569	523,000	SUBTOTAL		1,023,000	1,023,000	1,023,000
255,900	122,569	523,000	TOTAL RESOURCES		1,023,000	1,023,000	1,023,000
			IMPROVEMENT EXPENDITURES				
			CAPITAL OUTLAY:				
0	0	103,500	CONSTRUCTION	57-54-7025	302,500	302,500	302,500
0	0	103,500	TOTAL CAPITAL OUTLAY		302,500	302,500	302,500
0	0	103,500	TOTAL IMPROVEMENT EXPENDITURES		302,500	302,500	302,500
			REIMBURSEMENT EXPENDITURES				
			CAPITAL OUTLAY:				
0	0	219,500	CONSTRUCTION	57-55-7010	645,500	645,500	645,500
0	0	219,500	TOTAL CAPITAL OUTLAY		645,500	645,500	645,500
			TRANSFERS OUT:				
227,960	300,000	200,000	TRANSFER OUT-WW LOAN FUND	57-55-8575	75,000	75,000	75,000
227,960	300,000	200,000	TOTAL TRANSFERS OUT		75,000	75,000	75,000
227,960	300,000	419,500	TOTAL REIMBURSEMENT EXPENDITURES		720,500	720,500	720,500
227,960	300,000	523,000	TOTAL FUND EXPENDITURES		1,023,000	1,023,000	1,023,000

INVERTEBRATE ANIMALS			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Gonidea angulata	Western ridged mussel		
Lanx alta	Highcap lanx (snail)		
Juga orickensis	Redwood juga		
Juga sp. 9	Shasta juga		
Pomatiopsis binneyi	Robust walker		
Pomatiopsis chacei	Marsh walker		
Hochbergellus hirsutus	Sisters hesperian (snail)		
Monadenia fidelis beryllica	Green sideband (snail)		
Nebria gebleri siskiyouensis	Siskiyou gazelle beetle	SOC	
Hoplistoscelis heidemanni	Heidemann's damsel bug		
Platylygus pseudotsugae	Douglas-fir plant bug		
Callophrys johnsoni	Johnson's hairstreak (butterfly)		
Callophrys polios maritima	Seaside hoary elfin (butterfly)		
Plebejus saepiolus littoralis	Coastal greenish blue (butterfly)	SOC	
Polites mardon	Mardon skipper (butterfly)	C	
Namamyia plutonis	A caddisfly		
Rhyacophila haddocki	Haddock's rhyacophilan caddisfly	SOC	

NON-VASCULAR PLANTS AND FUNGI			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Arthrocardia silvae	Red marine alga		
Cryptopleura peltata	Marine red alga		
Desmarestia foliacea	Brown marine alga		
Dictyota binghamiae	Brown marine alga		
Farlowia compressa	Red marine alga		
Hollenbergia nigricans	Marine red alga		
Laminaria longipes	Brown marine alga		
Loranthophycus californica	Red marine alga		
Mazzaella californica	Red marine alga		
Microcladia coulteri	Red marine alga		
Pikea pinnata	Red marine alga		
Porphyra torta	Red marine alga		
Porphyropsis coccinea	Red marine alga		
Scinaia confusa	Red marine alga		
Scytosiphon gracilis	Brown marine alga		
Anastrophyllum minutum	Liverwort		
Calypogeia sphagnicola	Liverwort		
Cryptomitrium tenerum	Liverwort		
Phymatoceros phymatodes	Hornwort		
Andreaea schofieldiana	Moss		
Bryum calobryoides	Moss		
Encalypta brevicolla	Moss		
Encalypta brevipes	Moss		
Grimmia anomala	Moss		
Limbella fryei	Moss	SOC	C
Orthodontium gracile	Moss		
Orthodontium pellucens	Moss		
Pseudoleskeella serpentinensis	Moss		
Triquetrella californica	Moss		
Anaptychia crinalis	Lichen		
Bryoria pseudocapillaris	Lichen		
Buellia oidalea	Lichen		
Cladidium bolanderi	Lichen		
Lecanora caesiorubella ssp. merrillii	Lichen		
Niebla cephalota	Lichen		
Pyrrhospora quernea	Lichen		
Ramalina pollinaria	Lichen		
Sigridea californica	Lichen		
Stenocybe clavata	Lichen		
Teloschistes flavicans	Lichen		
Usnea schadenbergiana	Lichen		
Albatrellus avellaneus	Fungus		
Arcangeliella camphorata	Fungus		
Leucogaster microsporus	Fungus		
Macowanites chlorinosmus	Fungus		
Rhizopogon flavofibrillosus	Fungus		
Rhizopogon truncatus	Fungus		

VASCULAR PLANTS AND FUNGI			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Abronia latifolia	Yellow sandverbena		
Abronia umbellata ssp. breviflora	Pink sandverbena	SOC	LE
Adiantum jordanii	California maiden-hair		
Agrostis densiflora	California bentgrass		
Allium bolanderi var. bolanderi	Bolander onion		
Arabis koehleri var. stipitata	Koehler's stipitate rockcress		
Arabis macdonaldiana	Red Mountain rockcress	LE	LE
Arctostaphylos hispidula	Gasquet manzanita	SOC	
Artemisia pycnocephala	Coastal sagewort		
Astragalus umbraticus	Woodland milk-vetch		
Baccharis douglasii	Marsh baccharis		
Bensoniella oregana	Bensonia	SOC	C
Brodiaea terrestris	Dwarf brodiaea		
Calochortus howellii	Howell's mariposa-lily	SOC	LT
Cardamine nuttallii var. gemmata	Purple toothwort		C
Carex abrupta	Abrupt-beaked sedge		
Carex barbarae	Santa Barbara sedge		
Carex brevicaulis	Short-stemmed sedge		
Carex gynodynama	Hairy sedge		
Carex scabriuscula	Siskiyou sedge		
Castilleja brevilobata	Short-lobed red-paintbrush		
Castilleja mendocinensis	Mendocino coast paintbrush	SOC	
Castilleja wightii	Wight's paintbrush		
Cicendia quadrangularis	Timwort		
Clintonia andrewsiana	Andrew's bead-lily		
Cochlearia groenlandica	Scurvygrass		
Cryptantha leiocarpa	Seaside cryptantha		
Cyperus bipartitus	Shining cyperus		
Cypripedium californicum	California lady's-slipper		
Cypripedium fasciculatum	Clustered lady's-slipper	SOC	C
Darlingtonia californica	California pitcher-plant		
Dicentra formosa ssp. oregana	Oregon bleedingheart		
Dichelostemma ida-maia	Firecracker flower		
Draba howellii	Howell's whitlow-grass		C
Elymus glaucus ssp. virescens	Smooth wildrye		
Epilobium canum ssp. latifolium	California fire chalice		
Epilobium rigidum	Rigid willow-herb		
Ericameria arborescens	Golden fleece		
Erigeron cervinus	Siskiyou daisy	SOC	
Erigeron klamathensis	Klamath daisy		
Erigeron stanselliae	Stansell's daisy		
Eriogonum lobbii	Lobb's buckwheat		
Eriogonum nudum var. paralinum	Del Norte buckwheat		
Eriogonum pendulum	Waldo buckwheat		
Erysimum concinnum	Pacific wallflower	SOC	
Erythronium howellii	Howell's adder's-tongue		
Erythronium revolutum	Pink fawn-lily		
Eschscholzia caespitosa	Gold poppy		
Euonymus occidentalis	Western wahoo		
Festuca rubra ssp. mediana	Median red fescue		

Frasera umpquaensis	Umpqua swertia		C
Fritillaria glauca	Siskiyou fritillaria		
Galium californicum ssp. californicum	California bedstraw		
Gentiana setigera	Waldo gentian	SOC	C
Gilia millefoliata	Seaside gilia	SOC	
Gnaphalium californicum	California cudweed		
Hazardia whitneyi var. discoidea	Whitney's haplopappus		
Hesperevax sparsiflora var. brevifolia	Short-leaved evax		
Hieracium greenei	Greene's hawkweed		
Hieracium horridum	Shaggy hawkweed		
Horkelia sericata	Silky horkelia		
Hydrocotyle verticillata	Whorled marsh pennywort		
Iliamna latibracteata	California globe-mallow		
Kalmiopsis leachiana	Kalmiopsis		
Lasthenia ornduffii	Large-flowered goldfields	SOC	C
Lathyrus littoralis	Beach peavine		
Leucothoe davisiae	Sierra laurel		
Lewisia cotyledon var. howellii	Howell's lewisia		
Lewisia leeana	Lee's lewisia		
Lewisia oppositifolia	Opposite-leaved lewisia		
Lilium kelloggii	Kellogg's lily	SOC	
Lilium occidentale	Western lily	LE	LE
Lomatium engelmannii	Engelmann's desert-parsley		
Lupinus tracyi	Tracy's lupine		
Marsilea vestita	Hairy water-fern		
Microseris bigelovii	Coast microseris		
Microseris howellii	Howell's microseris		LT
Mimulus aurantiacus	Bush monkeyflower		
Mimulus douglasii	Douglas' monkeyflower		
Monardella purpurea	Siskiyou monardella	SOC	
Myrica gale	Sweet gale		
Myriophyllum sibiricum	Common water-milfoil		
Noccaea fendleri ssp. siskiyouense	Siskiyou Mountain pennycress		
Oenothera wolfii	Wolf's evening-primrose	SOC	LT
Persicaria punctata	Dotted smartweed		
Phacelia argentea	Silvery phacelia	SOC	LT
Phacelia malvifolia	Mallow-leaved phacelia		
Phalaris angusta	Narrow canarygrass		
Phalaris californica	California canarygrass		
Piperia elongata	Dense-flower rein orchid		
Poa piperi	Piper's bluegrass		
Poa stenantha	Narrow-flower bluegrass		
Poa unilateralis ssp. unilateralis	San Francisco bluegrass		
Polypodium calirhiza	Hotroot polypody		
Polystichum californicum	California sword-fern		
Prosartes parvifolia	Siskiyou fairy bells		
Pyrola dentata	Toothleaf pyrola		
Rhynchospora capitellata	Brownish beakrush		
Ribes divaricatum var. pubiflorum	Straggly gooseberry		
Rosa gymnocarpa var. serpentina	Serpentine dwarf rose		
Salix delnortensis	Del Norte willow		
Sanicula peckiana	Peck's sanicle		

Saxifragopsis fragarioides	Strawberry saxifrage		
Schoenoplectus subterminalis	Water clubrush		
Scirpus pendulus	Drooping bulrush		
Scoliopus bigelovii	California fetid adder's-tongue		
Sedum laxum ssp. heckneri	Heckner's stonecrop		
Senecio triangularis var. angustifolius	Bog groundsel		
Sidalcea malachroides	Maple-leaved sidalcea	SOC	
Sidalcea malviflora ssp. patula	Coast checker bloom	SOC	C
Silene hookeri ssp. bolanderi	Bolander's catchfly		
Silene lemmonii	Lemmon's catchfly		
Smilax californica	California smilax		
Solanum parishii	Parish's horse-nettle		
Streptanthus howellii	Howell's streptanthus		C
Triglochin striata	Three-ribbed arrow-grass		
Trillium kurabayashii	Giant purple trillium		
Triteleia hendersonii var. leachiae	Leach's brodiaea	SOC	C
Triteleia laxa	Ithuriel's spear		
Vancouveria chrysantha	Yellow vancouveria		
Viola langsdorfii	Aleutian viola		
Viola primulifolia ssp. occidentalis	Western bog violet	SOC	C

VERTEBRATE ANIMALS			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Anaxyrus boreas	Western toad		SV
Aneides ferreus	Clouded salamander		SV
Ascaphus truei	Coastal tailed frog	SOC	SV
Batrachoseps attenuatus	California slender salamander		
Plethodon elongatus	Del Norte salamander	SOC	SV
Rana aurora	Northern red-legged frog	SOC	SV
Rana boylii	Foothill yellow-legged frog	SOC	SC/SV
Rhyacotriton variegatus	Southern torrent salamander	SOC	SV
Accipiter gentilis	Northern goshawk	SOC	SV
Aechmophorus clarkii	Clark's grebe		
Aechmophorus occidentalis	Western grebe		
Aquila chrysaetos	Golden eagle		
Asio flammeus	Short-eared owl		
Brachyramphus marmoratus	Marbled murrelet	LT	LT
Branta hutchinsii leucopareia	Aleutian Canada goose		
Bucephala albeola	Bufflehead		
Cerorhinca monocerata	Rhinoceros auklet		SV
Charadrius nivosus nivosus	Western snowy plover	PS:LT	LT
Chordeiles minor	Common nighthawk		SC
Contopus cooperi	Olive-sided flycatcher	SOC	SV
Dryocopus pileatus	Pileated woodpecker		SV
Elanus leucurus	White-tailed kite		
Empidonax traillii brewsteri	Little willow flycatcher		SV
Falco peregrinus anatum	American peregrine falcon		SV
Falco peregrinus tundrius	Arctic peregrine falcon		SV
Fratercula cirrhata	Tufted puffin		SV
Haematopus bachmani	Black oystercatcher	SOC	SV
Haliaeetus leucocephalus	Bald eagle		SV
Histrionicus histrionicus	Harlequin duck	SOC	
Icteria virens	Yellow-breasted chat	SOC	SC
Melanerpes formicivorus	Acorn woodpecker	SOC	SV
Melanerpes lewis	Lewis's woodpecker	SOC	SC
Oceanodroma furcata	Fork-tailed storm-petrel		
Oreortyx pictus	Mountain quail	SOC	SV
Patagioenas fasciata	Band-tailed pigeon	SOC	
Pelecanus occidentalis californicus	California brown pelican		LE
Picoides albolarvatus	White-headed woodpecker	SOC	SC
Podiceps auritus	Horned grebe		
Podiceps grisegena	Red-necked grebe		SC
Progne subis	Purple martin	SOC	SC
Ptychoramphus aleuticus	Cassin's auklet		SV
Regulus satrapa	Golden-crowned kinglet		
Sialia mexicana	Western bluebird		SV
Sitta carolinensis aculeata	Slender-billed nuthatch		SV
Strix occidentalis caurina	Northern spotted owl	LT	LT

Sturnella neglecta	Western meadowlark		SC
Acipenser medirostris pop. 1	Green sturgeon (Southern DPS)	LT	
Acipenser medirostris pop. 2	Green sturgeon (Northern DPS)	SOC	
Entosphenus tridentatus	Pacific lamprey	SOC	SV
Lampetra richardsoni	Western brook lamprey		SV
Oncorhynchus clarkii pop. 1	Coastal cutthroat trout (Oregon Coast ESU)	SOC	
Oncorhynchus clarkii pop. 5	Coastal cutthroat trout (Southern Oregon/California Coasts ESU)	SOC	
Oncorhynchus kisutch pop. 2	Coho salmon (Southern Oregon/Northern California Coasts ESU)	LT	SV
Oncorhynchus kisutch pop. 3	Coho salmon (Oregon Coast ESU)	LT	SV
Oncorhynchus mykiss pop. 24	Steelhead (Klamath Mountains Province ESU, summer run)		SC/SV
Oncorhynchus mykiss pop. 25	Steelhead (Klamath Mountains Province ESU, winter run)		
Oncorhynchus mykiss pop. 30	Steelhead (Oregon Coast ESU, summer run)	SOC	SV
Oncorhynchus mykiss pop. 31	Steelhead (Oregon Coast ESU, winter run)	SOC	SV
Oncorhynchus tshawytscha pop. 25	Chinook salmon (Southern Oregon/Northern California Coast ESU, spring run)		SV
Oncorhynchus tshawytscha pop. 26	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)		SV
Thaleichthys pacificus	Eulachon	LT	
Arborimus albipes	White-footed vole	SOC	
Arborimus longicaudus	Red tree vole	PS:C	SV
Bassariscus astutus	Ringtail		SV
Canis lupus	Gray wolf	PS:LE	LE
Corynorhinus townsendii	Townsend's big-eared bat	SOC	SC
Enhydra lutris	Sea otter		LT
Eumetopias jubatus	Northern sea lion	LT	
Lasionycteris noctivagans	Silver-haired bat	SOC	SV
Lasiurus cinereus	Hoary bat		SV
Martes caurina pop 3	Pacific Marten - Coastal Population		SV
Myotis californicus	California myotis		SV
Myotis evotis	Long-eared myotis	SOC	
Myotis thysanodes	Fringed myotis	SOC	SV
Myotis volans	Long-legged myotis	SOC	SV
Myotis yumanensis	Yuma myotis	SOC	
Pekania pennanti	Fisher	PS:C	SC
Sciurus griseus	Western gray squirrel		SV
Thomomys bottae detumidus	Pistol River pocket gopher	SOC	

Thomomys mazama helleri	Gold Beach pocket gopher	SOC	
Ursus arctos horribilis	Grizzly bear	LT	
Actinemys marmorata	Western pond turtle	SOC	SC
Crotalus oreganus	Western rattlesnake		SC
Lampropeltis getula	Common kingsnake	SOC	SV
Lampropeltis zonata	California mountain kingsnake	SOC	SV

INVERTEBRATE ANIMALS			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Gonidea angulata	Western ridged mussel		
Lanx alta	Highcap lanx (snail)		
Juga orickensis	Redwood juga		
Juga sp. 9	Shasta juga		
Pomatiopsis binneyi	Robust walker		
Pomatiopsis chacei	Marsh walker		
Hochbergellus hirsutus	Sisters hesperian (snail)		
Monadenia fidelis beryllica	Green sideband (snail)		
Nebria gebleri siskiyouensis	Siskiyou gazelle beetle	SOC	
Hoplistoscelis heidemanni	Heidemann's damsel bug		
Platylygus pseudotsugae	Douglas-fir plant bug		
Callophrys johnsoni	Johnson's hairstreak (butterfly)		
Callophrys polios maritima	Seaside hoary elfin (butterfly)		
Plebejus saepiolus littoralis	Coastal greenish blue (butterfly)	SOC	
Polites mardon	Mardon skipper (butterfly)	C	
Namamyia plutonis	A caddisfly		
Rhyacophila haddocki	Haddock's rhyacophilan caddisfly	SOC	

NON-VASCULAR PLANTS AND FUNGI			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Arthrocardia silvae	Red marine alga		
Cryptopleura peltata	Marine red alga		
Desmarestia foliacea	Brown marine alga		
Dictyota binghamiae	Brown marine alga		
Farlowia compressa	Red marine alga		
Hollenbergia nigricans	Marine red alga		
Laminaria longipes	Brown marine alga		
Loranthophycus californica	Red marine alga		
Mazzaella californica	Red marine alga		
Microcladia coulteri	Red marine alga		
Pikea pinnata	Red marine alga		
Porphyra torta	Red marine alga		
Porphyropsis coccinea	Red marine alga		
Scinaia confusa	Red marine alga		
Scytosiphon gracilis	Brown marine alga		
Anastrophyllum minutum	Liverwort		
Calypogeia sphagnicola	Liverwort		
Cryptomitrium tenerum	Liverwort		
Phymatoceros phymatodes	Hornwort		
Andreaea schofieldiana	Moss		
Bryum calobryoides	Moss		
Encalypta brevicolla	Moss		
Encalypta brevipes	Moss		
Grimmia anomala	Moss		
Limbella fryei	Moss	SOC	C
Orthodontium gracile	Moss		
Orthodontium pellucens	Moss		
Pseudoleskeella serpentinensis	Moss		
Triquetrella californica	Moss		
Anaptychia crinalis	Lichen		
Bryoria pseudocapillaris	Lichen		
Buellia oidalea	Lichen		
Cladidium bolanderi	Lichen		
Lecanora caesiorubella ssp. merrillii	Lichen		
Niebla cephalota	Lichen		
Pyrrhospora quernea	Lichen		
Ramalina pollinaria	Lichen		
Sigridea californica	Lichen		
Stenocybe clavata	Lichen		
Teloschistes flavicans	Lichen		
Usnea schadenbergiana	Lichen		
Albatrellus avellaneus	Fungus		
Arcangeliella camphorata	Fungus		
Leucogaster microsporus	Fungus		
Macowanites chlorinosmus	Fungus		
Rhizopogon flavofibrillosus	Fungus		
Rhizopogon truncatus	Fungus		

VASCULAR PLANTS AND FUNGI			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Abronia latifolia	Yellow sandverbena		
Abronia umbellata ssp. breviflora	Pink sandverbena	SOC	LE
Adiantum jordanii	California maiden-hair		
Agrostis densiflora	California bentgrass		
Allium bolanderi var. bolanderi	Bolander onion		
Arabis koehleri var. stipitata	Koehler's stipitate rockcress		
Arabis macdonaldiana	Red Mountain rockcress	LE	LE
Arctostaphylos hispidula	Gasquet manzanita	SOC	
Artemisia pycnocephala	Coastal sagewort		
Astragalus umbraticus	Woodland milk-vetch		
Baccharis douglasii	Marsh baccharis		
Bensoniella oregana	Bensonia	SOC	C
Brodiaea terrestris	Dwarf brodiaea		
Calochortus howellii	Howell's mariposa-lily	SOC	LT
Cardamine nuttallii var. gemmata	Purple toothwort		C
Carex abrupta	Abrupt-beaked sedge		
Carex barbarae	Santa Barbara sedge		
Carex brevicaulis	Short-stemmed sedge		
Carex gynodynama	Hairy sedge		
Carex scabriuscula	Siskiyou sedge		
Castilleja brevilobata	Short-lobed red-paintbrush		
Castilleja mendocinensis	Mendocino coast paintbrush	SOC	
Castilleja wightii	Wight's paintbrush		
Cicendia quadrangularis	Timwort		
Clintonia andrewsiana	Andrew's bead-lily		
Cochlearia groenlandica	Scurvygrass		
Cryptantha leiocarpa	Seaside cryptantha		
Cyperus bipartitus	Shining cyperus		
Cypripedium californicum	California lady's-slipper		
Cypripedium fasciculatum	Clustered lady's-slipper	SOC	C
Darlingtonia californica	California pitcher-plant		
Dicentra formosa ssp. oregana	Oregon bleedingheart		
Dichelostemma ida-maia	Firecracker flower		
Draba howellii	Howell's whitlow-grass		C
Elymus glaucus ssp. virescens	Smooth wildrye		
Epilobium canum ssp. latifolium	California fire chalice		
Epilobium rigidum	Rigid willow-herb		
Ericameria arborescens	Golden fleece		
Erigeron cervinus	Siskiyou daisy	SOC	
Erigeron klamathensis	Klamath daisy		
Erigeron stanselliae	Stansell's daisy		
Eriogonum lobbii	Lobb's buckwheat		
Eriogonum nudum var. paralinum	Del Norte buckwheat		
Eriogonum pendulum	Waldo buckwheat		
Erysimum concinnum	Pacific wallflower	SOC	
Erythronium howellii	Howell's adder's-tongue		
Erythronium revolutum	Pink fawn-lily		
Eschscholzia caespitosa	Gold poppy		
Euonymus occidentalis	Western wahoo		

Festuca rubra ssp. mediana	Median red fescue		
Frasera umpquaensis	Umpqua swertia		C
Fritillaria glauca	Siskiyou fritillaria		
Galium californicum ssp. californicum	California bedstraw		
Gentiana setigera	Waldo gentian	SOC	C
Gilia millefoliata	Seaside gilia	SOC	
Gnaphalium californicum	California cudweed		
Hazardia whitneyi var. discoidea	Whitney's haplopappus		
Hesperevax sparsiflora var. brevifolia	Short-leaved evax		
Hieracium greenei	Greene's hawkweed		
Hieracium horridum	Shaggy hawkweed		
Horkelia sericata	Silky horkelia		
Hydrocotyle verticillata	Whorled marsh pennywort		
Iliamna latibracteata	California globe-mallow		
Kalmiopsis leachiana	Kalmiopsis		
Lasthenia ornduffii	Large-flowered goldfields	SOC	C
Lathyrus littoralis	Beach peavine		
Leucothoe davisiae	Sierra laurel		
Lewisia cotyledon var. howellii	Howell's lewisia		
Lewisia leeana	Lee's lewisia		
Lewisia oppositifolia	Opposite-leaved lewisia		
Lilium kelloggii	Kellogg's lily	SOC	
Lilium occidentale	Western lily	LE	LE
Lomatium engelmannii	Engelmann's desert-parsley		
Lupinus tracyi	Tracy's lupine		
Marsilea vestita	Hairy water-fern		
Microseris bigelovii	Coast microseris		
Microseris howellii	Howell's microseris		LT
Mimulus aurantiacus	Bush monkeyflower		
Mimulus douglasii	Douglas' monkeyflower		
Monardella purpurea	Siskiyou monardella	SOC	
Myrica gale	Sweet gale		
Myriophyllum sibiricum	Common water-milfoil		
Noccaea fendleri ssp. siskiyouense	Siskiyou Mountain pennycress		
Oenothera wolfii	Wolf's evening-primrose	SOC	LT
Persicaria punctata	Dotted smartweed		
Phacelia argentea	Silvery phacelia	SOC	LT
Phacelia malvifolia	Mallow-leaved phacelia		
Phalaris angusta	Narrow canarygrass		
Phalaris californica	California canarygrass		
Piperia elongata	Dense-flower rein orchid		
Poa piperi	Piper's bluegrass		
Poa stenantha	Narrow-flower bluegrass		
Poa unilateralis ssp. unilateralis	San Francisco bluegrass		
Polypodium calirhiza	Hotroot polypody		
Polystichum californicum	California sword-fern		
Prosartes parvifolia	Siskiyou fairy bells		
Pyrola dentata	Toothleaf pyrola		
Rhynchospora capitellata	Brownish beakrush		
Ribes divaricatum var. pubiflorum	Straggly gooseberry		
Rosa gymnocarpa var. serpentina	Serpentine dwarf rose		
Salix delnortensis	Del Norte willow		

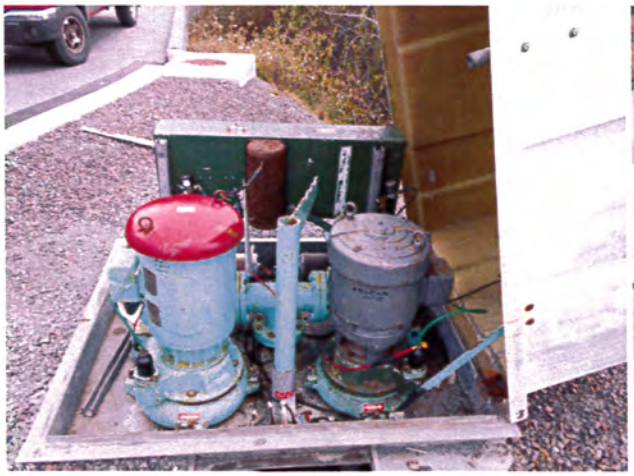
Sanicula peckiana	Peck's sanicle		
Saxifragopsis fragarioides	Strawberry saxifrage		
Schoenoplectus subterminalis	Water clubrush		
Scirpus pendulus	Drooping bulrush		
Scoliopus bigelovii	California fetid adder's-tongue		
Sedum laxum ssp. heckneri	Heckner's stonecrop		
Senecio triangularis var. angustifolius	Bog groundsel		
Sidalcea malachroides	Maple-leaved sidalcea	SOC	
Sidalcea malviflora ssp. patula	Coast checker bloom	SOC	C
Silene hookeri ssp. bolanderi	Bolander's catchfly		
Silene lemmonii	Lemmon's catchfly		
Smilax californica	California smilax		
Solanum parishii	Parish's horse-nettle		
Streptanthus howellii	Howell's streptanthus		C
Triglochin striata	Three-ribbed arrow-grass		
Trillium kurabayashii	Giant purple trillium		
Triteleia hendersonii var. leachiae	Leach's brodiaea	SOC	C
Triteleia laxa	Ithuriel's spear		
Vancouveria chrysantha	Yellow vancouveria		
Viola langsdorfii	Aleutian viola		
Viola primulifolia ssp. occidentalis	Western bog violet	SOC	C

VERTEBRATE ANIMALS			
Scientific Name	**Common Name**	**Federal Status**	**State Status**
Anaxyrus boreas	Western toad		SV
Aneides ferreus	Clouded salamander		SV
Ascaphus truei	Coastal tailed frog	SOC	SV
Batrachoseps attenuatus	California slender salamander		
Plethodon elongatus	Del Norte salamander	SOC	SV
Rana aurora	Northern red-legged frog	SOC	SV
Rana boylii	Foothill yellow-legged frog	SOC	SC/SV
Rhyacotriton variegatus	Southern torrent salamander	SOC	SV
Accipiter gentilis	Northern goshawk	SOC	SV
Aechmophorus clarkii	Clark's grebe		
Aechmophorus occidentalis	Western grebe		
Aquila chrysaetos	Golden eagle		
Asio flammeus	Short-eared owl		
Brachyramphus marmoratus	Marbled murrelet	LT	LT
Branta hutchinsii leucopareia	Aleutian Canada goose		
Bucephala albeola	Bufflehead		
Cerorhinca monocerata	Rhinoceros auklet		SV
Charadrius nivosus nivosus	Western snowy plover	PS:LT	LT
Chordeiles minor	Common nighthawk		SC
Contopus cooperi	Olive-sided flycatcher	SOC	SV
Dryocopus pileatus	Pileated woodpecker		SV
Elanus leucurus	White-tailed kite		
Empidonax traillii brewsteri	Little willow flycatcher		SV
Falco peregrinus anatum	American peregrine falcon		SV
Falco peregrinus tundrius	Arctic peregrine falcon		SV
Fratercula cirrhata	Tufted puffin		SV
Haematopus bachmani	Black oystercatcher	SOC	SV
Haliaeetus leucocephalus	Bald eagle		SV
Histrionicus histrionicus	Harlequin duck	SOC	
Icteria virens	Yellow-breasted chat	SOC	SC
Melanerpes formicivorus	Acorn woodpecker	SOC	SV
Melanerpes lewis	Lewis's woodpecker	SOC	SC
Oceanodroma furcata	Fork-tailed storm-petrel		
Oreortyx pictus	Mountain quail	SOC	SV
Patagioenas fasciata	Band-tailed pigeon	SOC	
Pelecanus occidentalis californicus	California brown pelican		LE
Picoides albolarvatus	White-headed woodpecker	SOC	SC
Podiceps auritus	Horned grebe		
Podiceps grisegena	Red-necked grebe		SC
Progne subis	Purple martin	SOC	SC
Ptychoramphus aleuticus	Cassin's auklet		SV
Regulus satrapa	Golden-crowned kinglet		
Sialia mexicana	Western bluebird		SV

Sitta carolinensis aculeata	Slender-billed nuthatch		SV
Strix occidentalis caurina	Northern spotted owl	LT	LT
Sturnella neglecta	Western meadowlark		SC
Acipenser medirostris pop. 1	Green sturgeon (Southern DPS)	LT	
Acipenser medirostris pop. 2	Green sturgeon (Northern DPS)	SOC	
Entosphenus tridentatus	Pacific lamprey	SOC	SV
Lampetra richardsoni	Western brook lamprey		SV
Oncorhynchus clarkii pop. 1	Coastal cutthroat trout (Oregon Coast ESU)	SOC	
Oncorhynchus clarkii pop. 5	Coastal cutthroat trout (Southern Oregon/California Coasts ESU)	SOC	
Oncorhynchus kisutch pop. 2	Coho salmon (Southern Oregon/Northern California Coasts ESU)	LT	SV
Oncorhynchus kisutch pop. 3	Coho salmon (Oregon Coast ESU)	LT	SV
Oncorhynchus mykiss pop. 24	Steelhead (Klamath Mountains Province ESU, summer run)		SC/SV
Oncorhynchus mykiss pop. 25	Steelhead (Klamath Mountains Province ESU, winter run)		
Oncorhynchus mykiss pop. 30	Steelhead (Oregon Coast ESU, summer run)	SOC	SV
Oncorhynchus mykiss pop. 31	Steelhead (Oregon Coast ESU, winter run)	SOC	SV
Oncorhynchus tshawytscha pop. 25	Chinook salmon (Southern Oregon/Northern California Coast ESU, spring run)		SV
Oncorhynchus tshawytscha pop. 26	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)		SV
Thaleichthys pacificus	Eulachon	LT	
Arborimus albipes	White-footed vole	SOC	
Arborimus longicaudus	Red tree vole	PS:C	SV
Bassariscus astutus	Ringtail		SV
Canis lupus	Gray wolf	PS:LE	LE
Corynorhinus townsendii	Townsend's big-eared bat	SOC	SC
Enhydra lutris	Sea otter		LT
Eumetopias jubatus	Northern sea lion	LT	
Lasionycteris noctivagans	Silver-haired bat	SOC	SV
Lasiurus cinereus	Hoary bat		SV
Martes caurina pop 3	Pacific Marten - Coastal Population		SV
Myotis californicus	California myotis		SV
Myotis evotis	Long-eared myotis	SOC	
Myotis thysanodes	Fringed myotis	SOC	SV
Myotis volans	Long-legged myotis	SOC	SV
Myotis yumanensis	Yuma myotis	SOC	
Pekania pennanti	Fisher	PS:C	SC
Sciurus griseus	Western gray squirrel		SV

Thomomys bottae detumidus	Pistol River pocket gopher	SOC	
Thomomys mazama helleri	Gold Beach pocket gopher	SOC	
Ursus arctos horribilis	Grizzly bear	LT	
Actinemys marmorata	Western pond turtle	SOC	SC
Crotalus oreganus	Western rattlesnake		SC
Lampropeltis getula	Common kingsnake	SOC	SV
Lampropeltis zonata	California mountain kingsnake	SOC	SV

APPENDIX E: **PHOTOS**



BEACH AVENUE LIFT STATION

BUENA VISTA LIFT STATION

CONSTITUTION WAY LIFT STATION

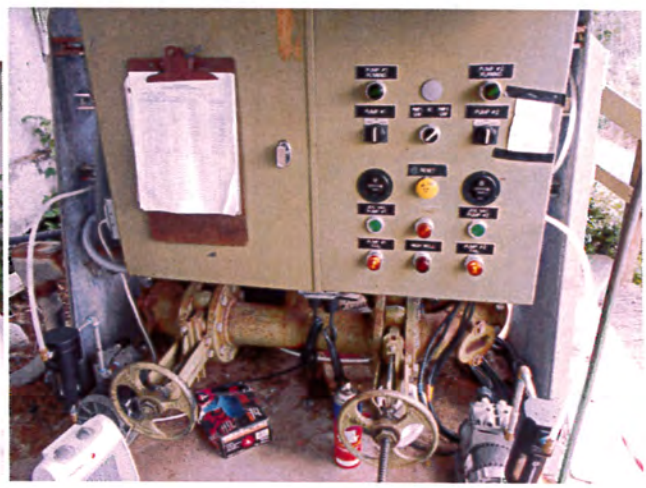
DAWSON Tract #1 Lift Station

DAWSON TRACT #2 LIFT STATION

DAWSON TRACT #3 LIFT STATION

DAWSON TRACT #4 LIFT STATION

DAWSON TRACT #5 LIFT STATION



MACKLYN COVE LIFT STATION

MILL BEACH LIFT STATION

RIVERVIEW LIFT STATION

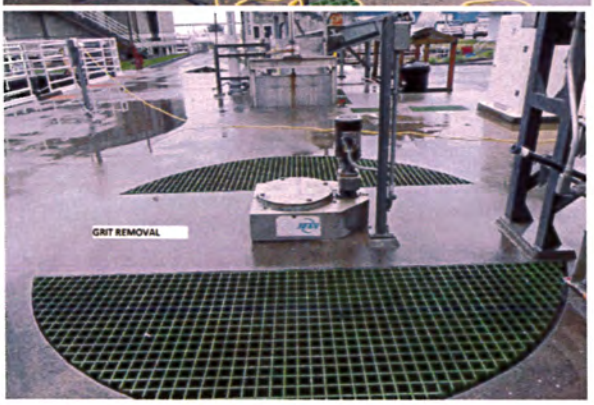
SEACLIFF TERRACE LIFT STATION

THE COVE 9CYPRESS0 LIFT STATION

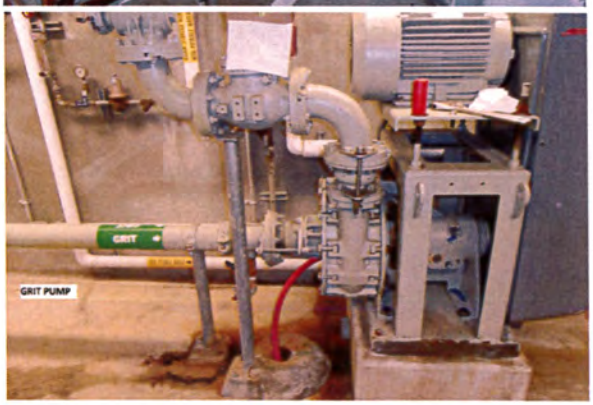
VIEW OF HEADWORKS (BAR SCREENS, GRIT REMOVAL BASIN, GRIT CLASSIFIER), PRIMARY CLARIFIERS, OFFICE AND STORAGE BUILDING IN BACKGROUND

HEADWORKS - BAR SCREENS

GRIT CLASSIFER

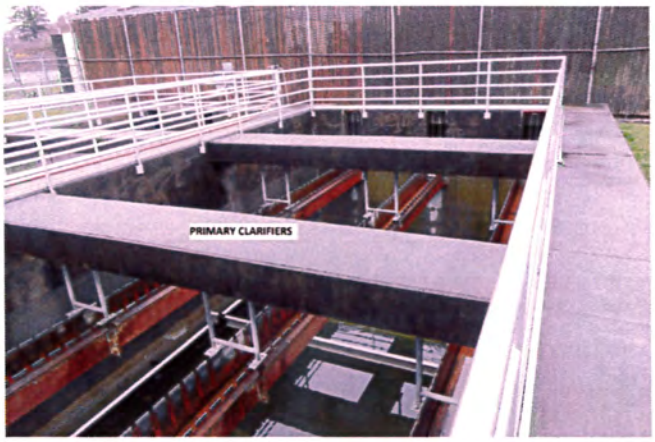


GRIT REMOVAL

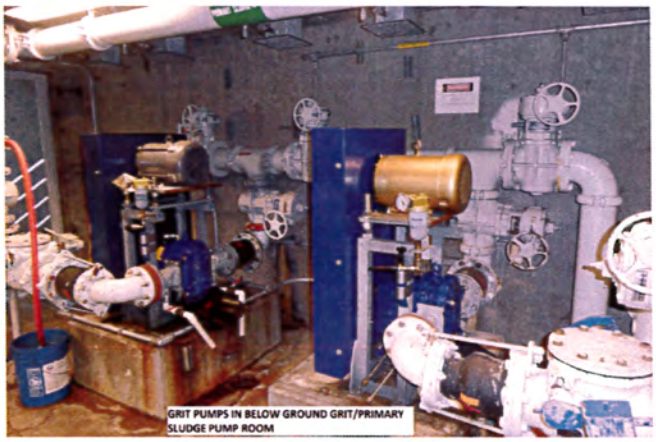


GRIT PUMP

PRIMARY CLARIFIERS


PRIMARY CLARIFIERS

STAIR WELL TO
BELOW GROUND
PUMP ROOM


GRIT PUMPS IN BELOW GROUND GRIT/PRIMARY
SLUDGE PUMP ROOM

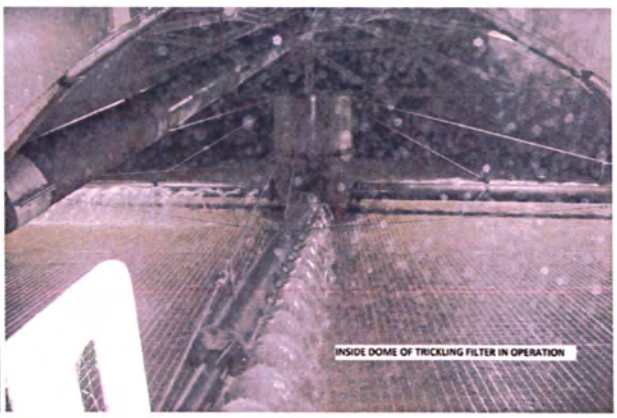
PUMP SLUDGE
PRIMARY SLUDGE PUMP IN BELOW GROUND
GRIT/PRIMARY SLUDGE PUMP ROOM

EXAMPLE OF LEAKAGE & CORROSION IN BELOW
GROUND PUMP ROOM

TRICKLING FILTER W/ODOR CONTROL SYSTEM FOREGROUND

ODOR CONTROL SYSTEM AND BLOWER FOR TRICKLING FILTER

PIPING BETWEEN CONTACT STABILIZATION / RE-AERATION BASIN & TRICKLING FILTER, SNAIL REMOVAL IN BACKGROUND



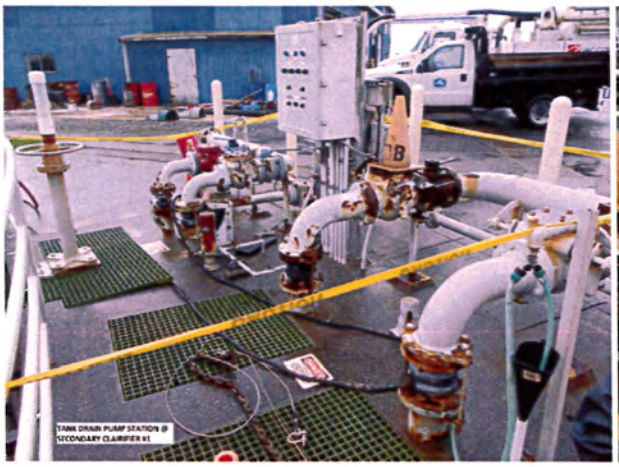
INSIDE DOME OF TRICKLING FILTER IN OPERATION

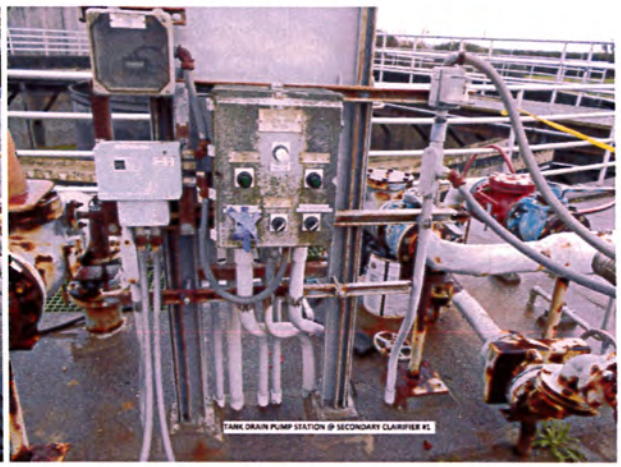
AERATION BLOWERS #1 & 2

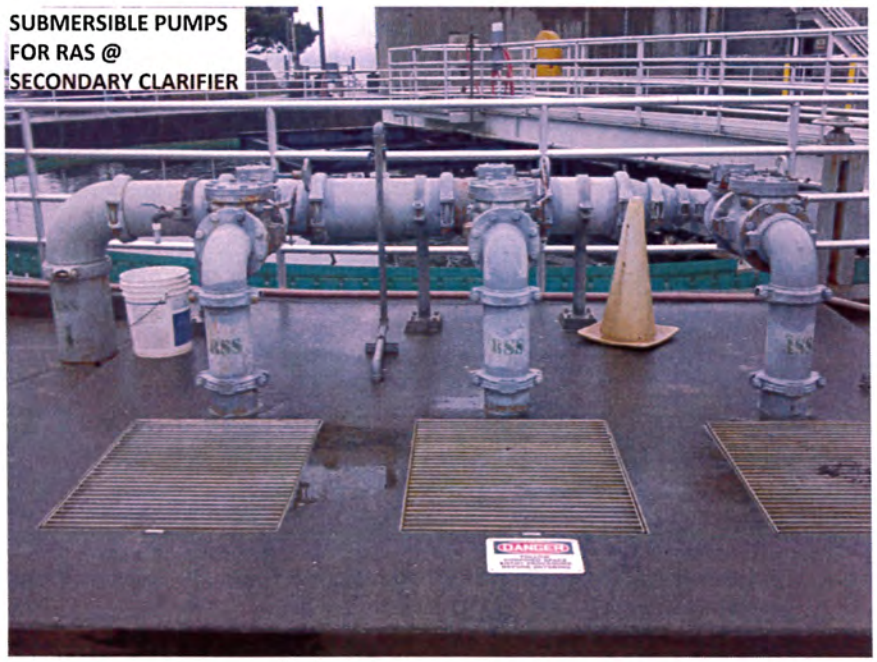
RE-AERATION/CONTACT STABILIZATION BASIN

SECONDARY CLARIFIER OUT OF
SERVICE FOR REPAIR

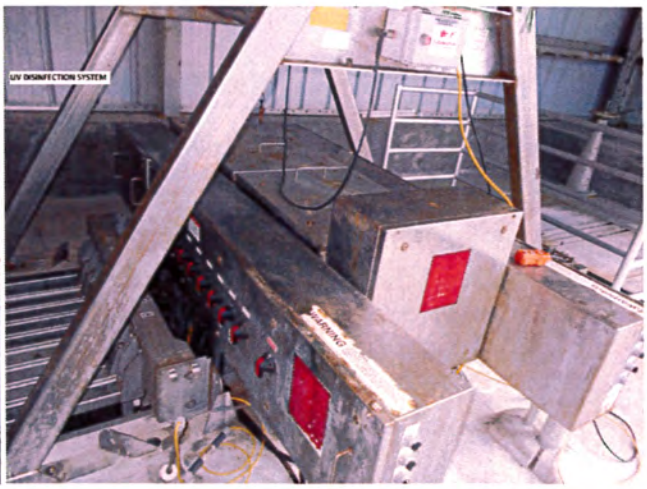
SECONDARY CLAIRIFIER
IN OPERATION


TANK DRAIN PUMP STATION @
SECONDARY CLARIFIER #1


TANK DRAIN PUMP STATION @ SECONDARY CLARIFIER #1


SUBMERSIBLE PUMPS
FOR RAS @
SECONDARY CLARIFIER
RSS
RSS
RSS
DANGER

UV DISINFECTION SYSTEM

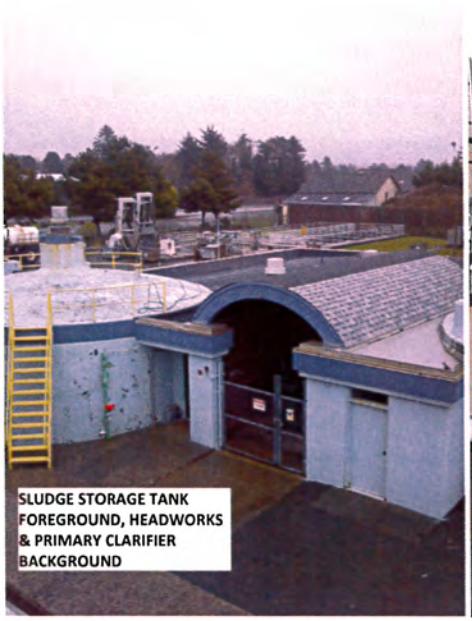

UV DISINFECTION SYSTEM

SNAIL REMOVAL CHAMBER

PLANT WATER PUMP STATION

MAIN GENERATOR IN STORAGE BUILDING

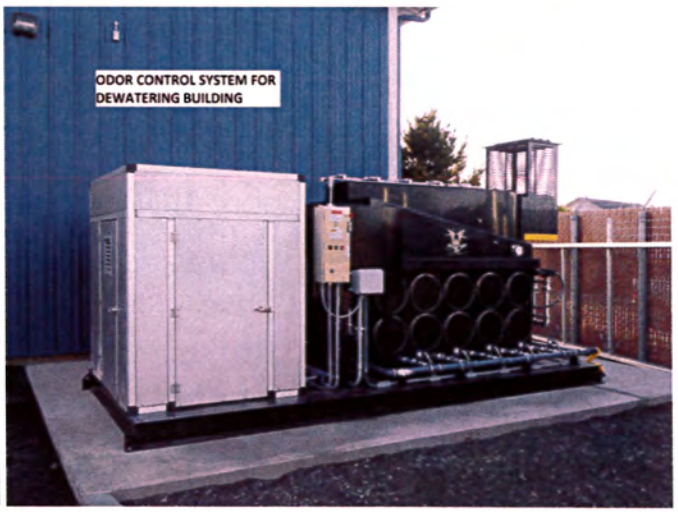
GENERATOR IN BLOWER BLDG



SLUDGE STORAGE TANK FOREGROUND, HEADWORKS & PRIMARY CLARIFIER BACKGROUND

SLUDGE STORAGE TANK #3 - 2 MILLION GALLONS

BIOSOLIDS DEWATERING BUILDING



ODOR CONTROL SYSTEM FOR DEWATERING BUILDING

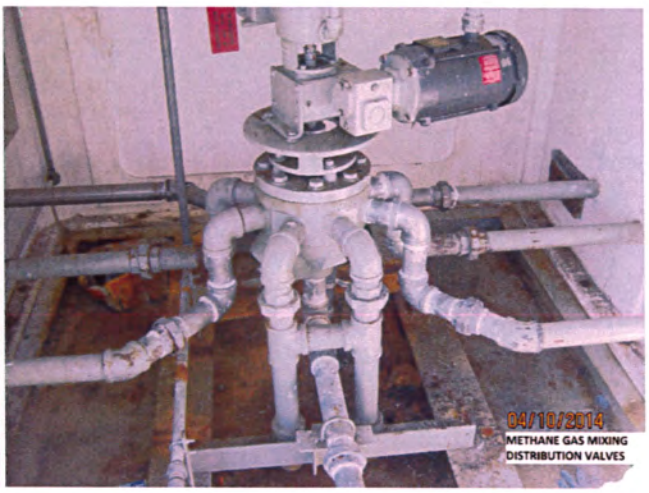
BIOSOLIDS DEWATERING SCREW PRESS

DEWATERED BIOSOLIDS IN DEWATERING FACILITY CONTAINER ROOM TO BE HAULED TO LANDFILL

DIGESTER METHANE GAS HEAD SPACE & PRESSURE/VACUUM RELEASE ASSEMBLY

METHANE GAS & SLUDGE PIPING DIGESTER ROOF

LEAKING 3 WAY PLUG VALVE AT DIGESTER PRESSURE/VACUUM RELEASE ASSEMBLY



METHANE GAS MIXING DISTRIBUTION VALVES

LEAKING RE-CIRCULATING METHANE GAS INJECTOR

LEAKING DIGESTER TOP HATCH

Attachment B

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Proposed new text is **bold**

PUBLIC FACILITIES PLAN

CITY OF BROOKINGS WATER SYSTEM

The City of Brookings acquired the water system serving property within the City in 1973 and operates the water system as a City business enterprise. The City has made substantial improvements to the water system over the years.

The water enterprise consists of the following operating systems:

- Source of Supply: The locations where the City takes or has the right to take ground water for municipal purposes, and the system for transmission of the water taken from these locations identified in Table 3.1 to the water treatment plant and distribution system.

- Treatment: Filtering and chemically treating water from the sources of supply during river turbidity which DHS has determined the water treatment is not necessary.

- Distribution: A system of pipes that delivers water from the treatment plant to storage reservoirs, fire hydrants and individual properties for domestic and industrial use. Distribution includes operation and maintenance of water usage meters.
- Management and Customer Service: Overall management of the water enterprise, engineering, planning, meter reading, billing/collections and customer service (new connections, turn-on/turn off, etc).

WATER SOURCE

Following is the current status of the City's various water right development applications and certificates.

Table 3.1: City of Brookings Water Rights

Source/Type	Permit No.	Certificate No.	Priority Date	Quantity
Chetco River (S)	27610	83682	9/14/1961	4.0 cfs
(Ranney)				
Chetco River (S)	31293	87358	1/21/1966	1.57 cfs
(Ranney)				
Chetco River (G)	G5601	64614	8/14/1972	6 cfs
("Tide Rock")				
Chetco River (S)	51383		12/12/1990	1.0 cfs
				Mar 1 - Jun 30)
Chetco River (R)	R11535		5/13/1993	62.3 Ac-ft
Chetco River (R)	51595		5/13/1993	62.3 Ac-ft
(10 Reservoirs)				
Ferry Creek (S)	1740	2078	8/22/1913	3.0 cfs
Ferry Creek Reservoir (R)	372	1407	8/9/1916	1.5 MG
Ferry Creek Reservoir (R)	408	2071	8/25/1917	28 Ac-ft
Ferry Creek Reservoir (R)	31224	46861	2/10/1966	167.4 Ac-ft
Ferry Creek Reservoir (R)	R4720	46860	2/10/1966	167.4 Ac-ft
Joe Hall Creek (S)	4674	4953	6/23/1920	2.5 cfs
Ransom Creek (S)	18123	20734	2/24/1948	0.53 cfs

Currently, the Chetco River supplies 100 per cent of the City's water needs through a Ranney type groundwater intake collector located along the North Bank Chetco River approximately 4 miles upstream from the Highway 101 bridge. The Ranney Collector is designed for a capacity of 5.7 cubic feet per second (cfs) with all three pumps running, although a portion of the 12-inch AC piping from the intake to the treatment plant is questionably undersized for this flow rate. The Ranney Collector is operated with only 1 pump running rated 1250 gpm or 2.7 cfs. The City installed 9,500 ft of new 16-inch raw water line from the point of diversion to the treatment plant in 2008. There is 4,900 feet of 12-inch AC line between the intake and treatment plant that should be upsized to 16-inch DI in order to operate more than one 1250 gpm (2.7 cfs) pump at the intake.

In 2012, Certificates 83682 and 87358 were obtained as part of a negotiated agreement with Oregon Water Resources Department (OWRD) and Waterwatch, and represent the only water rights currently used by the city for municipal water production.

WATER TREATMENT

The water treatment plant, installed in 1976, is a Neptune Microfloc Aquarius Model AQ-300 that utilizes the conventional rapid sand filtration treatment process. The plant consists of two identical, side-by-side units with a combined capacity of approximately 2.6 mgd**.** DHS recently downgraded the requirement to operate the treatment plant and water is allowed to be delivered year round with only disinfection. The water treatment plant is also the location of the main distribution pumps which are operated at 2.1 MGD.

WATER DISTRIBUTION

The main line distribution system consists of approximately 26.5 miles of pipe ranging in size from 2 to 16 inches. Pipe materials vary with the most common types being asbestos cement (AC) and polyvinyl chloride (PVC). The distribution system is over-extended in the higher elevation portions of the service area and is not capable of delivering fire flows in some areas. The master plan update has identified over $6 million dollars in needed distribution pipe upgrades and replacements.

WATER USAGE

Water projection demands in 2013 maximum day demand is 2.1 MGD and expected to increase to 2.3 MGD by 2018. Residential water use has significantly decreased from 96.9 gpcd in 2007 to 96.9 gpcd in 2012. The City began offering water conservation incentives to customers in 2007. Unaccounted for water use has also reduced from 17% loss in 2007 to 10.1% water loss in 2012. The City has contracted an annual leak detection survey to credit for the loss reduction.

FIRE FLOWS

The water system must offer sufficient capacity to furnish water for firefighting while maintaining adequate flows for domestic, commercial and industrial demands. In addition, the required fire flow must be delivered at an accepted residual pressure, which is 20 psi. The City of Brookings has adopted the Oregon Fire Code. The Oregon Fire Code provides the minimum fire flow standard applied to new development. A matrix used to determine fire flow requirements can be found in Oregon Fire Code, Appendix B, Table 105.1- Minimum required fire flow and flow duration for buildings. There is no community-wide standard, although a basic fire flow of 1,500 gpm for a two hour duration is a minimum in the Oregon Fire Code.

WATER STORAGE

With the completion of the 1.6 million gallon Seacrest reservoir in 2009, the current available storage is 3.6656 million gallons, or 1.78 times the peak day demand. The sizing of the Seacrest reservoir was reduced from a proposed 2.0 mg due to site constraints. The City received a grant to fund installation of a .5 mg water reservoir east of the Brookings Airport. Construction is slated to begin on this project in the fall of 2014. The site will accommodate an additional .5 mg reservoir in the future. In addition, the 2014 master plan update recommends an additional new water storage facility of at least 250,000 gallons in the Old County Road area.

WATER SYSTEM MASTER PLAN

The City adopted a Water System Master Plan Update prepared by PACE, An Engineering Services Company on July 28, 2014.

Harbor Water People's Utility District

WATER SOURCE

Currently the Chetco River supplies the Harbor Water Peoples Utility District (HWPUD) water needs. The river intake is a Ranney collector with a rated capacity of 6 million gallons per day. Four pumps serve the intake; each rated at 2.4 mgd capacity. The pumps alternate, with two operating together to handle peak demands.

The HWPUD currently holds two surface water rights from the Chetco River and has two ground water sources. These are summarized in the following table.

Harbor Rural Water District Water Rights			
Source	Priority Date	Amount	Amount
Chetco River	1966	3.500 cfs	2.26 mgd
Chetco River	1980	7.00 cfs	4.53 mgd
Well G3240	1966	3.50 cfs	2.26 mgd
Well G9438	1980	7.00 cfs	4.53 mgd
	Total	21.00 cfs	13.58 mgd

WATER TREATMENT

The Ranney intake is considered equivalent to a ground water system. For this reason, water treatment is not practiced.

WATER DISTRIBUTION

The distribution system is an extensive loop system that extends from the Chetco River to the California border, and consists of approximately 50-55 miles of pipe ranging in size from 2 to 16 inches. Pipe materials vary with the most common types being asbestos cement (AC) and polyvinyl chloride (PVC), and ducitile pipe.

WATER USAGE

Current water production data shows that the average daily water demand is 700,000 gallons with the peak day demand being 1,700,000 gallons. Serving an estimated 2,500 persons, the current population, the average daily water usage per person is approximately 280 gallons, with a peak demand of 680 gallons.

FIRE FLOWS

The water system must offer sufficient capacity to furnish water for fire fighting while maintaining adequate flows for domestic, commercial, and industrial demands. Also the required fire flow must be delivered at an accepted residual pressure which is 20 psi. The HWPUD has sufficient storage to meet a demand of 1500 gpm for two hours where necessary. The necessary storage to meet that requirement would be 180,000 gallons. HWPUD has the capacity to deliver fire flows.

WATER STORAGE

There are eleven water storage reservoirs in the HWPUD, which give a total storage capacity of 2,060,000 gallons. The following table summarizes the current water storage for the district.

Harbor Water District Storage			
Reservoir	Bottom Elevation	Overflow Elevation	Storage Capacity
Crown Terrace 1	525.5’	537.5’	10,000 gal
Crown Terrace 2	525.5’	537.5’	10,000 gal
Crown Terrace 3	795’	807’	10,000 gal
Crown Terrace 4	795’	807’	10,000 gal
Crown Terrace 5	1,025’	1,037’	10,000 gal
Crown Terrace 6	1,025’	1,037	10,000 gal
Hallway 1	201.36'	234.81'	750,000 gal
Hallway 2	203.62'	234.81'	500,000 gal
Coleman	355.18'	388.60'	300,000 gal
Benham	355.18'	386.60'	200,000 gal
Freeman	203.32'	234.74'	250,000 gal
TOTAL			2,060,000 gal

The required storage for the HWPUD is shown in the following table.

Harbor Water Storage Estimate		
Peak Day Demand	1,700,000 gallons	
Twice the Ave Day Demand	1,400,000 gallons	

Larger of the above two		1,700,000 gallons
Fire Storage	1500 gpm x 2hrs	180,000 gallons
Equalization Storage	20% peak	340,000 gallons
	Required Storage	2,220,000 gallons

HARBOR WATER PUD MASTER PLAN

Harbor Water PUD adopted a Master Plan in December, 2000 that is incorporated herein by this reference.

CITY OF BROOKINGS WASTEWATER SYSTEM

The original Brookings sewer system was constructed about 1916 and service was initially limited to the downtown area. The City assumed operation of the sewer system soon after incorporation in 1951. The City operates the wastewater system as a City business enterprise. The wastewater enterprise consists of the following operating systems:

COLLECTION

The City accepts domestic sewage from property in the service area that is connected to the sanitary collection system, and transmits the sewage to the wastewater treatment plant. The collection function includes the operation of sewage lift stations installed at various locations within the collection system to assist the flow of sewage to the treatment plant.

Currently, the collection system consists of a network of 6, 8, 10 and 12-inch mains connected to 18 and 21-inch interceptors and lift stations. There are approximately 32.7 miles of 6-inch to 21-inch gravity mains and 2.75 miles of 4-inch to 14-inch diameter force mains in the collection system. The system provides service connections to individual properties within the service area. The interconnection with the HSD also functions as a part of the collection system.

LIFT STATIONS

The City currently operates 13 lift/pump stations located to serve areas which cannot be served with gravity-fed sewer mains.

TREATMENT

Treatment involves removal of solids from the sewage received at the wastewater treatment plant, and clarification of processed solids after biological treatment and disinfect using U.V. bulbs in the effluent stream, to meet federal and state standards prior to discharge into the ocean. Treatment includes the processing, reprocessing and disposal of solids removed from the sewage.

The wastewater treatment plant has been located at Chetco Point since the early 1950's. Major modifications to the plant were made in 1973, 1991, and 2000.

Treated water, or effluent, produced by the wastewater treatment plant is discharged to the Pacific Ocean. The Oregon Department of Environmental Quality establishes discharge limitations for discharge to ocean waters. ~~The residual of the solids removal process, or sludge,~~

~~is currently taken from the bio-solids storage tank and transported to a processing facility in Grants Pass during the summer months. Approximately 1,598,040 gallons of sludge was transported for disposal in 2009.~~ A new Class B sludge dewatering facility **was constructed and brought on line in December, 1012** ~~is planned for construction during 2010-11~~ which ~~will~~ eliminate**d** the need for sludge trucking to Grants Pass.

RELATIONSHIP TO HARBOR SANITARY DISTRICT

In 1976, the Harbor Sanitary District was formed to serve an area just south of the City. The City and HSD have entered into a series of intergovernmental agreements whereby the City accepts sewage from HSD for treatment. See below for a description of the HSD system.

BROOKINGS WASTEWATER MASTER PLAN

The City adopted a Wastewater Facilities Master Plan in ~~March, 2008~~ **(date of adoption)**. That Master Plan is incorporated herein by reference. A detailed discussion of the treatment system and plant capacity can be found in the Plan. Until sewer service can be extended to properties, interim urban-level treatment systems may be allowed only if specifically provided for in master plans which set forth appropriate standards and conditions and which have been adopted as post-acknowledgement plan amendments or periodic review work task elements.

HARBOR SANITARY DISTRICT WASTE WATER SYSTEM

The community of Harbor is an unincorporated residential, commercial, and industrial area south of the Chetco River and the City of Brookings. The Harbor Sanitary District (HSD) has served this area since June 1976. The HSD operates only a collection system. Wastewater is piped to the Brookings wastewater treatment plant for treatment. The area's land use is predominantly residential, but a regional shopping center and an extensive commercial and industrial complex surround the Brookings-Harbor Boat Basin. The Harbor Bench area south of Harbor, an area experiencing steady growth, currently is out of the sewer service area; however, it is an area that potentially may become part of the service area. In 1979 the Oregon Health Division directed the HSD to annex an adjoining area, the Oceanview Mobile Home Estates, due to wastewater treatment concerns.

POPULATION

The following population data was taken from the "City of Brookings Comprehensive Utilities Plan" dated September 1981. Population projections were based on the 1970s, a growth period.

Harbor Sanitary District Population Growth				
Year	1980	1990	2000	2010
Population	1,968	2,645	3,555	2,770

COLLECTION SYSTEM

In 1976, the HSD was formed. The collection system consists of four pump stations and a network of gravity lines. Wastewater is pumped across the Chetco River to the south portion of

the City of Brookings service area. There a 20-inch gravity main conveys the wastewater to the Brookings treatment plant. The daily flow rate is approximately 0.28 mgd.

The collection system consists of 16.5 miles of 8-inch and 12-inch transite pipe.

PUMP STATIONS
Flows from the entire Harbor collection system enter HSD pump station No. 14. Discharge from this station is to the Brookings WWTP by means of an 8-inch force main over the Chetco River or a 12-inchforce main under the Chetco River. Space for additional force mains is available. Pump station No. 14 is rated at 2,000 gpm and 125 feet. The other three pump stations are small and serve limited areas.

HARBOR SANITARY DISTRICT MASTER PLAN
HSD plans to complete a Master Plan during the winter of 2010.

Until sewer service can be extended to properties, interim urban-level treatment systems may be allowed only if specifically provided for in master plans which set forth appropriate standards and conditions and which have been adopted as post-acknowledgement plan amendments or periodic review work task elements.

CITY OF BROOKINGS STORM DRAINAGE

The City of Brookings operates a storm drainage system within the city boundaries. Drainage basins flow to the ocean or the Chetco River. Generally local area flows are conveyed via pipes to discharge points at surface drainage ways. The majority of the existing piping system is located in the western old portions of the city draining to the Chetco. Highway 101 presents a major flow obstruction to natural drainage pattern, requiring culvert crossings. Some limited historical flooding has occurred, but the problems are related to site-specific causes.

CURRY COUNTY
Curry County services all public storm drainage in the study areas north and south of the Chetco outside City limits. The service level is mainly rural road maintenance that consists of ditch culvert cleaning associated with road maintenance. All other drainage features are privately owned. The Harbor Bench area, which is outside the urban growth area, has experienced flooding and erosion due to upstream growth and diversion of flows due to culvert placement.

CITY/ COUNTY STORM DRAINAGE MASTER PLAN
On January 12, 2009, the City and the County adopted the “Storm and Surface Water Facilities Plan for Brookings-Harbor Area.” In the Plan are design and development standards and proposed improvements to the storm drainage facility. There are also maps depicting the various basin areas in City limits and the Urban Growth Area, hydrologic/ hydraulic analysis, and the discussion of the effects on specific areas in the Plan. The Plan is hereby incorporated by this reference.

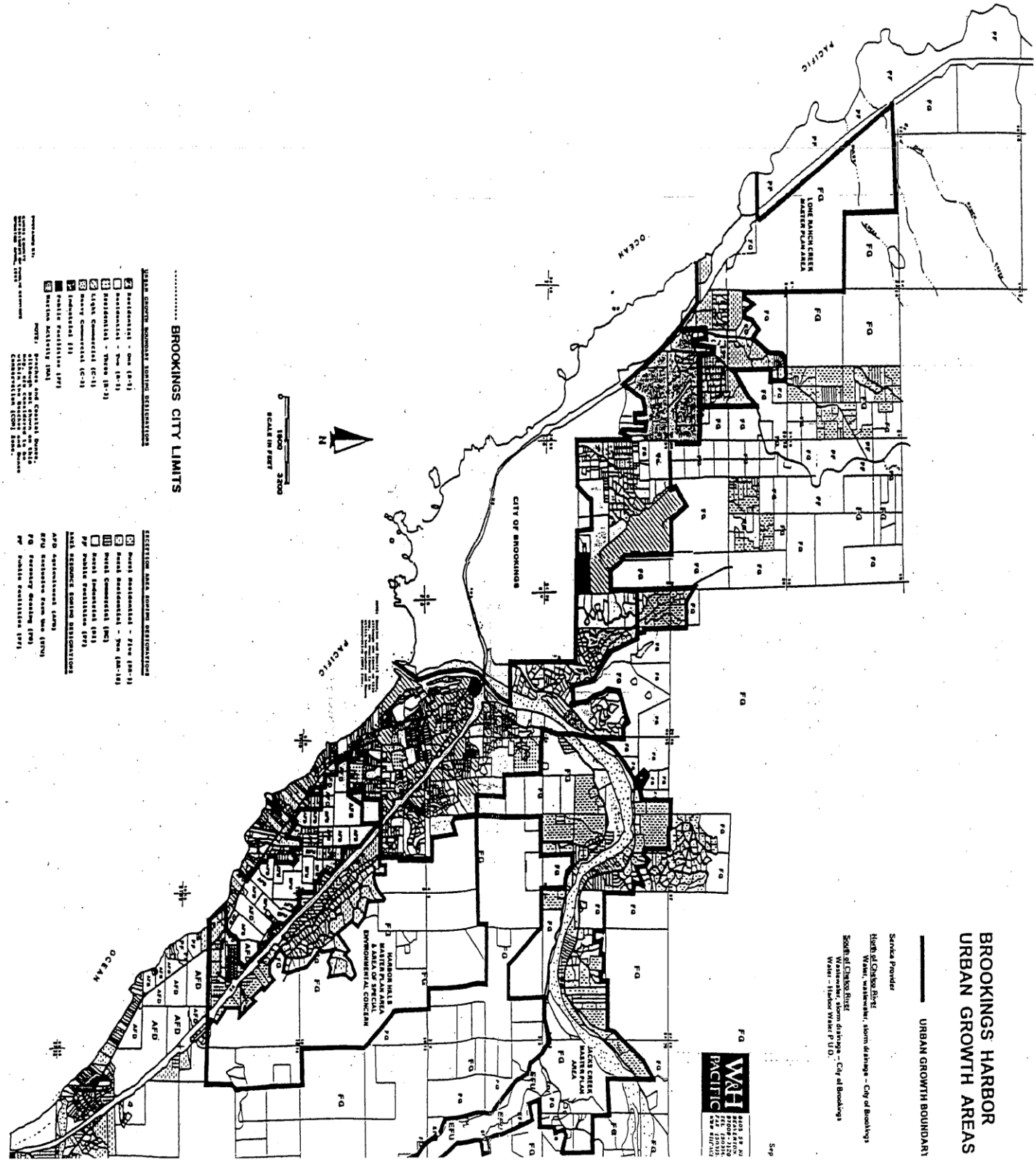
The Storm and Surface Water facilities Plan for Brooking Harbor Area” contains the following policies:

- Low impact development is preferred.
- Negative impacts to natural watercourses are to be avoided.
- Piping of a natural watercourses is to be avoided, where practicable.
- Protection of ground water sources is critical.
- Proposed facilities should address water quality impacts and mitigation measures.
- Erosion and sediment must be controlled using the City, County, and Department of Environmental Quality requirements.
- Stormwater discharges shall be maintained at current levels.
- A public education program is recommended to disseminate information on the importance of preventing negative impacts from stormwater.

The "Storm and Surface Water Facilities Plan for Brookings-Harbor Area" contains specific design and development standards and proposed improvements to the storm drainage facility. To avoid adverse impacts created by development, the Plan contains five strategies to be generally utilized:

1. There should be no post-development net increase in storm drainage discharge downstream.
2. Low impact development practices as described in the 2007 "Storm and Surface Water Facilities Plan" shall be implemented.
3. The capacity of the downstream drainage infrastructure is improved to convey the increased flow. Usually this means constructing larger culverts and storm drains. Generally, the natural drainage channels are improved, but because of the study area's proximity to the ocean and the steep rocky terrain, these channel improvements may not be necessary.
4. A regional detention facility is constructed to capture the additional runoff and release the flow at a slower natural rate. A regional facility is normally associated with a single drainage way or creek.
5. An onsite detention facility is constructed for each individual development. The goal for a regional or onsite detention facility is that the runoff from the post-development condition be reduced to flow equaling the pre-development condition.

The Harbor Hills Master Plan Area within the UGA is required to prepare a comprehensive surface water management plan prior to any land use approvals. The details required and the review and approval process are described in the "City of Brookings and Curry County Joint Management Agreement", dated June 30, 2010.


BROOKINGS HARBOR
URBAN GROWTH AREAS
URBAN GROWTH BOUNDARY
Service Provider
North of Chetco River
Water, wastewater, storm drainage – City of Brookings
South of Chetco River
Wastewater, storm drainage – City of Brookings
Water – Harbor Water P.U.D.
W&H PACIFIC
LONE RANCH CREEK MASTER PLAN AREA
JACKS CREEK MASTER PLAN AREA
HARBOR HILLS MASTER PLAN AREA & AREA OF SPECIAL ENVIRONMENTAL CONCERN
CITY OF BROOKINGS
PACIFIC
OCEAN
N
1000 3200
SCALE IN FEET
BROOKINGS CITY LIMITS
URBAN GROWTH BOUNDARY EXISTING DESIGNATIONS
Residential - One (R-1)
Residential - Two (R-2)
Residential - Three (R-3)
Light Commercial (C-1)
Heavy Commercial (C-2)
Industrial (I)
Public Facilities (PF)
Marine Activity (MA)
NOTE: Beaches and Coastal Dunes, although not shown on this map, are subject to the Beaches and Dunes Construction (CDB) Zone.
EXCEPTION AREA EXISTING DESIGNATIONS
Rural Residential - Five (RR-5)
Rural Residential - Two (RR-10)
Rural Commercial (RC)
Rural Industrial (RI)
Public Facilities (PF)
NON RESOURCE EXISTING DESIGNATIONS
AFD Agriculture/Forest (AFD)
EFU Exclusive Farm Use (EFU)
FG Forestry Grazing (FG)
PF Public Facilities (PF)

Attachment C

Original text to be deleted is ~~stricken~~.

Proposed new text is **bold**

GOAL 11 PUBLIC FACILITIES AND SERVICES

GOAL:

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to provide a framework for urban and rural development.

FINDINGS:

1. The City has adopted a Public Facilities and Services Plan that establishes the framework for the distribution of water and sanitary sewer services and storm drainage systems throughout the expanded Urban Growth Boundary.

2. The City has adopted a Water Master Plan/Conservation Management Plan. On July 28, 2014, the City adopted "City of Brookings Water Master Plan Update". This update included data in the appendices from the 2007 "Water System Master Plan Update" regarding the Harbor Water People's Utility District which serves the Brookings Urban Growth Area south of the Chetco River Bridge.

3. The City has adopted a Water Curtailment ordinance that provides the city with the mechanisms to curtail water use in emergencies, including low surface water flows in the Chetco River.

4. On January 12, 2009, the City adopted the "Storm and Surface Water Facilities Plan for Brookings-Harbor Area." New policies from this Plan are found in the "Public Facilities Plan for Urban Growth Expansion."

5. **On (date)** ~~In March, 2008~~, the City adopted a **Wastewater Facilities Plan developed by the Dyer Partnership dated November 2015.**

6. The city currently provides the following facilities and services within the City Limits:

   A. Public Works
      1) Water Treatment - 2.0 to 2.6 mgd capacity.
      2) Water Distribution, Pumping and Storage - (Total connections 3,354 -3,053 of the connections are residential, 2012).
      3) ~~Wastewater Treatment - 15.4 mgd peak wet weather capacity. The yearly average flow is 1.42 mgd.~~ The service area includes the incorporated area of Brookings plus the Harbor Sanitary District to the South. (Total of ~~2,228~~ **3358** connections within the City limits. The Harbor Sanitary District has approximately 895 connections, which are pumped to the City's treatment plant., **November 2015** ~~July 8, 2010~~). **Current capacity provides for an average dry weather flow of 1.7 MGD, peak day average flow of 10.9 MGD and a peak wet weather hydraulic capacity of 15.5 MGD.**
      4) Wastewater Collection and Pumping - All public facilities within the city limits

are the responsibility of the City of Brookings. All such facilities in the Harbor Sanitary District are owned, operated and maintained by that district.

5) Street and Infrastructure Maintenance - The City's Public Works Department provides maintenance of City streets, water mains, sewer mains, storm drains, and other infrastructure systems.

B. Solid Waste Removal - is presently done by franchised contract

C. Fire Prevention and Protection Services

These services are provided with two paid employees (**Operations** Chief and **Captain** ~~Assistant Chief~~) and **24** ~~40~~ volunteers. Ratings outlined in the Inventory document show an adequate program with primary need being in the area of improved water system. **However, improvements have been made that resulted in the classification being upgraded from a 7 to a 4B.**

D. Police Protection

1) Existing police facilities in the city hall ~~are presently adequate as a base of operations~~ **were rated as having a moderate risk of failure in a major seismic event by FEMA through the Rapid Visual Screening Score. The location was rated as a very high risk seismic zone in the same screening process.**
2) If population growth exceeded significantly the number projected or if the city boundaries were considerably expanded through annexation, or if the incident of crime jumped radically, it is conceivable that new facilities and additional manpower might be required.

E. Parks and Recreation Facilities and Services

1) One state park, Harris Beach State Park, is located within the City of Brookings. See adopted Harris Beach Master Plan, 2003.
2) The city owns and maintains approximately 54.4 acres of parkland.
   a. Azalea Park (formally Azalea State Park)
      - 33 -.2 acres
      - 2 Softball fields
      - Outdoor amphitheater/bandshell
      - 2 Volleyball Courts
      - Kidtown (.25 ac.)
      - Walking and biking trails
      - Capella by the Sea (weddings and passive meditation)
      - Gazebo
      - -4 Horseshoe pits
      - -2 Bar-ba-que grills
      - -11 Picnic tables
      - -Flower garden/natural area
      - -Restroom facilities
      - -Snack shack
   b. Bud Cross Park
      - 6.4 acres
      - 3 lighted tennis courts
      - 2 baseball fields
      - swimming pool and bathhouse
      - restroom facilities
      - concession stand
      - -Skate park
      - -3 Picnic tables
      - -Basketball courts
   c. Chetco Point Park
      - 8.9 acres
      - - 4 Horseshoe pits

- walking trails
- 5 picnic tables
- ocean access/ beach access
- Fire pit
- Restroom facilities
- 4 Seating benches

d. Easy Manor Park
- .8 acres
- 2 Bar-ba-que grills
- playground facilities (remodeled in 2010)
- 4 Picnic tables
- 4 Seating benches
-Restroom facilities

e. Stout Park
-3.3 acres
- walking paths
- 8 Seating benches
- Model railroad garden
- Manley Arts Center

f. Numerous mini parks around the City (pocket parks).

3) The City adopted a Parks Master Plan in Aug., 2002. This Plan is incorporated herein by reference.

F. Other facilities and services provided in the City of Brookings are
1) Schools
2) Transportation for the elderly.
3) Regional recreational facilities such as state parks and harbor facilities.

7. The following entities will provide services outside of the city limits within the Urban Growth Boundary.

A. Wastewater Collection
1) The Harbor Sanitary District.
a. Collects wastewater within their district south of the Chetco River and pumps to the City's wastewater treatment plant.
b. Has stated, expansion of the District will only occur when it is in compliance with the Districts adopted Growth Management Policy (Resolution 07-18-R).
2) The City of Brookings
a. Will provide wastewater collection in the Urban Growth Boundary, south of the Chetco River outside of the Harbor Sanitary District boundaries when land is annexed to the city.
b. Will provide wastewater collection in the Urban Growth Boundary north of the Chetco River when land is annexed to the city.

B. Water Distribution
1) The Harbor Water District People's Utility District
a. Pumps from an intake on the south bank of the Chetco River.
b. District boundaries include the entire Urban Growth Boundary expansion south of the Chetco River except for the areas north of its intake facility and the top of the Harbor Hills.
c. Is willing to expand its boundaries to include the entire Urban Growth Boundary south of the Chetco River.

2) The City of Brookings
   a. The City currently provides water service to some areas of the Urban Growth Boundary north of the Chetco River.
   b. The City will provide service to the entire Urban Growth Boundary north of the Chetco River.
   c. ~~Due to City Charter language, the City must provide water service to properties in the Urban Growth Area that want to annex unless the legal voters of the City authorize another water provider to serve.~~

C. Fire Protection
   1) Brookings Rural Fire Protection District.
      a. Is located around the City in the area north of the Chetco River.
      b. Is served under contract by the Brookings Fire Department
   2) Harbor Rural Fire Protection District
      a. Provides service to the entire Urban Growth Boundary south of the Chetco River.
      b. Fire station is located on Benham Lane.

D. Police protection
   All of the Urban Growth Boundary outside of the city limits is provided police protection by the Curry County Sheriff's Department.

E. Storm Drain Maintenance
   1) The Oregon Department of Transportation maintains all drainage facilities within a state road or highway rights-of-way.
   2) The Curry County Road Department maintains all drainage facilities within county road or street rights-of-way.
   3). Drainage facilities on private property are maintained by the property owner.

POLICIES:

To insure timely, orderly and efficient arrangement of public facilities and services the following policies will be implemented by the City of Brookings.

1. Public Works

   A. Water treatment facilities. Facilities will be maintained with the proper observation and planning to expand facilities on a timely basis to provide continued service to existing customers and projected growth. Expansion programs will be funded through the most cost-effective methods utilizing all available federal, state and local funds.

   B. Water distribution, pumping and storage. New development requiring extension of water mains, pumping and storage facilities will be paid for and constructed by the developer pursuant to the provisions of the current City of Brookings Engineering Requirements and Standard Specifications for Public Works Infrastructure document.

C. Water Master Plan/Conservation Management Plan. The City will maintain a Water Master Plan/Water Conservation Management Plan, which will be updated as required.

D. A Backflow Prevention Program was adopted in 2012.

E. Wastewater treatment facility. Expansion programs will be funded through the most cost-effective methods utilizing all available federal, state and local funds.

F. Wastewater collection facilities. New development requiring extension of sewer mains and new pumping stations will be paid for and constructed by the developer pursuant to the provisions of the current City of Brookings Engineering Requirements and Standard Specifications for Public Works Infrastructure document.

G. Streets and other infrastructure facilities. The City's Public Works Department will inspect and maintain all public street and subsurface infrastructure facilities. The extension of existing streets for new development shall be paid for and constructed by the developer pursuant to the provisions of the current City of Brookings Engineering Requirements and Standard Specifications for Public Works Infrastructure document.

H. Storm drain facilities. New development requiring new storm drain systems or the extension of existing systems including provision of detention basins, will be paid for and constructed by the developer pursuant to the provision of the current City of Brookings Engineering Requirements and Standard Specifications for Public Works Infrastructure document.

2. Fire Prevention and Protection

The Fire **Operations** Chief will continue to serve as the head of prevention and protection services. He will continue to maintain the high level of training and service that the community has come to expect through the conduct of local and regional training sessions and a continued education for himself.

3. Police Protection

The Chief of Police shall be responsible for continually monitoring the department's facility requirements and operations. In conjunction with the annual preparation of his budget request, a written evaluation shall be prepared for the City Manager, who in turn, may call attention to specific items for consideration by Planning Commission, Council or staff.

MINUTES
BROOKINGS PLANNING COMMISSION
November 17th, 2015

The regular meeting of the Brookings Planning Commission was called to order by Chair Bryan Tillung at 7:00pm in the Council Chambers at the Brookings City Hall on the above date. The following Commission members and staff were in attendance:

Commissioners Present:	Loren Rings, Ray Hunter, Joe Vogl, Gerry Wulkowicz, Timothy Hartzell, Cheryl McMahan, Bryan Tillung
Staff Present:	Planning Manager - Donna Colby-Hanks; Administrator - Jordan Fanning
Others Present:	5 members of the public

PUBLIC HEARINGS

Public hearing procedures addressed by Chair Tillung

- Chair Tillung opened the quasi-judicial hearing regarding File No. CUP-5-15

File Description: In the matter of File No. **CUP-5-15**, a request for approval of a conditional use permit to operate a short term vacation rental at 222 Del Norte Lane #15, on a 700 square foot condo parcel located on Assessor's Map No. 41-13-05CD, tax lot 60215; Applicant/Owner, Baldwin/Christman. The criteria used to decide this matter is found in Chapter 17.28.040 Multiple-Family Residential (R-3), Conditional Uses, Section 17.124.170 Short term rentals, and Chapter 17.136 Conditional Use Permits of the Brookings Municipal Code (BMC). This is a quasi-judicial hearing and the Planning Commission will make a decision on this matter.

Planning Manager Colby-Hanks presented the staff report in full. Applicant Lisa Baldwin, 5007 Laurel Ave., Grants Pass, answered basic questions from the Commission. The public hearing portion of the file was closed at 7:16pm and McMahan made a motion to approve the file, which was seconded by Hartzel. The file was approved by a unanimous vote. Wulkowicz made a motion to approve the final order, which was seconded by McMahan. The final order was approved by a unanimous vote.

- Chair Tillung opened the quasi-judicial hearing regarding File No. MOD-1-15/MPD-1-04

File Description: In the matter of File No. **MOD-1-15/MPD-1-04**, a request to modify a condition of approval, #1 to extend the expiration period for the Lone Ranch Master Plan. Owner/Applicant is U.S. Borax and Representative is Ed Trompke, Jordan Ramis PC. The subject property is located adjacent to the eastern boundary of Hwy 101 approximately 0.8 miles north of Carpenterville Road; Assessor's map 40-14-00, tax lots 2400, 2401 and 2404. The criteria used to decide this matter are found in Chapter 17.70 Master Plan Development (MPD) District, of the BMC. This is a quasi-judicial hearing and the Planning Commission will make a recommendation to City Council on this matter.

Ex parte contact: Hunter noted that he was a professor for the college of which the land is both adjacent to and had been donated by the applicant Borax. Hunter confirmed that he would be able to make an un-biased decision on the file.

Rings declared ex parte contact having visited the Lone Ranch website to familiarize himself with the project. No questions were asked of the commissioner and he was allowed to hear the case.

Planning Manager Colby-Hanks presented the staff report in full. Applicant representative Burton Weast, PO Box 1258 Mesquite NV, introduced himself and gave a brief oral history of the property as well as Borax/RioTinto. Ed Trompke, 2 Centerpoint Dr, Lake Oswego, OR explained the

applicant's findings/report. Trompke emphasized that the client is still very interested in moving the project forward but with the stagnate economy, building has largely been infeasible. Nathan Francis, 14486 Borax Rd, Boron CA, introduced himself as the new North/South American land manager for Rio Tinto/Borax. Francis reiterated the applicant's interest in the area as well as its commitment to Brookings as a whole. As an interested party, Janet Pretti, PO Box 295 Port Orford, introduced herself as the executive dean of the Curry campus, noted the College's support of the applicant and file. The public hearing portion of the file was closed at 7:56pm. Wulkowicz noted that he has been a Commissioner long enough to hear several files regarding the development of Lone Ranch. Further, on a personal level, he expressed the opinion that Rio Tinto has been very transparent and has shown commitment in the project. Rings, wanting to know more about the costs associated with the project, made a motion to reopen the public testimony, which was seconded by Hunter. Public hearing was reopened by a unanimous vote. Applicant representative Weast enlightened the commission detailing various costs, historic and future. Further he elaborated on City capacity as requested by Hartzel. Next, Catherine Wiley, 96370 Duley Creek Rd, made comments regarding her concerns that several federal agencies had not been notified of the file. She noted that although she did oppose the proposal of file she had concerns regarding procedures and unanswered questions. Colby-Hanks noted that Wiley's testimony would be entered as exhibit "C". Colby-Hanks clarified some issues brought up by Wiley for the Commission and explained basic Land-Use/Planning practices. Trompke rebutted by elaborating upon the applicants original findings. At 8:18pm the public hearing portion of file was closed. Hunter and Tillung made positive comments regarding the applicant as well as expressing their desire for a positive recommendation to the Council. Rings made a motion to make a positive recommendation to the Council which was seconded by Vogl. The motion was approved by a unanimous vote.

- Chair Tillung opened the quasi-judicial hearing regarding File No. MOD-1-15/MPD-1-04

File Description: In the matter of File No. **MOD-1-15/DDP-1-10**, a request to modify a condition of approval, #2, to revise the expiration period for the Detailed Development Plan (DDP). Owner/Applicant is U.S. Borax and Representative is Ed Trompke, Jordan Ramis PC. The subject property is located adjacent to the eastern boundary of Hwy 101 approximately 0.8 miles north of Carpenterville Road; Assessor's map 40-14-00, tax lots 2400, 2401 and 2404. The criteria used to decide this matter are found in Chapter 17.70 Master Plan Development (MPD) District, of the BMC. This is a quasi-judicial hearing and the Planning Commission will make a decision on this matter.

Ex parte contact: Hunter reiterated his connection with the college but did not feel his connection unfairly biased him in any way.

Rings reiterated viewing of the Lone Ranch website would not interfere with his duties as a planning commissioner.

Planning Manager Colby-Hanks presented a shortened version of the staff report citing the demonstrative similarities of the file just heard. Applicant representatives Ed Trompke, 2 Centerpoint Dr, Lake Oswego, and Burton Weast, PO Box 1258 Mesquite N, answered a question regarding HOA's and street maintenance of the planned development. Because of the overwhelming similarities of the file with the file previously heard (*File No. MOD-1-15/MPD-1-04)* the interested parties of public opted to defer to all comments previously made. The public hearing portion of the file was closed at 8:39pm. After a brief discussion the Commission voted to approve the motion made by McMahan to approve the file (2nd Rings) unanimously. Further, the Final Order was approved by a unanimous vote (motion McMahan, 2nd Rings).

APPROVAL of MINUTES

By a 5-0 vote (motion: Tillung, 2nd Wulkowicz) the Planning Commission approved the minutes of the September 1st, 2015 Planning Commission meeting. (Commissioners Tillung and McMahan abstained due to not being present at the meeting.)

STAFF REPORT

Code revisions were handed out to the Commission. There will be no December meeting. January's meeting will involve the CIS report as well as the Chair's annual report to the Council.

COMMENTS FROM THE COMMISSION

Tillung noted that he had been to some planning commission training in Bend, and will report on his experience at the next meeting.

ADJOURNMENT

Meeting adjourned at 8:47pm
Respectfully submitted,

_____

Bryan Tillung, Chair of the Brookings Planning Commission
(Approved at the 1/5/16 meeting)

City of Brookings

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TO: Planning Commission

FROM: Donna Colby-Hanks, Planning Manager DC

DATE: December 23, 2015

RE: Committee for Citizen Involvement 2015

The Resolution creating the Committee for Citizens Involvement (CCI) requires an annual evaluation of the Citizens Involvement Program and a report to be given to the Mayor and City Council, the County Planning Coordinator, and the State's Citizen Involvement Advisory Committee.

Many efforts are made to be sure information concerning meetings, process, and specific applications is available to the public. These efforts include providing hearing notices and/or agendas to several local papers, several radio stations, to the library, posting in City Hall, on the City's website, and mailed to neighbors when a specific property is involved. Contact information is provided and files are available for review at the Planning Department, the public library, City Hall and on the City's web site. The public is able to sign up to receive email or text message notices of Planning Commission meetings, both regular meetings and workshops. There are 51 participants in this program.

In the past year, an open house forum was implemented to have planning staff available for one hour prior to each Planning Commission meeting to meet with interested citizens. The forum was not utilized by the public and was discontinued.

A survey form, designed to evaluate the effectiveness of the citizen involvement program, has been available for the past year at the sign-in table at every Planning Commission meeting and on the City's website. The survey is mailed to all participants in the land use process with the Notice of Decision. With this process, the number of returned surveys continues to increase each year. Below is a summary of the responses from the surveys.

Summary of key questions:

- Is information concerning meetings, process, and specific applications available to the public?

  All responses indicated that the process or criteria were able to be located prior to the Planning Commission meetings or that no efforts were made to obtain the information.
- Were citizens allowed to participate and did the Planning Commission consider their input?

  Most responses were favorable with several stating that they didn't feel their input was considered.
- Did the Planning Commission explain their decision and how it pertains to the applicable policies?

  Most felt that the Planning Commission accomplished this. However, a revision is being considered to the meeting procedure that will more clearly emphasize that Planning Commission decisions are required to be made based on the criteria. This may help folks to understand that sometimes input is considered but may not be relevant in making decisions.

Recommendation: Motion to accept the CCI Annual Report for 2015 and forward to the City Council.