City of Yachats
Lincoln County, Oregon

WASTEWATER FACILITIES PLAN

SEPTEMBER 2004

The Dyer Partnership
Engineers & Planners, Inc.

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Project No. 141.05

City of Yachats

Lincoln County, Oregon

Wastewater System

Facilities Plan

REGISTERED PROFESSIONAL
ENGINEER
17231
OREGON
JULY 19, 1994
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EXPIRES 6/30/05

September, 2004

Project No. 141.05

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Executive Summary

ES.1 Background and Purpose

The City of Yachats has operated a public wastewater collection system and treatment plant since 1974. The City's most recent improvement to its system, a major expansion of the wastewater treatment plant (WWTP), was completed in 1994, increasing the peak capacity to 1.9 million gallons per day (MGD). DEQ records indicate that the collection system has experienced multiple overflows each year and the WWTP has exceeded effluent permit limits on several occasions. The existing system experiences peak hydraulic flows of 2.3 MGD with oxygen demand and solids loadings that are at the design maximum for the facility. The City entered into a Mutual Agreement and Order (MAO) with DEQ on June 13, 2003 to set a schedule and interim compliance standards while the City works to resolve the permit compliance issues.

This plan addresses I/I reduction efforts needed, along with the ability of the existing wastewater system to effectively convey additional wastewater generated by the projected population growth in the 25-year study period. The capacity and condition of the existing WWTP is analyzed as compared to current and future flows and loads projected for the system after the I/I rehabilitation is complete.

ES.2 Population and Flow Projections

Population

Yachats has a core full time resident population of about 620. In addition, about 50% of the dwelling units are seasonally or part-time occupied as vacation homes or rentals. There are also over 270 tourist-lodging rooms in local hotels, motels, and bed and breakfast establishments. The population swings widely with summer and holiday vacation periods establishing peak occupancy periods. Census data indicates that there is an average of 1.85 people per household (per EDU). Off peak population is estimated at 1,360 and peak population at 2,040.

A 2.25% per year growth rate was selected for the residential population, based on historical averages in the study area, over the next 25 years for use in this Facilities Plan. Lincoln County and DLDC have agreed that this rate coordinates with their efforts. Tourist occupancy is based on a 3% growth rate. Projected off peak and peak populations for the year 2025 are 2,285 and 3,495 respectively. Population and EDU growth is discussed in more detail in Section 2 of this Plan.

Flows

Unit wastewater flows are used along with population projections to estimate future wastewater flows. Existing users are estimated to have higher per capita flows due to the higher infiltration present in an older system. Current flows exceed the WWTP design hydraulic capacity. A successful

I/I rehabilitation program, based on areas identified in the February 2002 I/I study, has reduced peak I/I flows at the project sites by about 30% and brought peak flows back within design limits for the facility. Projected flows for 2029 exceed the WWTP capacity, even with the I/I work.

ES.3 System Condition

The City completed an I/I rehabilitation project in December 2003 that significantly reduced I/I flows. In addition, smoke testing of the system in summer 2003 resulted in the discovery of a number private rain drains, downspouts, and abandoned connections that were introducing inflow into the system that have since been addressed.

Several areas of gravity sewers are installed at slopes lower than recommended by DEQ guidelines. Two pipe segments, on Yachats Ocean Road and Ocean View Drive were identified as being at or over capacity during peak flows and the section on Yachats Ocean Road was remedied as part of the I/I project. It is likely that manholes on the remaining sewer sections surcharge during heavy rains.

DEQ files reference several sewer blockages caused by grease accumulations in 2000-2001 and grease is a consistent problem at the WWTP. Yachats has a high ratio of restaurants to residents and restaurants are typically the source of most grease in a sewer collection system. A grease ordinance is in place requiring the proper use and maintenance of grease traps and the City passed a transient housing grease ordinance to provide authority to regulate grease deposits from rental housing. The City has also distributed grease collection containers to residential customers.

There are capacity, condition and safety issues at all but one pump station. Three pump stations, Main, Ocean View, and Riverside are undersized for handling future flows. In addition to corrosion problems, Main Pump Station has confined space issues that make it difficult to maintain. Pontiac Pump Station has a vertical drop to the ocean with no guardrail or fall protection for workers, in addition to broken cowling supports. As there are no built in generators, system operators must rely on two portable generators for power outages. Quiet Water pump Station is in good overall shape and adequately sized for future flows.

Based of the projected flows and loads presented in this Study, a major expansion project will be required at the treatment facility. The mass load treatment capacity of the WWTP has been reached by the existing population, and is inadequate for future needs. Current wastewater flows are at the design capacity. This facility lacks a redundant clarifier and back-up pumps, which EPA requires for Class II wastewater treatment plants. The staff lacks instrumentation and equipment for sampling, monitoring, testing, and control of the wastewater treatment processes.

The existing clarifier and tanks are in good shape and provide a base for upgrading the WWTP. The ocean outfall and adjacent pipeline are in good shape and adequately sized to meet projected flows during the study period. City owned property surrounds the existing facility, providing space for expansion to meet future needs.

ES.4 Recommendations and Costs

The recommended projects for improving the City's existing collection system and WWTP are summarized in Table ES.4.1. Projects are phased with Phase 1 projects identified as lower cost measures and operational changes to improve the operations of the existing facility and minimize permit violations during the construction stage. Phase 2 projects are long term construction projects to improve collection and treatment capacity issues.

TABLE ES.4.1
CAPITAL COSTS OF RECOMMENDED PROJECTS
PROJECT PHASES

Phase	Year	Project#	Project Description	
1	2005	2	Grease Prevention	$6,670
		7	Pontiac Pump Station Safety Improvements	$3,350
		14	Manure Spreader	$3,500
		10	Supernatant Decanting	$10,000
		11	Automatic Sampling Stations	$19,000
		13	Biosolids Irrigation Sprayer	$4,700
		15	Additional Biosolids Disposal Sites	
			Subtotal	**$47,220**
2	2005 to 2007	12	WWTP Upgrade	$4,850,480
		4	Main Pump Station Replacement	$430,000
		5	Ocean View Pump Station Replacement	$336,000
		6	Riverside Pump Station Replacement	$107,000
		1	Ocean View Drive	$39,000
		9	New Effluent Meter	$23,000
		8	Upgrade WWTP Laboratory	$50,000
			Subtotal	**$5,835,480**
Total				**$5,882,700**

* These projects are not considered capital improvements and funding is anticipated as part of the City's O&M budget.

Financing is based on a best-case scenario of a Clean Water State Revolving Fund Loan of $5.9 million at 3.06% over 20 years. To finance these measures and improvements the City will likely need to raise monthly user fees by between $16.50 and $24.50 per EDU. Financing is discussed in detail in Section 8.

Introduction

Section

1

Section 1

Introduction

1.1 Background

The City of Yachats has operated a public wastewater system since 1974 when the existing wastewater system was constructed. Numerous extensions, additions, upgrades, and improvements have brought the Yachats wastewater system to its current configuration. Today, the Yachats wastewater system includes pipe of various sizes and materials in the collection system, five raw sewage pump stations, a wastewater treatment plant providing secondary level treatment, and an ocean outfall.

The City of Yachats has experienced relatively steady growth during the period of time that it has provided a wastewater utility to the community. Increased tourism and continued steady growth is expected to lead the City to build-out conditions within the next 20 to 25 years.

To prepare for the growth and ensure the City's wastewater infrastructure is adequate, the City has chosen to undertake this Sanitary Sewer Facilities Plan.

1.2 Objectives

The overall objectives of the Plan are to:

- Evaluate the existing collection system condition and capacity, identifying current deficiencies;
- Estimate current and projected wastewater flows from within the existing UGB;
- Develop potential wastewater collection improvements to serve existing and future development within the UGB;
- Provide cost estimates and phasing recommendations for the recommended improvements.

1.3 Scope of Study

The scope of the Yachats Wastewater Facilities Plan is intended to comply with the applicable requirements of State of Oregon's Department of Environmental Quality (DEQ) and its State Revolving Fund (SRF) program.

Study area characteristics were identified and included both physical and socioeconomic conditions. City population and land use are addressed and projected in the future.

The **existing wastewater facilities** are investigated in detail. Data was collected on the existing wastewater collection and treatment systems from such sources as operating records, conversations with City staff, on-site investigation, maps, as-built records and other pertinent documentation. Existing facilities were evaluated in terms of location, sizing, capacity, condition, limitations, and performance. Consideration was given to the manner in which existing facilities could be utilized in the future. The infiltration and inflow (I/I) contribution to the wastewater flow was evaluated based on past and recent I/I investigations and historic plant operating data.

Wastewater characteristics were identified in terms of loads, flows, and strength during various times of the year. Future characteristics were projected to establish capacity requirements. Flows were addressed for both dry period and wet period conditions, and unit design values were established. Future wastewater characteristics were projected.

The basis for planning was established. Applicable regulatory requirements were identified and addressed, including management plans, current and future treatment criteria, and discharge standards. The present design capacity of the City's conveyance system and treatment plant was estimated to assess the present and future operation of wastewater facilities.

Alternatives were identified for conveyance and treatment. Nonviable options were screened out, and a limited number of selected alternatives were established and evaluated in detail.

Finally, a **recommended plan** was identified which will enable the City to meet the present and future demands and requirements of their wastewater facilities. This plan includes preliminary design data, capital improvement and operational costs, recommended staging of improvements, a project schedule, and a financing strategy.

1.4 Previous Studies and Information

The following studies, reports and other sources of information have been used in the compilation of this Facilities Plan:

Comprehensive Wastewater Plan
September 1991, H.G.E. Engineers and Planners, Inc.

USGS 7.5 Minute (Topographic) Quadrangle Maps - Yachats
1984 Provisional Edition

Infrastructure and City Mapping Files
Lines Drafting Services

Proposed improvements (gravity lines, pump stations, etc.) discussed in this Facilities Plan are based on the limited amount of topographic information that was available at the time. Locations of pump stations and the extents of gravity flow sewers may change when more accurate topographical information is made available. The information in this Plan is for preliminary planning and budgeting purposes. Detailed surveys and elevation information must precede design and some changes from this Plan are anticipated.

1.5 Authorization

The City of Yachats authorized the Dyer Partnership, Engineers & Planners, Inc. to proceed with this Wastewater Facilities Plan on March 21, 2003. Services are provided in accordance with a Professional Services Agreement dated August 23, 2000.

1.6 Acknowledgments

This plan is the result of contributions made by a number of individuals and agencies. We wish to acknowledge the efforts of Lee Corbin, Mayor, The City Council of Yachats, John McClintock, Public Works Director, Kevin Chesshir and Rick McClung, Wastewater Treatment Plant Supervisors. The assistance of the City of Yachats office staff was invaluable in compiling information on City services and the community.

1.7 Staff Credits

Staff at the Dyer Partnership that worked on this project include Janette Kerbo, Rachel Arbuckle, Steve Major, and John Waddill.

1.8 Format Note

In an effort to conserve resources, each sheet of this report has been printed double sided. All figures that require single sided printing have been bound at the end of each section, or placed in an appendix as noted.

Study Area Characteristics

Section

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Section

2

Study Area Characteristics

2.1 Study Area

The City of Yachats is located in Lincoln County on the beautiful Oregon Coast. Figure 2.1.1 illustrates the location of the City within the State of Oregon.

Most of the community lies on the gentle slopes adjacent to the Yachats River immediately to the north of the Cape Perpetua coastal landmark. US Highway 101 bisects the City, connecting it to the City of Newport, 24 miles to the north, and to the City of Florence, 26 miles to the south.

Yachats is a well-known tourist destination with numerous beaches, resorts, hotels, shopping, and other popular amenities. Especially in the summer months, the City experiences a large influx of tourist traffic and visitors and part-time residents. This influx in population is evident at the wastewater treatment plant as flows increase during the tourist season.

The area encompassed within the City Limits is just less than 600 acres (0.92 square miles). The study area for this Facilities Plan is located within the City Limits and the Urban Growth Boundary (UGB) as shown on Figure 2.1.2. The current UGB is the same as the City limits.

2.2 Physical Environment

The following provides information about the physical environment in and around the City of Yachats.

Climate

The climate of Yachats is moist, marine, and temperate. Temperatures average 43° F in January and 64° F in August. The yearly mean temperature is approximately 53°F. Extreme temperatures range from 5 to 106°F. Yachats experiences prevailing northwest winds from May through August. During the winter and early spring months, the winds are generally from the southwest. Average wind velocities range from 15 to 25 miles per hour with winter gusts of up to 100 mph reported.

Yachats receives an average of about 72 inches of precipitation per year. Nearly all precipitation occurs as rainfall, with the majority (approximately 69%) falling between the months of November and March. Rainfall amounts for November, December and January average approximately 14 inches per month. The wettest month is December with a historic average of approximately 15 inches of rainfall. The driest month is July with a historic average of less than one inch of rainfall. Records show that the average maximum 24-hour rainfall is 5.8-inches. A maximum mean 24-hour rainfall of 8.2-inches is recorded for the month of January.

Soils

There are three general classifications of surficial geologic formations found in the local Yachats area. A map showing these formations is included in the appendix. The formations are described as follows:

- **Quaternary Alluvium (Qal)** - These soils are alluvial bottomland deposits generally composed of silts, sand, and gravels. Within Yachats, in the lower lying areas of the Yachats drainage, these soils can be more specifically described as sandy silts, clayey silts, silty clays, and some local areas of peat. Qal soils are found in the lower elevations of Yachats around the confines of the Yachats River.

- **Basalt of Yachats (Teyb)** – These soils are characterized by rocky basaltic formations, 10 to 20 feet thick, found in the upper elevations to the east of the City. The formations commonly display irregular jointing and include pillow basalt, basaltic conglomerates, and basaltic sandstone in the northern part of the outcrops.

- **Quaternary Marine Terrace Deposits (Qmt)** – These soils are flat-lying marine terrace deposits overlain in places by semiconsolidated dune sand. The deposits are typically fine to medium grained friable sandstone of beach origin with thin interbeds of siltstone. Thicknesses may be 20 feet, more or less, and up to 75 feet. Qmt soils cover most of the Yachats UGB area including the area to the south of the Yachats River mouth.

Geologic Hazards

There are several areas within Yachats that are susceptible to geologic hazards. These hazards include coastal and river flooding, high groundwater, landslides, earthquakes associated with fault zones, tsunamis, and coastal and river erosion. A discussion of each hazard and expected locations are discussed below. A hazard map is included in the appendix.

- **Coastal and River Flooding.** Flooding in Yachats is unpredictable and may occur at any time throughout the year. High tides, ocean currents, low barometric pressure, winds, and rain contribute to flooding unpredictability. Generally, flooding occurs along coastal rivers whenever westerly storm winds and high tides coincide with heavy precipitation runoff. Major flooding occurred on the Lincoln County coastline in early December of 1967. Prolonged 50 mph southwesterly winds and tides exceeding 10 and 11 feet caused floods and related damage to the entire county coastline. Though most of the City is located above the flood plain, the areas adjacent to the Yachats River mouth area identified as being prone to flooding.

- **Earthquakes and Tsunamis.** Earthquakes are the products of deep-seated faulting and the subsequent release of large amounts of energy. A complex system of northwest and northeast trending normal faults comprise the majority of faults in Lincoln County. Some minor, concealed faults pass through the study area; however, none of the faults within the Lincoln County area are recognized as master earthquake producing.

  Tsunami waves are sea waves generated by seismic activity, producing wavelengths of sometimes more than 100 miles and amplitudes of only a foot or so. The waves can grow to tremendous heights in shallower water, inflicting extensive damage to coastal developments. Tsunamis occur in a series of waves, sometimes over a period of several hours. Tsunamis are immediately preceded by a noticeable rise or fall of the seawater. The last tsunami to hit the Oregon Coast was in March 1964, about six hours following the Good Friday Earthquake in Alaska. Relatively minor damage resulted in Lincoln County; however, four lives were lost—as a result of drowning—at Beverly Beach State Park.

- **High Groundwater.** High groundwater is characteristic along the northern borders of the City of Yachats. This water may be due to perched water, springs, hillside seepage, or saturated soil conditions following periods of wet weather.

- **Coastal Erosion.** Yachats's Urban Growth Area includes thousands of feet of shoreline along the Pacific Ocean and Yachats River terminus. These areas are susceptible to extensive erosion by waves and the elements of weather. However, much of the shoreline in the vicinity of the study area is characterized by rocky coastline that is relatively protected from wind and wave actions.

Public Health Hazards

Most of the development within the UGB is connected to the existing sanitary sewer system with about 4% of the current population served by septic tank systems. There are no known ongoing problems with on-site systems in the UGB.

Soils along Highway 101 north of Yachats, up to Waldport, are of iron-cemented sand, with a perched water table. These soils are unsuited to on-site septic systems. New on-site systems and existing systems when they fail usually require a sand filter.

Yachats has a history of minor sewage spills from the pump stations. Current operation and maintenance practices have worked to reduce the frequency and exposure of these spills.

Water Resources

Yachats, being a coastal community at the mouth of the Yachats River, is contained within an environmental region with two major water resources. These resources are the Pacific Ocean and the Yachats River and its estuary. The impacts each resource has on the community are vast in both physical and socioeconomic terms.

The City of Yachats utilizes an ocean outfall for the wastewater treatment plant. The City holds an NPDES permit for the discharge of treated wastewater to the Pacific Ocean.

The City's municipal water supply comes from Salmon and Reedy Creeks. A number of other minor creeks and water features are found within the Study Area.

Flora and Fauna

Vegetation in the Yachats area is typical of coastal regions in Oregon. Forestlands lie north, south, and east of the City; the Pacific Ocean lies to the west. Forestlands consist of Douglas Fir, Western Hemlock, and Western Red Cedar. Other plants common to the area include Pacific Rhododendron, Vine and Big Leaf Maple, Red Elderberry, Hairy Manzanita, Kinnikinnick, and Sword and Bracken Fern.

The tidal zone along the Pacific Coast and Yachats Estuary are the habitat of marine bass, rock fish, and ocean perch. Other types of marine life include clams, mussels, chitons, limpets, crab, shrimp, starfish, sea anemone, and urchins.

Sea mammals living in the ocean off the coast of Yachats include harbor seals and sea lions. Other mammals native to the region include shrew, mole, raccoon, river otter, muskrat, beaver, skunk, squirrel, and blacktail deer.

Environmentally Sensitive Areas

The areas in and around the City of Yachats are known for their beauty and their coastal flavor. Numerous public viewpoints, walking trails, and other local treasures are favorites of residents and visitors alike.

The Yachats estuary serves as a habitat for a number of fish and wildlife species. The coastal headlands, tidal areas, and uplands, are all sensitive natural areas, each supporting it's own ecosystem of diverse species of wildlife and vegetation.

Air Quality and Noise

Air quality within the Yachats area is excellent. Favorable prevailing winds, low population with corresponding low auto emissions, and absence of heavy industrial development result in few air quality problems. Noise is also not a nuisance. Automobile and truck traffic along Highway 101 would likely be the source of any future air quality or noise problems in the City.

Energy Production and Consumption

No major energy resources have been identified in the Study Area. There is some potential for individual small-scale wind generation projects. Energy consumption is expected to increase within the Study Area due to population growth during the planning period. Central Lincoln PUD serves the Study Area with electrical power.

Endangered Species Act

No known threatened or endangered species reside within the Study Area except for the presence of the coastal population of steelhead in the river. A number of listed threatened and endangered species are known to occur outside the study area in Lincoln County. The projects proposed in this study will not harm or threaten any species protected under the Endangered Species Act.

Wild and Scenic River System

There are no Wild and Scenic Rivers within the Study Area.

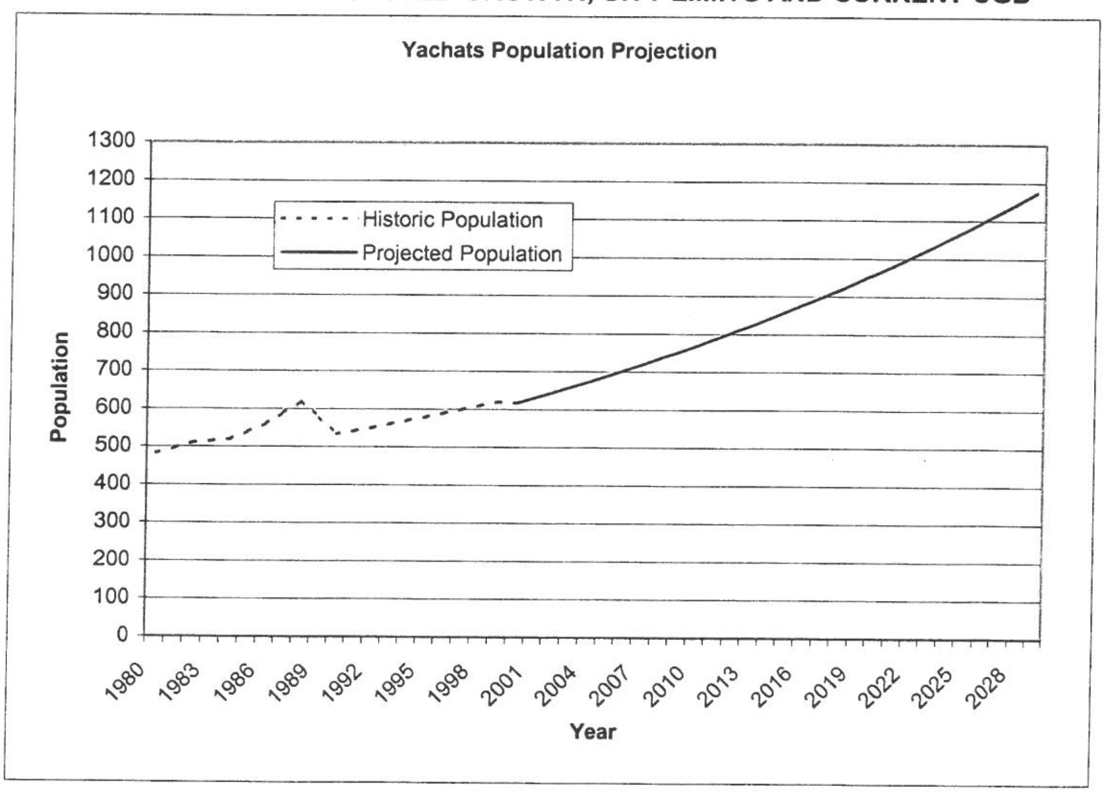
2.3 Socioeconomic Environment

Population

Since 1990 Yachats has experienced a growth rate higher than most other communities in Oregon. Economic conditions were difficult in the early 1980's due to the decline of the forest products industry, and some uncertainty remains over the availability of timber and lumber. Yachats' livability characteristics, however, especially for retired persons and those enjoying outdoor recreation, have attracted a long term growing populace to the Oregon Coast regardless of the local economic climate.

Based on United States Census data, the City of Yachats's population increased from 533 to 617 between 1990 and 2000. This increase equates to an average annual growth rate of 1.5%. During this same period, the average County growth rate was 1.35%. The growth rate for the previous 20-year planning period (1978-1998) was approximately 1.8%. Growth is expected to continue at a rate similar to that experienced in the community during the last decade. A conservative growth rate of 2.25% per year has been selected for projections used in this Facilities Plan over the next 25 years (to the year 2029), which matches the growth rate chosen for other recent planning efforts for the City of Yachats. The county currently does not have a coordinated growth rate, but both Lincoln County and the Department of Land Conservation and Development agreed that 2.25% was a reasonable growth rate for the purposes of this study. This projected growth trend, along with the historic growth in the City over the last 20 years is shown below in Figure 2.3.1.

FIGURE 2.3.1
HISTORIC AND PROJECTED GROWTH, CITY LIMITS AND CURRENT UGB



The 2000 census population for the City of Yachats was 617. Occupied housing units totaled 333, resulting in an occupancy rate of about 1.85 people/housing unit. For projections in this Facilities Plan, a value of 1.85 persons per dwelling unit shall be used. An additional 235 housing units were seasonally occupied. Owners of these homes are not counted on census data, but for the purposes of this plan, seasonally occupied homes are assumed to have the same number of occupants as the general residential population. This factor gives a seasonal residential population of 435 people.

The 2000 census shows an additional 51 residential housing units as vacant. The projections for population are based on current population; so vacant units are not counted. Infiltration and inflow (I/I) are dependant partly on the size of the piping system in the ground, which will be greater due to the vacant units. Flows will be accurate on a per capita basis for base sewage, but slightly high for I/I, which will include flows from vacant properties with sewer connections. The assumption is made that vacant housing is interspersed throughout the community, and that the vacancy rate will hold steady in the future. Unless the occupancy rate changes neglecting the vacant units will introduce negligible error in the future projections.

Tourist / Transient Population

The vast majority of commercial water use within the City is related to the lodging industry. The tourist population, during the peak summer and winter holiday vacation periods, frequently exceeds the resident population.

Visits were made to each lodging facility in the City to obtain data on numbers of rooms, the approximate occupancy rates throughout the year, toilet and fixture counts, and other pertinent data. It was determined that approximately 270 lodging units are located within the City with approximately 60 transient rental properties for a total of 330 lodging units. Transient rental properties include beach houses, bed & breakfasts, and other “rent-by-the-day” establishments.

The City Comprehensive Plan estimates that approximately 2.5 persons per lodging unit are typical of visitors to the Yachats lodging facilities. Based on a full or peak occupancy rate, a tourist population of approximately 825 persons should be expected on peak tourist days. Peak tourist season includes the summer months, spring break and mid-December to mid-January.

According to information received from various lodging facilities, the estimated off-peak or yearly average occupancy rate is approximately 50 percent based on revenue streams throughout the year. Therefore, during off-peak times, approximately 413 persons will make up the tourist population sector for the City of Yachats.

The Comprehensive Plan also suggests that the growth of commercial facilities will be at approximately 3.0 percent over the 20-year planning period. This slightly higher growth rate will serve to provide capacity for the increasing popularity of Yachats as a tourist destination.

Total Sewer Service Population

The sum of each population sector described above is the total equivalent population for the City of Yachats. Table 2.3.1 summarizes both peak and off-peak population estimates for the City of Yachats current population and projections for the planning period.

TABLE 2.3.1
CURRENT POPULATION ESTIMATE AND POPULATION PROJECTIONS

Year	2000	2004	2005	2010	2015	2020	2025	2029
Residential Population(1)	617	673	689	770	860	961	1,075	1,175
Peak Part-Time Residential(2)	427	465	476	532	595	665	743	812
Off-Peak Part-Time Residential(3)	214	233	238	266	297	332	371	406
Peak Tourist Population(4)	825	901	929	1,076	1,248	1,447	1,677	1,888
Off-Peak Tourist Population(5)	413	451	464	538	624	723	839	944
Total Peak Population	1,869	2,040	2,093	2,378	2,703	3,073	3,494	3,874
Total Off-Peak Population	1,294	1,357	1,391	1,574	1,781	2,017	2,285	2,524

(1) With moderate 2.25% (+ -) growth per year.
(2) With moderate 2.25% (+ -) growth per year.
(3) 50% occupancy.
(4) Beginning with 268 motel rooms and 61 transient rentals w/ 2.5 ppr @ 3% (+ -) growth per year.
(5) 50% occupancy.

Not all residents in the City are currently connected to the sewer system. City records show a total of 684 water accounts inside the UGB versus 639 sewer accounts for the year 2000. Assuming 1.85 persons per sewer account, the sewered population was 1,786 or 96% of the population of 1,869 inside the City Limits. This Facilities Plan proposes improvements that will allow 100% of the population inside the UGB to be sewered.

Land Use

Land use within Yachats is categorized into five general uses: residential, commercial, public facilities, state parks, and estuary natural. There is an estimated 600 acres within the current UGB. The Yachats zoning map is shown as Figure 2.3.2. The five land use classifications are briefly discussed below:

- **Residential Lands.** Yachats' residential lands are throughout the community and on each side of Highway 101. Residential lands also occupy the elevated marine terrace directly south of town and new subdivisions are being constructed in the hilly areas surrounding town. Residential land use ranges from single-family dwellings to multi-family dwellings to bed and breakfast and motel land uses.

- **Commercial Lands.** The commercial properties are clustered around Highway 101. The center of the commercial land use areas is located around Third Street and extends outward. Commercial activities generally include retail and tourist related services. Small shops and restaurants catering to the seasonal tourist market make up the majority of the commercial properties in the City.

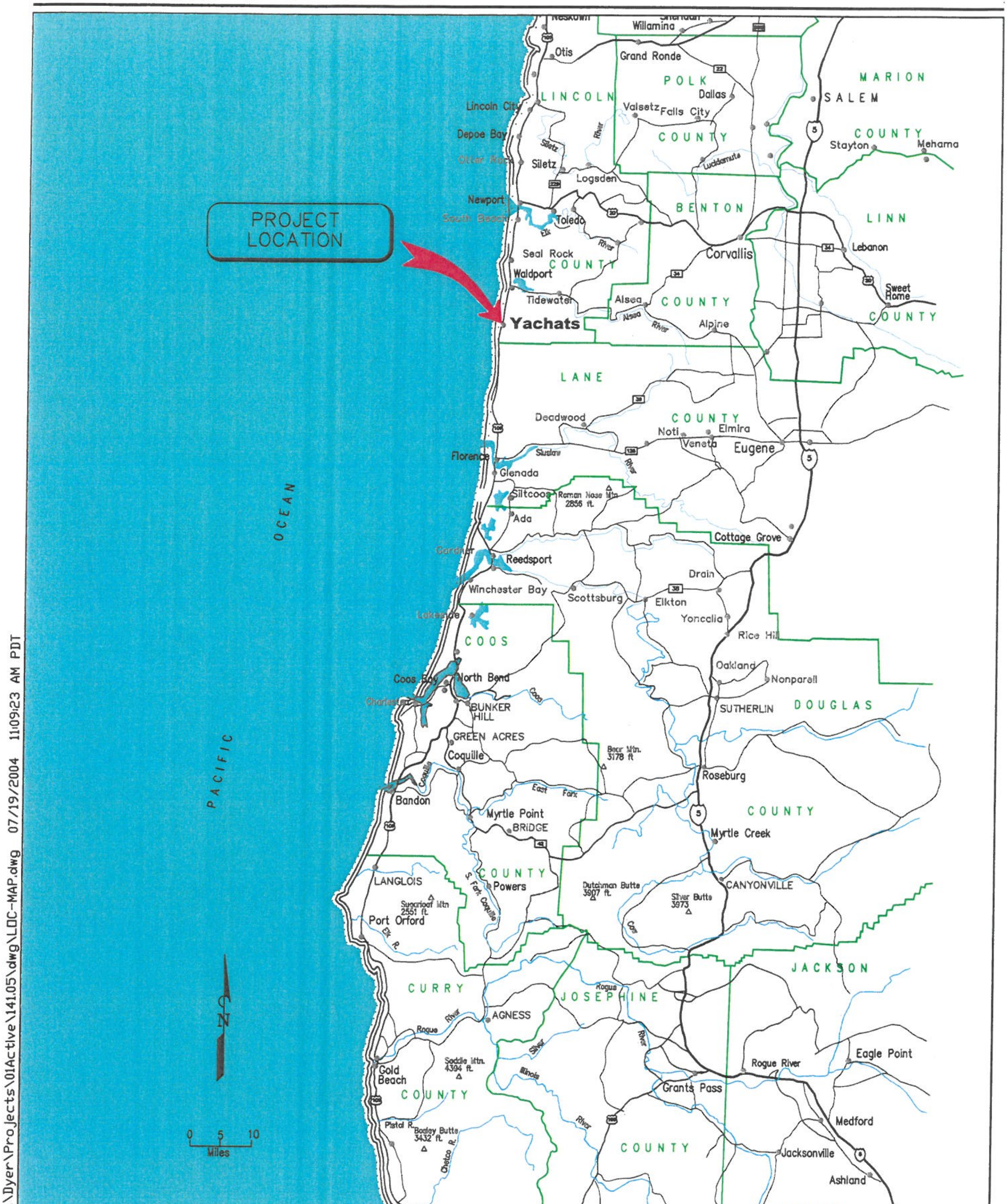
- **Public Facilities Lands.** Public lands consist of those required for government offices, schools, hospital, transportation facilities, parks, and recreation areas. The wastewater treatment plant and city shops are included within the public facilities lands.

- **State Parks Lands.** A number of state park land use areas are located within the City's UGB. Smelt Sands State Wayside, Yachats State Park, and Yachats Ocean Road Wayside are all located within the UGB and provide access to the ocean beaches and scenic areas which for tourists and residents alike.

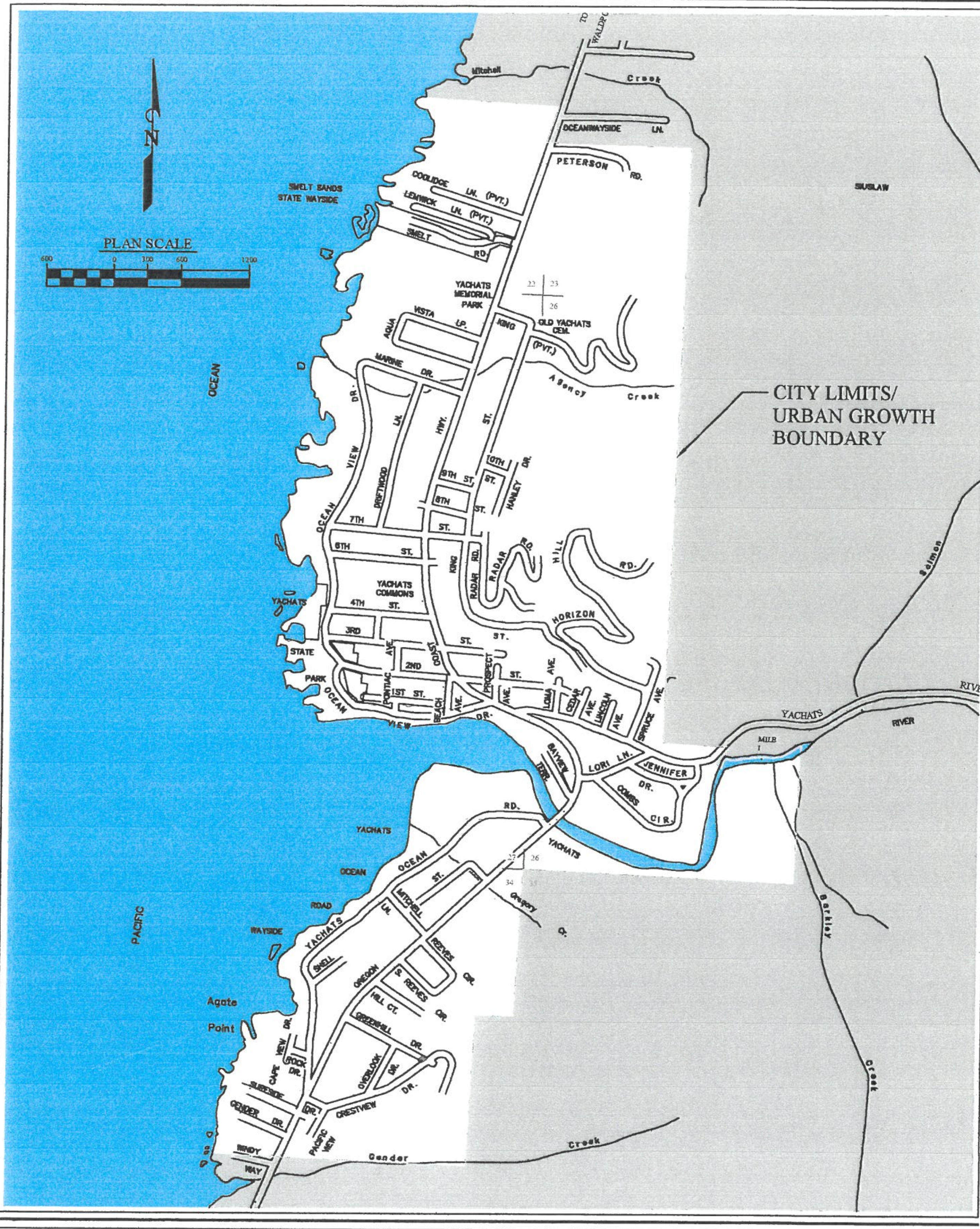
- **Estuary Natural Lands.** The estuary natural land use areas are located near the mouth of the Yachats River and extend into the Yachats Estuary. The ocean beaches and areas immediately adjacent to the coast are also included within the estuary natural land use sector.

Economic Profile

The median household income (MHI) in Yachats was $32,308 based on the 2000 census. Approximately 40% of the working population is employed in industries heavily influenced by tourism, such as retail sales, food service, entertainment, and property leasing. Less than 15% of local jobs are in production industries, such as agriculture, manufacturing, or construction.



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	**CITY OF YACHATS WASTEWATER FACILITIES PLAN**	FIGURE NO.
DATE: SEPTEMBER, 2004	**LOCATION MAP**	**2.1.1**
PROJECT NO.: 141.05		



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS WASTEWATER SYSTEM FACILITIES PLAN***	FIGURE NO.
DATE: SEPTEMBER, 2004 PROJECT NO.: 141.05	***STUDY AREA MAP***	***2.1.2***

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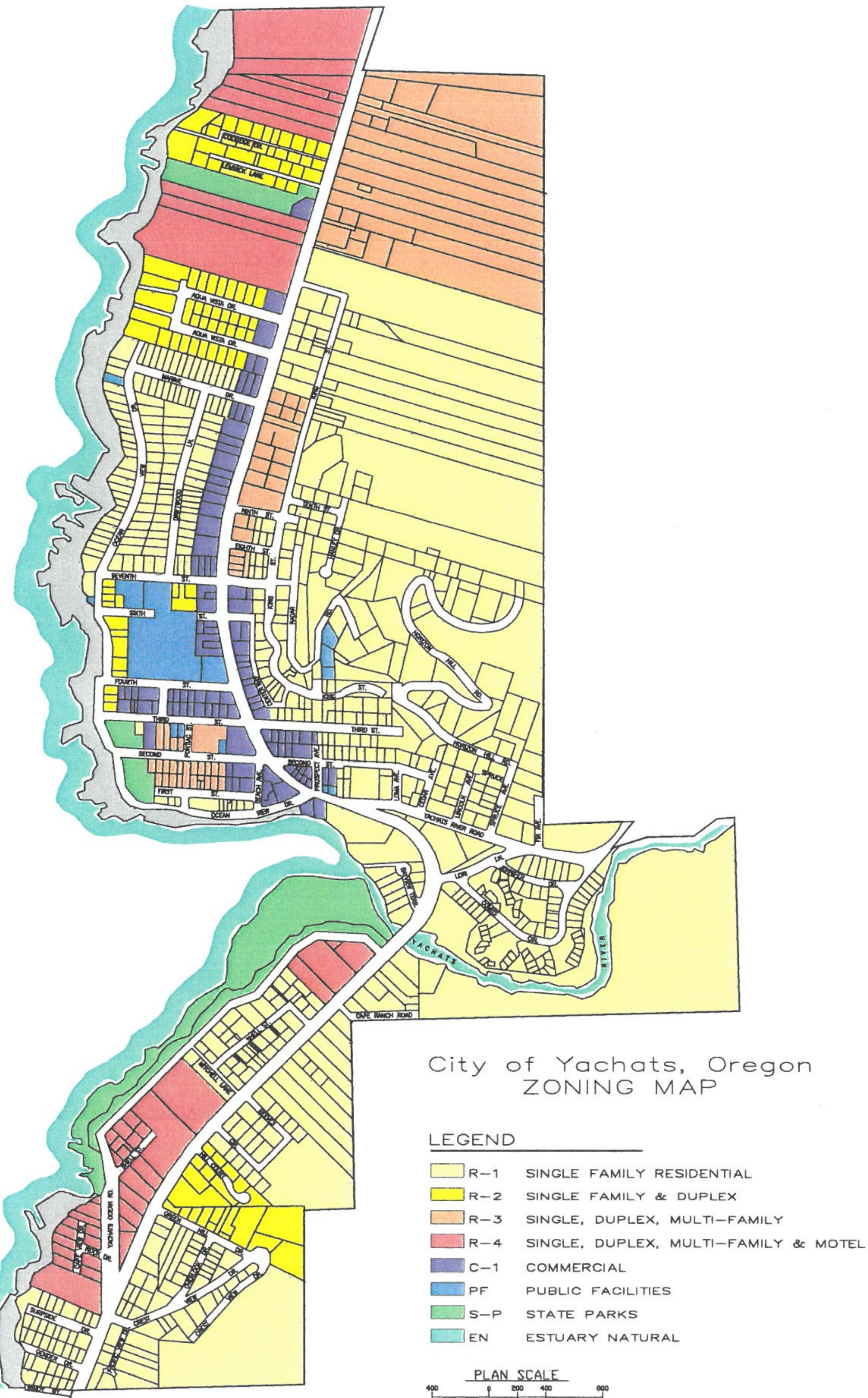

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	WASTEWATER SYSTEM FACILITIES PLAN	FIGURE NO.
DATE: SEPTEMBER, 2004		
PROJECT NO.: 141.05	ZONING MAP	2.3.2

Existing Wastewater Facilities

Section

3

Existing Wastewater Facilities

Section 3

3.1 System History

The City of Yachats wastewater system is relatively new when compared to other communities in the State of Oregon. The existing system was essentially constructed in 1974 as a modern sanitary system complete with collection, pumping stations, a secondary wastewater treatment plant, and an ocean outfall. The wastewater system is operated under Waste Discharge Permit # 100812 of the National Pollutant Discharge Elimination System a copy of which is included in Appendix A.

In 1991, a large line extension project was undertaken in order to provide services for newer homes built on the eastern side of the City near the treated water reservoir. A substantial system expansion was constructed in 1980 to provide sanitary sewer service to the Quiet Water Subdivision. The development included both gravity and pressure systems in order to serve the development. Numerous other sanitary sewer extensions have been undertaken over the years to expand sewer services to nearly all residents living within the City Limits.

An inflow and infiltration (I/I) improvement project was completed in December 2003 to address deficiencies in the existing system that allowed surface and ground water to flow into the collection system. The I/I project included upsizing trunk lines on Yachats Ocean Road and inversion lining approximately 750 feet of existing line.

Today, the Yachats wastewater system includes about twelve miles of gravity collection piping, five wastewater-pumping stations, a wastewater treatment plant providing primary and secondary level wastewater treatment, and an ocean outfall. The system has experienced raw sewage overflows and has received Notices of Noncompliance letters from DEQ for exceeding the allowed effluent concentration levels. The City entered into an MAO (see Appendix A) with DEQ on June 13, 2003 to establish a schedule and interim compliance level for operating the WWTP while working to correct the system deficiencies.

The following sections include more detailed descriptions and analyses of each component of the wastewater system including capacity, performance, and operation and maintenance issues.

3.2 Wastewater Conveyance System

Collection System Description

The Yachats wastewater conveyance system currently consists of approximately 65,430 feet of mainline gravity pipe (6 to 12 inch), 300 manholes, and 7,100 feet of pressure piping. The system also has five lift stations. The existing collection system is illustrated in Figure 3.2.1, bound at the end of this section. The piping system inventory is presented in Table 3.2.1.

TABLE 3.2.1
WASTEWATER CONVEYANCE SYSTEM INVENTORY

Pipe Diameter	Type	Material	Length (LF)	% of Total
Pipe Diameter	Type	Material	Length (LF)	% of Total
4	Pressure	AC	633	0.86%
4	Pressure	Cast Iron	809	1.1%
4	Pressure	PVC	820	1.1%
6	Pressure	AC	3,023	4.1%
10	Pressure	PVC	1,850	2.5%
10	Gravity Outfall	CI	670	0.9%
6	Gravity	AC	1086	1.5%
8	Gravity	AC	46,076	62.9%
8	Gravity	PVC	11241	15.3%
10	Gravity	AC	5,870	8.0%
10	Gravity	Concrete	380	0.5%
12	Gravity	AC	780	1.1%
Total			73,238	100%

The collection system was largely constructed in 1974 with the pump stations and treatment plant. Most of the piping in the collection system is 8-inch asbestos cement piping or larger and placed with generous slopes, in many cases exceeding 0.4%. A review of the as-built drawings shows that piping systems in the southern portion of the system are placed below the minimum slope guidelines with the flattest section constructed with a slope of 0.05%.

As part of the Facilities Plan, the collection system was separated into nine distinct sub-basins based upon areas of gravity drainage. These sub-basins are shown in Figure 3.2.1.

A brief discussion of each sub-basin is provided below:

Sub-Basin "A"

Sub-basin "A" is located in the northern portion of the City between Highway 101 and Ocean View Drive. The majority of the land use in this basin is made up of residential users. The northern portion of the basin is home to hotel and bed-and-breakfast type businesses including the Adobe Resort, The Overleaf Hotel, and the Fireside Hotel. The hotels are popular resort and travel destinations throughout the year.

Flows from the basin are collected into an interceptor that runs south on Ocean View Drive. The interceptor terminates in a 12-inch diameter main line into the Main Pump Station.

Approximately 58 residential dwellings are located within sub-basin "A". In addition to the residential dwellings, three hotels with a total of 176 rooms are located within the sub-basin.

A new 30 to 40-unit retirement community development is currently under construction in the northern portion of the sub-basin adjacent to Highway 101.

The basin contains a number of large lots that are over one-acre in size. The midsection of the sub-basin includes residential properties on typical ¼ acre lots. Few lots in the sub-basin are vacant and available for development.

Sub-Basin "B"

Sub-basin "B" is located just to the south of sub-basin "A" and is made up of primarily residential users. A band of commercial property is located adjacent to Highway 101.

All of the collection piping in the sub-basin is 8-inches in diameter and is collected into a trunk line on Marine Drive. The collection system from the sub-basin terminates where the truck line connects into the interceptor on Ocean View Drive.

Approximately 64 dwellings are located within sub-basin "B". The majority of the dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. Few lots in the sub-basin are vacant and available for development.

Sub-Basin "C"

Sub-basin "C" is located to the south of sub-basin "B" and is made up primarily of residential users with commercial users fronting Highway 101.

All of the collection piping in the sub-basin is 8-inches in diameter and is collected into a trunk line on Driftwood Lane. The collection system from the sub-basin terminates when the truck line connects into the interceptor on Ocean View Drive in Sub-Basin "D".

Approximately 50 dwellings are located within sub-basin "B" along with two hotels with a total of 37 rooms. The majority of the dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. A number of vacant lots are located on the east side of Highway 101 with few vacant lots on the west side of Highway 101.

Sub-Basin "D"

Sub-basin "D" is located in the center of the City and includes the property housing the wastewater treatment plant, City Hall and the City Shops. In addition, commercial users border Highway 101, while residential properties are located in the hills to the east of the highway.

The collection system in the sub-basin is primarily 8-inch piping with a 10-inch interceptor running through the sub-basin and eventually terminating in the Main Pump Station, which is also located within sub-basin “D”. A 6-inch pressure main transmits all the flows in the entire system from the Main Pump Station to the wastewater treatment plant. For higher winter flows, a 12-inch pressure main was installed parallel to the 6-inch pressure main. The larger pressure main, resulting in lower head-losses, is capable of transmitting much higher flows from the Main Pump Station to the wastewater treatment plant.

Approximately 118 dwellings are located within this sub-basin. The majority of the dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. A number of larger lots are located in the upland hills to the east of Highway 101. A handful of vacant lots are scattered throughout the sub-basin with little development opportunities available.

Sub-Basin “E”

Sub-basin “E” is located on the north side of the Yachats River mouth to the west of Highway 101. This sub-basin includes some residential properties with commercial properties adjacent to the Highway. The western portion of the sub-basin is home to Yachats State Park.

8-inch collection piping carries flows to the Pontiac Pump Station where a 4-inch pressure main pumps sewage into the interceptor in sub-basin “D”.

Approximately 53 dwellings are located within this sub-basin. Nearly all dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. Few vacant lots are available within this sub-basin.

Sub-Basin “F”

Sub-basin “F” is located to the east of sub-basin “E” and Highway 101. The sub-basin is entirely zoned for residential dwellings with the exception of the properties adjacent to the highway. The majority of the basin is located in the upland, hilly area east of Highway 101.

The collection system is made up of 8-inch piping that terminates at the Riverside Pump Station. A 4-inch pressure main carries sewage along the highway where it dumps into the interceptor in sub-basin "D”.

Approximately 51 dwellings are located within this sub-basin. Nearly all dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. Some larger lots are located in the easternmost portion of the sub-basin, many of which are vacant and available for residential development.

Sub-Basin “G”

Sub-basin “G” is located south of sub-basin “F” and north of the Yachats River. The sub-basin is primarily composed of the Quiet Water residential subdivision.

8-inch collection piping carries flows to the Quiet Water Pump Station where a 4-inch pressure main conducts sewage to a gravity line on Bayview Terrace. Flows then proceed by gravity to the Riverside Pump Station.

Approximately 53 dwellings are located within this sub-basin. Approximately half of the sub-basin is composed of single-family residential dwellings on typical residential lots, ¼-acre in size or less. The balance of the sub-basin is composed of vacation, time-share, or temporary homes on small lots.

Sub-Basin "H"

Sub-basin "H" is located to the south of the Yachats River and the west of Highway 101. Residential properties are located within the sub-basin along with hotels and lodging establishments. The Yachats Ocean Road State Wayside is located along the western edge of the sub-basin.

8-inch collection piping carries flows to the Ocean View Pump Station. A 4-inch cast iron pressure main crosses the Yachats River and empties into the Riverside Pump Station. Much of the collection system within the sub-basin is placed below minimum slope standards resulting in backed up flows and occasional overflows at specific manholes in the sub-basin. problem

Approximately 71 dwellings are located within this sub-basin including two hotels with a total of 56 units. A 40-unit condominium complex is currently under development within the basin. The residential lots within the basin are comprised of typical ¼-acre lots with some large lots adjacent to the coastline. A handful of large parcels are vacant in the mid-section of the sub-basin. Few vacant parcels are available elsewhere within the sub-basin for development.

Sub-Basin "I"

Sub-basin "I" is located to the east of sub-basin "H" in the upland areas east of Highway 101. Residential properties make up the vast majority of the users in this sub-basin.

8-inch collection piping carries flows into the adjacent sub-basin "H".

Approximately 44 dwellings are located within this sub-basin. Much of lots in the sub-basin are comprised of typical ¼-acre lots with some large lots in the eastern portion of the sub-basin. Sub-basin "I" has the largest share of vacant and developable property within the UGB.

Pump Stations

The Yachats wastewater system includes five raw sewage pump stations. The location of each pump station is shown on Figure 3.2.1. A visual inspection and drawdown test was performed on each pump station during the month of October of 2000. The following sections provide a brief summary of each pump station. Figure 3.2.2 provides a schematic detailing the relationship of each basin, pump station, and the treatment plant to the rest of the wastewater system.

The public works staff monitors each station's performance by visiting the stations every other day. Each station is duplex, with a redundant pump at each station. Photographs of each pump station are shown in Figures 3.2.3 through 3.2.7, bound at the end of this section.

Forcemain detention times were calculated by comparing the working volume of the wet well for each pump station with the average flow to calculate time between pump starts and the volume of waste pumped with each pump start. The pump cycle volume was divided into the force main volume to determine the minimum number of pump cycles needed for waste to pass through the forcemain. The minimum number of pump cycles multiplied by the time between pump starts is the forcemain detention time.

Generator loads were based on sequential starting of each of the two pumps and a load of one kW for controls and alarms. The highest step load was compared to generator catalog data for a maximum 35% voltage drop at pump start up, and the smallest generator that met the load under these conditions was selected.

Overflow discharge locations and time to overflow were taken from the current City Bypass Plan. Other information was collected on site and from design and construction documents.

Key design data for the pump stations is summarized in Table 3.2.2.

TABLE 3.2.2
PUMP STATION DESIGN DATA

Pump Station	Main(1)	Pontiac	Riverside	Ocean View	Quiet Water
STATION					
Date Built	1973	1973	1973	1973	1980
Last Upgrade	1993	1991	-	-	-
Type	Duplex Drywell-Wetwell	Duplex Packaged	Duplex Packaged	Duplex Packaged	Duplex Packaged
EPA Classification	I	I	I	I	I
Brand	Smith & Loveless	Smith & Loveless	Smith & Loveless	Smith & Loveless	Hydronix
Level Control	Electronic Probe	Electronic Probe	Electronic Probe	Electronic Probe	Electronic Probe
Pump Type	Non-clog vertical	Self-Priming	Self-Priming	Self-Priming	Self-Priming
Pump Installation Year	1993	1973	1973	1973	1980
Motor Size (HP)	10	5	5	1.5	7.5
VFD	Yes	No	No	No	No
Rated Flow (GPM)	350 – 540	150	150	100	150
Head (FT)	58 – 47	21.5	38	4	50
Flow Monitoring	None	None	None	None	None
Overflow Point	MH A-4	MH E-13	MH G-1	Wetwell	MH G-3
Overflow Elevation	23.8	24.8	16.0	18.5	
Overflow Discharge Stream	Pacific Ocean	Pacific Ocean	Pacific Ocean	Yachats River	Yachats River
Time to Overflow(2)	3 hours	4 hours	4 hours	3 hours	18 hours
Alarm Type	Autodialer	Autodialer	Autodialer	Autodialer	Autodialer
AUXILIARY POWER					
Type	Portable	Portable	Portable	Portable	Portable
Aux. Power Output(3)	30/35 kW	30/35 kW	30/35 kW	30/35 kW	30/35 kW
Station Requirement	25 kW	20 kW	20 kW	5 kW	25 kW
Diesel Fuel Tank Capacity	50 gallon	50 gallon	50 gallon	50 gallon	50 gallon
Run Hours per Tank	25	25	25	31	25
ELEVATIONS					
Ground	23.8	22.0	16.0	17.9	11.5
Wet Well Floor	10.0	15.5	6.0	8.0	-2.31
FORCE MAIN					
Force Main Length (feet)	1,850	633	1,173	809	820
Force Main Dia. (inches)	6 & 10	4	6	4	4
Detention Time (minutes)(4)	15	10	23	10	96
Material	AC	AC	AC	Cast Iron	
Profile	Descending/ Ascending	Ascending	Ascending	Descending/ Ascending	Ascending
Discharge Point	Headworks	MH D-17	MH D-18	Riverside PS	MH G-2
Condition Discharge MH	NA	Good	Good	NA	Good
Air/Vacuum Release Valve	None	None	None	None	None
Sulfide Control	None	None	None	None	None

(1) First number for flow & head is with 6" main, second number is with 10" main
(2) Based on City Bypass Response Plan
(3) Two portable generators are available for emergency power, one is 35 kW and one is 30 kW, each with 50 gallon fuel tank.
(4) Detention time is based on average flow equal to ½ of single pump capacity. Quiet Water is based on actual pump run times.

Main Pump Station

All of the flows in the Yachats wastewater system eventually find their way to the Main Pump Station. The pump station acts as the final leg in the collection system as it pumps all combined flows into the wastewater treatment plant.

Located near the intersection of Marine and Ocean View Drives, the station was originally constructed in 1974 with the rest of the wastewater system. The station is a factory-built, deep dry well with an adjacent wet well type pumping station by Smith and Loveless. The dry well houses two variable speed pumps each rated at 350 gpm at 58 feet TDH. Each pump utilizes a vacuum priming system. Specifications on the pumps are as follows: 10 HP, 230 V, 60 Hz, 3 phase, 1,200 rpm.

Originally, a 6-inch pressure main transmitted all combined flows to the wastewater treatment plant. To reduce head losses and increase flow rates, a 10-inch pressure main was constructed parallel to the original 6-inch main in 1993. In the summer, while flows are reduced, the 6-inch main is utilized. In the winter, when flows increase, the City manually switches to the 10-inch main. The pumps are rated at 540 gpm at 47 feet TDH each when using the 10-inch main. Combined pump capacity is rated at 1040 gpm at 47 feet TDH in the HGE construction design for the 10-inch pressure main.

While observing the wetwell, it was clear that the Main Pump Station utilizes short pumping cycles. Also, as the level of the wetwell falls, a significant amount of sewage empties out of the adjacent inlet pipes. This flow indicates that a significant amount of sewage backs-up into the surrounding collection system. Shortly after the flows from the collection system normalize, the pumping cycle ends, the wetwell fills to cover the pipe outfalls, wastewater backs-up into the collection system, and the process begins again.

Due to the short pump cycles, long distance from the control panel and the wetwell, and the high flows in the station, a drawdown test was not possible at this time. However, the influent flow meter at the wastewater treatment plant read approximately 530 gpm during pumping cycles into the headworks.

Estimated peak system flow for a five-year storm with existing conditions is 1,600 gpm. This quantity exceeds the capacity of the pumps and puts the station at risk of an overflow during a major winter storm.

Generally, the Main Pump Station is in good condition. Minor upgrades and regular maintenance over the years have helped the station remain in good repair and operating condition. The station is due for replacement of the anodic protection for the steel chamber. The inside of the drywell for this pump station is illustrated in Figure 3.2.3, bound at the end of this section.

Pontiac Pump Station

This station is located in sub-basin "E" near the intersection of Ocean View Drive and Pontiac Drive. The pump station collects flows from sub-basin "E" and transmits flows to sub-basin "D" through a 4-inch pressure main. The pump station was constructed at the same time as the majority of the wastewater system in 1974.

The station is a Smith and Loveless packaged unit (4B2B) mounted on top of the wet well, with two pumps rated at 150 gpm each at 21.5 feet TDH. Each pump utilizes a vacuum priming system. Specifications on the pumps are as follows: 5 HP, 230 V, 60 Hz, 3 Phase, 1,200 rpm.

The Pontiac Pump Station is constructed on a rocky cliff immediately adjacent to the Pacific Ocean. The wetwell is formed into the large rock and rubble that makes up the breakwater separating Ocean View Drive from the sea. Despite regular maintenance and upkeep, the elements and the constant pounding from wind and saltwater has taken its toll on the pump station. The hinges and hardware on the fiberglass enclosure have completely rusted away; a worker must manually hold the open cowling to prevent the wind from sending it sailing into the ocean. The piping and control panel within the station also show severe signs of corrosion. The cliff side location of this station makes it physically difficult to maintain and exposes it to the elements more than any other City pump station. The station lacks railings or anchor clips for safety gear, posing a risk to maintenance workers.

During drawdown testing, it was determined that the pump station is capable of pumping approximately 140 gpm. While this rate is 7-percent below the design capacity, it is well within acceptable ranges for pump performance. The discharge manhole condition was checked by probing with a screwdriver and is in good condition.

Riverside Pump Station

This station is located near the intersection of First Street and Highway 101 as shown in Figure 3.2.5. The pump station collects flows from sub-basins "F" and "G" as wells as sub-basins "H" and "I" from the south side of the Yachats River. Flows are transmitted to sub-basin "D" through a 4-inch pressure main. The pump station was included in a portion of the original wastewater system that was developed in 1973.

The station is a Smith and Loveless unit (4B2B), with two pumps rated at 150 gpm each at 38 feet TDH. Each pump utilizes a vacuum priming system. Specifications on the pumps are as follows: 5 HP, 230 V, 60 Hz, 3 Phase, 1,200 rpm.

A number of improvements and regular maintenance over the years have kept the Riverside Pump Station in good condition. Aluminum and stainless steel parts installed on the station will last for many years. The discharge manhole condition was checked by probing with a screwdriver and is in good condition.

During draw down testing, it was determined that the pump station is capable of pumping approximately 146 gpm. Being only 3-percent off of the design capacity, the performance of the pump station is considered to be very good.

Ocean View Pump Station

Ocean View Pump Station (formerly called Park Road Pump Station) is located off of Yachats Ocean Road on the south side of the Yachats River as shown in Figure 3.2.6. Flows from sub-basins "H" and "I" are collected and transmitted across the Yachats River and into the Riverside Pump Station. The pump station was included as part of the original wastewater system that was developed in 1973.

Problem

The station is a Smith and Loveless packaged unit (4B2B), with two pumps rated at 100 gpm each at 4 feet TDH. Each pump utilizes a vacuum priming system. Specifications on the pumps are as follows: 1-1/2 HP, 230 V, 60 Hz, 3 Phase, 1,200 rpm.

The pump station is in good condition today due to regular maintenance and upgrading by City personnel. The wetwell appears to be quite shallow, providing little storage for pump down times or equipment failures. Estimated peak flows for this basin meet or exceed the rated pumping capacity of this station, which could lead to raw sewage spills.

During drawdown testing, it was determined that the station is capable of pumping approximately 73 gpm. Since the design capacity of the station is 100 gpm, the 27-percent difference is considered to be a significant deficiency. Worn impellors are a likely cause of the reduced pumping capacity.

Quiet Water Pump Station

This pump station is located adjacent to Combs Circle in the Quiet Water. The pump station was constructed when the subdivision was developed in 1980. All of the flows within sub-basin "G" are transmitted through a 4-inch pressure main into the Riverside Pump Station in sub-basin "F".

The station is a packaged type system by Hydronix. The two Hydro-Matic pumps are rated at 150 gpm each at 50 feet TDH. Each pump is self-priming and has the following specifications: 7-½ HP, 230 V, 60 Hz, 3 Phase, 1,800 rpm.

Due to the small service population and seasonal influx of tourists, the pump station has experienced low run times and limited use. In the off-season, the station will go for some time without running. Because of the light duty required of the station, and a regular maintenance program, the station is in good condition today. The discharge manhole condition was checked by probing with a screwdriver and is in good condition.

During drawdown testing, it was determined that the station is capable of pumping approximately 140 gpm. While this rate is 7-percent below the design capacity, it is well within acceptable ranges for pump performance.

Existing I/I Problems

The core problem within the existing collection system is the presence of large amounts of I/I. Flows at the WWTP are very responsive to the previous 48 hours of rainfall. The immediate flow response at the WWTP indicates that there is a significant amount of inflow and rain induced infiltration in the system. As part of the 1991 Comprehensive Wastewater Plan, flow mapping and smoke testing were conducted. The conclusion was that most of the winter-flow in the system at that time was due to rain induced infiltration. Rain induced infiltration is difficult to locate and eliminate from the system.

Wet weather peak flows increased 52% between 1991 and 2001, while dry weather flows (an indicator of population) have increased only 31%. Since the population in general tends to be lower in winter, domestic sewage does not account for the wet weather increase. The higher wet weather flows suggest an increase in prohibited downspout and area drain connections to the sanitary sewer, or a deterioration of the collection system. Smoke testing, the most efficient method of detecting inflow, was performed in May 2003 and numerous uncapped cleanouts and broken laterals were discovered. Letters were sent to affected property owners, and the majority of problems have been addressed. A map showing the location of inflow sources detected by smoke testing is included in Figure 3.2.8, bound at the end of this section.

Flow mapping in February 2002 located several areas of infiltration as noted in Figures A and B in Appendix B, but flows at the plant indicate much higher I/I flows than were apparent during the flow mapping. Select sections of the collection system, identified as potential problem areas by the flow mapping results were video inspected in May 2003. The general condition of the piping was much better than expected considering the high I/I rates, but several isolated areas of severely damaged pipe were discovered.

I/I repair work on the problems already identified was completed in December 2003. This work includes replacement of damaged pipe, lining of some deteriorated pipe, and rehabilitation of 24 manholes as shown in Figure 3.2.9, bound at the end of this section. Flow reductions as a result of this project are discussed in Section 4.

Collection System Deficiencies

Two sections of piping are laid at slopes that do not provide adequate capacity for peak flows during a five-year storm with current I/I conditions. The projection for these pipe sections is for increased future flows, with an associated probability of raw sewage overflows. A portion of the low slope pipe on Yachats Ocean Road was replaced as part of the I/I repair program in January 2004.

Five manholes were identified as leaking, during the 2002 flow mapping. Water infiltrating these manholes contributes to the high flows seen at the treatment plant during rainy weather.

DEQ records indicate that several manholes are below local floodwaters during heavy rains. Flow into these manholes during heavy rains or local flooding may dramatically increase the peak flows at the WWTP.

3.3 Wastewater Treatment Facility

History

The Yachats wastewater treatment plant was constructed in 1973 as a complete mix, activated sludge, secondary treatment facility. The style of plant is commonly referred to as a "doughnut" type packaged plant, with the clarifier in the center and aeration basins and a digester around the doughnut's ring. Constructed adjacent to the treatment facility is a combination control building, laboratory, and housing for equipment and supplies related to the wastewater treatment plant.

Originally, the process was designed and constructed with a total biological capacity of 150,000 gpd and a total hydraulic capacity of 500,000 gpd. A 1991 wastewater study (HGE Engineers and Planners, Inc) identified deficiencies in the original plant and recommended that the treatment plant be expanded to provide additional hydraulic and biological capacity. To accomplish this expansion, an additional treatment unit was constructed adjacent to the original to relocate the secondary clarifier operation and increase the sludge digestion capabilities of the plant. The existing clarifier was converted into a second digestion chamber. A 60 kW generator and transfer switch were added to provide emergency power to essential treatment components. The new treatment plant hydraulic capacity was increased to approximately 1.9 MGD (peak one-hour flow). A summary of component specifications is included in Table 3.3.1. 13 years

TABLE 3.3.1
YACHATS WWTP COMPONENT DESIGN SPECIFICATIONS

Component	Type	Capacity
Influent Pump Station	Non-clog Centrifugal Pumps	1040 gpm
Influent Flow Meter	Ultrasonic	7.0 MGD
Influent Screen	Lakeside Fine Mesh	2.0 MGD
Grit Removal	Centrifugal Vortex	2.5 MGD
Grit Washer	Screw Classifier	1,100 lbs/hr
Aeration Basin 1	Complete Mix/Plug Flow/Step Feed	5,414 CF
Aeration Basin 2	Complete Mix/Plug Flow/Step Feed	5,414 CF
Secondary Clarifier	Conventional Scraper	35 ft Dia/16 ft deep
Digester 1	Aerobic Digester	5,000 CF
Digester 2	Aerobic Digester	6,124 CF
Chlorine Contact Chamber	Dual Channel	7,925 CF total
Chlorinators (2)	Water Champ, Vacuum	100 lbs/day each
Outfall	10" Concrete Pipe W/Ocean Outfall	3.1 MGD
Sludge Drying Beds	Sand/Gravel bed over tile	3 @ 500 CF
Sludge Tank Truck	Spreader	3,000 gallons
Generator	Diesel	60 kW

Existing Treatment Process Description

Raw wastewater flows from the outlying basins to the Main Pump Station. From the Main Pump Station, flows are transmitted through either a 6-inch or 10-inch diameter pressure main to the wastewater treatment plant (WWTP).

Once flows reach the WWTP, they pass through a magnetic flow meter prior to entering a Lakeside brand, fine-mesh screening system. Rags, floatables, large debris, and non-decomposable materials are removed at the screen before flows enter a grit removal system. Flows from the grit works pass through piping and enter the doughnut portions of the treatment process.

Flows enter one of two complete mix aeration basins through circumferential distribution channels in the original donut structure. To accomplish aeration, air is introduced through diffusers on the floor of each basin.

Once aeration is completed, the wastewater is drawn off the aeration basins through standpipes and transmitted to the new secondary or final clarifier for final sedimentation. Within the circular clarifier, flows are introduced at the center and proceed to the exterior of the clarifier where they flow over a weir and into a circular collection channel. A rotating arm removes debris and buildup from the entrances to the collection channel.

The collection channel transmits flows to the entrance of a chlorine contact basin. The disinfected flow stream follows a serpentine path around baffles in the circular contact basin until finally entering the effluent or outfall manhole.

Nearly one-half of the original doughnut structure was converted to serve as an aerobic digester to increase sludge handling capabilities. Solids from the aeration and sedimentation processes are wasted to the digesters by air-lift pumps. Aeration is introduced to the digesters to provide the required oxygen for aerobic digestion. For emergency purposes, sludge-drying beds are located on the treatment plant site.

The plant was originally designed to provide an effluent discharge quality of 20 mg/L BOD and 20 mg/L TSS during summer flows and 30 mg/L BOD & TSS during winter flows. Generally, the effluent quality is excellent with the average BOD below 9 mg/L and the average TSS below 12 mg/L. Since 1999 the WWTP has not met the permit limits for Fecal Coliform on two occasions, the required removal rate on two occasions and the BOD mass load limit on one occasion. DEQ enforcement guidelines allow for three effluent limit permit violations in a 36-month period.

5 violations
3-4 yrs

Plant flows and processes are diagrammed in Figure 3.3.2. Design flows and loads for the WWTP are listed in Table 3.3.2.

TABLE 3.3.2
PLANT DESIGN FLOWS AND LOADING

Design Flows	
Average Dry Weather	0.17 MGD
Peak Monthly Average	0.29 MGD
Peak Daily Average	0.77 MGD
Peak Wet Weather	1.91 MGD
Reliability	EPA Class II
Design Loading	
Average Month BOD	206 ppd
Peak Day BOD	535 ppd
Average Month TSS	243 ppd
Peak Day TSS	681 ppd
Current Actual Flows (Based on 1997-2004 Jan. to May flows)	
Max. Month Wet Weather	0.30 MGD
Average Month Wet Weather	0.23 MGD
Average Month Dry Weather	0.14 MGD
Peak Daily	1.18 MGD
Peak Instantaneous	2.30 MGD
Current Actual Loading (Based on 1996 - 2001 flows)	
Average Month BOD	201 ppd
Peak Day BOD	1,159 ppd
Average Month TSS	212 ppd
Peak Day TSS	1,414 ppd

WWTP Condition

The facility has been maintained in good condition. The equipment is operable, and the buildings and tanks are structurally sound. There is some surface corrosion of steel components due to the salt air environment. The biological process provides adequate treatment and experiences minimal upsets.

Current DEQ regulations for a Class II facility require a redundant clarifier, which this facility lacks. The hydraulic flow for the plant regularly exceeds the design flow in the winter, and the plant is operating at capacity for mass loads. Flow readings from the raw sewage influent meter are questionable. The digester appears to be unable to deliver a Class B biosolid without the addition of lime. High humidity levels and low coastal temperatures prevent the effective use of the sludge drying beds.

Each component of the treatment plant was examined for condition, capacity and operability. Details for each component are discussed below.

Headworks

The existing headworks screen is designed for a flow of up to 2.0 MGD but experiences current peak flows of 2.3 MGD. The projected peak hourly flow for 2029 is 2.7 MGD, which exceeds the capacity of the screen. The diversion system flows through a bar screen sized for a flow of 3.0 MGD, large enough for future capacity. The headworks are uncovered, which creates a difficult work environment for operators. Screened solids are collected in open drums on carts, which then are dumped over an open platform into a dumpster. The cart is subject to overflow and collection of rainwater, creating an unsanitary condition. There is no safety stop to prevent the cart from falling off the platform. The grit container frequently is too heavy to safely lift, requiring manual shoveling of accumulated solids. At a minimum the headworks screen and piping need to be upsized for the future flows of 2.7 MGD. This required construction provides a good opportunity for addressing sanitation and worker safety issues.

Aeration Basins

There are two existing aeration basins with a total volume of 10,027 ft^3 based on the design data in the O&M manual. Guidelines for aeration basin sizing run from 25 lbs/day BOD per 1000 ft^3 of volume for extended aeration systems to 75 lbs/day BOD per 1000 ft^3 of volume for contact stabilization. As most plants employ a variety of operational methods, depending on intake flows and conditions, 50 lbs/day BOD per 1000 ft^3 was used for preliminary sizing. Based on this criteria, the existing aeration basins are capable of treating 500 lbs of BOD per day, which correlates well with the design maximum month load of 535 reported in the construction documents. The current maximum month load on the plant is 443 lbs of BOD per day with the projected future load at 819 lbs per day. The estimated capacity required for aeration of the future load is 16,500 ft^3.

Clarifier

The existing clarifier was built in 1995 and is in good condition. A maximum peak overflow rate of 1200 gallons/day/square foot (g/d/sf) and an overflow rate of 800 g/d/sf for MMDWF (Jon Gasik of Oregon DEQ, 2002) were used for sizing. Using these parameters, the existing clarifier can handle 1.15 MGD peak flow and 0.77 MGD MMDWF. The clarifier is undersized for the current peak daily flow of 1.18 MGD, and future peak day flows are estimated at over 1.4 MGD. DEQ regulations for a Class II WWTP require a second clarifier that is capable of handling 50% of the peak flow. The WWTP needs a second clarifier sized for a minimum of 50% of the peak flow. The peak design flow for the plant is limited by the capacity of the smallest clarifier, so matching the size of the existing clarifier would give the plant maximum clarifier design capacity.

The working volume of the clarifier basin is 15,490 cubic feet at average flow conditions. Based on the current average annual influent flow of 0.33 MGD, the average residence time in the clarifier is 8.4 hours.

Digesters

The existing digesters have a total capacity of 11,124 cubic feet (ft^3). The projected required capacity in 2029 is 13,705 ft^3. The existing digester space should be adequate to meet the current needs of the plant when sludge is removed from the digester regularly, based on a minimum 60 day digester retention time at 15°C. Site access for biosolids hauling is more difficult during rainy weather and not allowed during the growing season, causing excess sludge to be held in the digester. Currently there is a serious problem with digester capacity due to storing treated sludge in the digesters.

Digested sludge is currently treated with lime to obtain a pH level consistent with a Class B biosolid. Sacks of lime are manually carried up and emptied into the digesters. It is possible that the sludge has aged to the level of a Class B biosolid without the addition of lime, but the staff lacks the proper laboratory equipment to perform the tests. Reducing the need for lime would save staff time, material cost, and reduce staff exposure to hazardous conditions.

Biosolids treatment at the WWTP was reviewed in terms of actual and required tankage to comply with 40 CFR Part 503 regulations on control of pathogens and vector attraction. Control of pathogens for WWTP biosolids was evaluated using Class B Alternative 2: Use of Processes to Significantly Reduce Pathogens, PSRP (EPA 1995). For aerobic digestion, the mean cell residence time and temperature shall be between 40 days at 20°C and 60 days at 15°C. Vector attraction reduction was analyzed using Option 1, which is at least 38 percent reduction in volatile solids during treatment (EPA 1995). With the current WWTP operating parameters and assuming a mean cell residence time of 60 days, the required tankage to comply with the pathogen and vector attraction requirements is estimated to be about 87,000 gallons (see Appendix C). With both digesters, the actual tankage used for aerobic digestion is 83,000 gallons. Although the WWTP biosolids have been in compliance with the Part 503 regulations, it appears that the WWTP is at or over its capacity. To accommodate future loading, the WWTP will require approximately from 175,000 of aerobic digester space to meet the projected growth in the year 2029.

The City currently disposes of its biosolids by year-round land application. DEQ staff has indicated that land application of biosolids during the wet weather months may not be permitted in the future. If land application of biosolids is not permitted during the wet weather months, the City would need store the generated biosolids until land application was permitted (i.e. dry weather months). The anticipated biosolids generation in the Year 2029 is approximately 2,000 gallons per day or 350,000 gallons for a six-month period. Use of the existing donut plant as a digester would provide approximately 150,000 gallons of storage. Assuming 10 percent capacity for freeboard, the total estimated capacity required to be added for wet weather holding of biosolids would be equal to approximately 220,000 gallons.

Disinfection

The existing disinfection system consists of two chlorine contact chambers with a total capacity of 7,925 ft^3, listed in the O&M manual. Detention time is given as 65 minutes at ADWF and 14 minutes at peak daily flow in the construction plans for the facility. Current Oregon DEQ guidelines suggest 15 minutes of contact time at peak hourly flow, 20 minutes at peak daily flow or 60 minutes at ADWF, whichever produces the largest basin. Contact time for the basins, calculated by dividing the basin volume by the flow, is about 7.5 times the numbers given in the O&M manual. Assuming that the contact times were derated due the low length to width ratio and minimal baffling of the contact chamber, the O&M manual figures will be used for this study

The chlorinator is a gas induction system, originally tied to the influent meter to release chlorine amounts proportional to influent flows. The influent pump station operates in an on/off mode, which causes flow into the plant to be intermittent. Effluent flows do not match influent flows, resulting in uneven chlorination. Operating staff have over ridden the flow pace controls and manually set chlorine levels each day, with use ranging from two pounds per day to a high of 33 pounds. Manually controlling the chlorine tends to result in over chlorination at night. Chlorine use averaged seven pounds per day in 2001, based on the plant DMRs. Chlorine residuals averaged .96 mg/L for the same time period, with a high of 3.5 and a low of 0.2. Chlorination systems provide a possible hazard due to potential worker exposure to chlorine gas.

Permit allowed Fecal Coliform levels are 200 organisms per 100 ml monthly average with a weekly high of 400 organisms per 100 ml. Fecal levels reached 1600 on May 30, 2001 and 500 on September 12, 2001, violations of the NPDES permit. A note in the DMR for May 30 explains the elevated level as due to a build up of grease in the clarifier.

Laboratory

The existing laboratory lacks basic equipment necessary to analyze the wastewater stream. Several pieces of existing equipment are not working, or are unreliable. Without daily information on suspended solids, BOD levels, digester temperature, and dissolved oxygen levels, the plant will not run at maximum efficiency. The in-house staff has been remodeling the existing space to provide adequate room for testing. The addition of updated equipment would complete this space and allow the staff to more efficiently operate the plant.

3.4 Effluent Disposal

The City of Yachats utilizes an ocean outfall for the disposal of effluent. The outfall pipe is a 10-inch diameter, cast-iron pipe encased in a concrete backfill. The outfall is approximately 650 feet long and falls from the outfall manhole at elevation 30.50 feet to the pipe outfall at an elevation of approximately 0.00 feet. Under these conditions, the capacity of the outfall is approximately 3.1 MGD. The outfall is installed on a shallow rock shelve that extends out to a chasm between two rock outcroppings. Wastewater discharges onto the rock shelve about three feet from the chasm and flows into the ocean. Violent wave action between the two outcroppings provides mixing action. The discharge pipe is exposed during minus tides. The flow path from the end of the discharge pipe was clear of marine life, possibly due to the effects of residual chlorine in the effluent.

The mixing zone for the ocean outfall is defined as a 100-foot radius from the point of discharge. A mixing zone study was not performed due to lack of safe access. This outfall is located in the Mid Coast Basin, which has the following water quality criteria set: The discharge is allowed to cause no violations of the Clean Water Act including no reduction in dissolved oxygen levels, no significant increase in temperature, no more than a 10% increase in turbidity outside of the mixing zone. In addition the waters outside the mixing zone are limited to a pH between 7.0 and 8.5 and a maximum fecal coliform median concentration of 14 organisms per 100 milliliters, with not more than ten percent of the samples exceeding 43 organisms per 100 ml.

The waters inside the mixing zone may exceed the Clean Water Act standards, providing there is no acute or chronic toxicity to aquatic life. The most probable concern for toxicity within the mixing zone is chlorine with an acute threshold limit of 13 micrograms per liter and a toxic threshold limit of 7.5 micrograms per liter. This limit is likely not exceeded except when the discharge pipe is exposed and effluent flows undiluted across the rock outcropping.

No deficiencies or problems are apparent with the outfall capacity at this time or are expected within the planning period. The location of the discharge is of concern, both due to the potential for exceeding chlorine limits and to the potential for public contact with the effluent during minus tides.

3.5 Sludge Disposal

Sludge from the WWTP is treated with lime to achieve Class B pathogen standards. Meeting Class B standards allows the sludge to be used for beneficial soil enhancements on agricultural and forestlands. DEQ restricts the sites to non-public access sites with nitrogen-depleted soils. Strict limits are enforced on the amount of nitrogen and trace elements in the municipal sludge applied.

Disposal of the WWTP biosolids was evaluated with respect to regulatory requirements pollutant limits (i.e. 40 CFR Part 503, Subpart B) and to agronomic rate for the on-site vegetation (i.e. nitrogen). The Part 503 rule requires that biosolids be land applied at a rate that is equal to or less than the agronomic rate for nitrogen at the application site. Additional Part 503 requirements include the following (EPA 1995).

- Biosolids cannot be land applied unless trace element concentrations in the sludge are below ceiling concentrations specified in Part 503.

- Biosolids must meet either (1) the pollutant concentration limits specified in Table 3 of Part 503 or (2) the Part 503 cumulative pollutant loading rate (CPLR) limits for bulk biosolids.

The amount of plant available nitrogen (PAN) currently applied to the City's biosolids reuse site was first calculated and then compared with the nitrogen requirements of the site. The PAN provided at the reuse site from 1999 to 2002 was calculated using procedures outlined in EPA's *Process Design Manual - Land Application of Sewage Sludge and Domestic Septage* (1995). For the PAN calculation, average nitrogen concentrations (e.g. TKN, nitrate, etc.) from 1999 to 2002 biosolids analysis were utilized. It was assumed in this analysis that the biosolids contained 2.0% solids and were applied annually to 16 acres. Volatilization of applied ammonia was assumed to be negligible. A summary of the PAN calculations is presented in Appendix C. The reported nitrogen uptake for biosolids application to rye grass is 100 pounds per acre per year (EPA 1995).

The City land applies the treated sludge from the digesters for soil enhancement on agricultural land. A 16-acre pasture is the only current application site. The site is permitted for spreading year-round but is not usable during the May-August grazing season and heavy rain periods when the truck cannot access the site. The City owns a 3,000-gallon truck, which direct spreads the sludge. The site has the capacity for about 360,000 gallons of sludge per year, without becoming overloaded with nitrogen. This application level meets current needs, but will not be adequate for the 25-year study period. To assess future applications, it was assumed that the amount of biosolids generated at the end of the planning period is proportional to the estimated increase of average daily BOD from the Year 2000 to the Year 2029. With this assumption, it is estimated that the City will generate approximately 733,000 gallons of sludge in the year 2029, which is above the agronomic rate for the site.

The City is currently investigating several small parcels adjoining the current enhancement site that might be suitable for spreading during the grazing season. The City lacks a back-up site, or sites for future expansion. Relying on one landowner for disposal makes the City susceptible to abrupt service disruption.

3.6 WWTP Sludge Quality

The WWTP is operated to produce a sludge in compliance with the Class B pathogen reduction requirements of the 40 CFR Part 503 regulations. Reduction of vector attraction of the digested sludge is achieved at the WWTP by reducing the mass of volatile solids in the sludge by 38 percent where possible with the existing digester as prescribed by the 40 CFR Part 503 regulations. The staff has not tracked actual volatile solids reductions in the past. Lime is added to increase the pH to a minimum of 12.0 for two hours to assure compliance.

Based on the results from the annual metals sampling and analysis of sludge from 1999 to 2002, the sludge hauled for land application was in compliance with the regulatory concentration limits for pollutants given in CFR 40 Part 503, Subpart B. A summary of sludge analysis results on the WWTP sludge is given in Table 3.6.1.

TABLE 3.6.1
SUMMARY OF HEAVY METALS CONCENTRATION IN WWTP SEWAGE SLUDGE

	Concentration Limits (mg/kg) (1)		Concentration (mg/kg) in Sludge			
Metal	Pollutant	Ceiling	8/22/2002	8/22/2001	8/21/2000	8/11/1999
Arsenic	41	75	ND	ND	ND	2.82
Cadmium	39	85	2	2.8	2.8	2.7
Copper	1,500	4,300	335	478	435	423
Lead	300	840	21.3	27.4	15.3	24.7
Mercury	17	57	0.5	0.5	0.6	0.6
Molybdenum	-	75	5	6	6.2	4.9
Nickel	420	420	10.7	13.2	13.6	15.8
Selenium	100	100	ND	ND	ND	ND
Zinc	2,800	7,500	590	888	798	841

(1) – Concentration limits are based on 40 CFR Part 503, Subpart B for land application of sludge
ND – non-detected
NM – Not measured

For all of the trace elements covered under the 40 CFR Part 503 rules, the trace element concentrations in the WWTP biosolids were below the ceiling and pollutant concentration limits. Since the WWTP biosolids is in compliance with these limits, 40 CFR Part 503 does not require metal loadings to be tracked (EPA 1995). Based on the cumulative loadings allowed by EPA, copper is the limiting pollutant in the applied biosolids. For the current average rate of biosolids application at each active site and current metal levels, the estimated site life based on copper loadings is 1,556 years. The life of the site exceeds the study period.

The biosolids application sites are all used for pastureland with an agronomic use rate of 100 pounds of nitrogen per acre per year used for the purposes of this study. The biosolids are surface applied with an assumed use factor of 0.5. A portion of the nitrogen is organic and it is assumed that 15% of the organic nitrogen is released in the second year after application and an additional 8% in the third year. Based on the above information, the current 16-acre site has a maximum application rate of about 300,000 gallons of biosolids per year. The capacity of this site is about equal to the current biosolids output of the WWTP but will not be adequate for the study period.

3.7 Emergency Standby Power Systems

Each pump station is equipped with connections, panels, relays, and other components necessary to operate under standby power generation. The City maintains two portable, trailer mounted, generators for the purposes of operating the pumping stations during power outages.

The wastewater treatment plant has a 60 kW diesel backup generator and an automatic transfer switch. The generator is connected to all systems at the WWTP.

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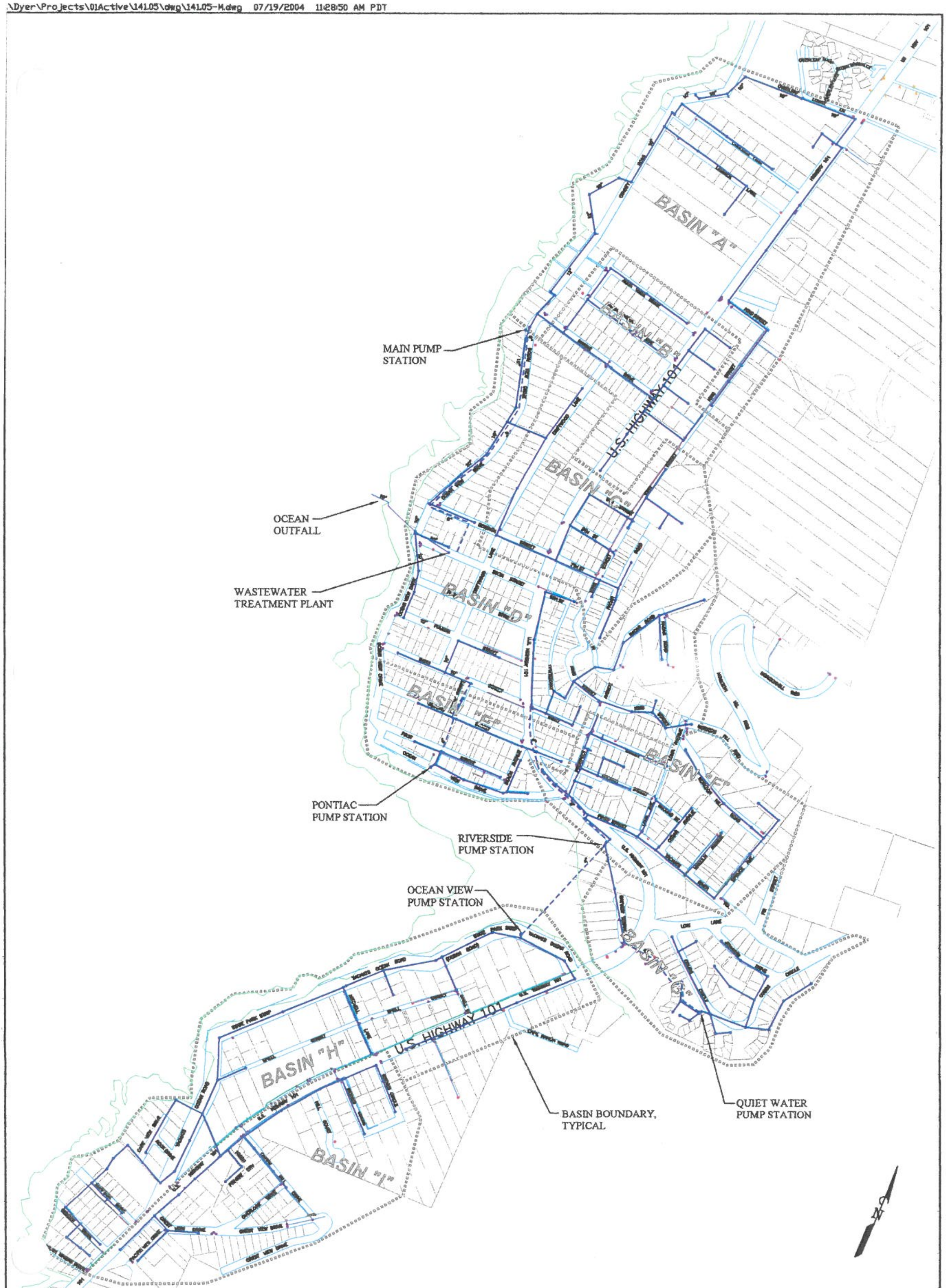
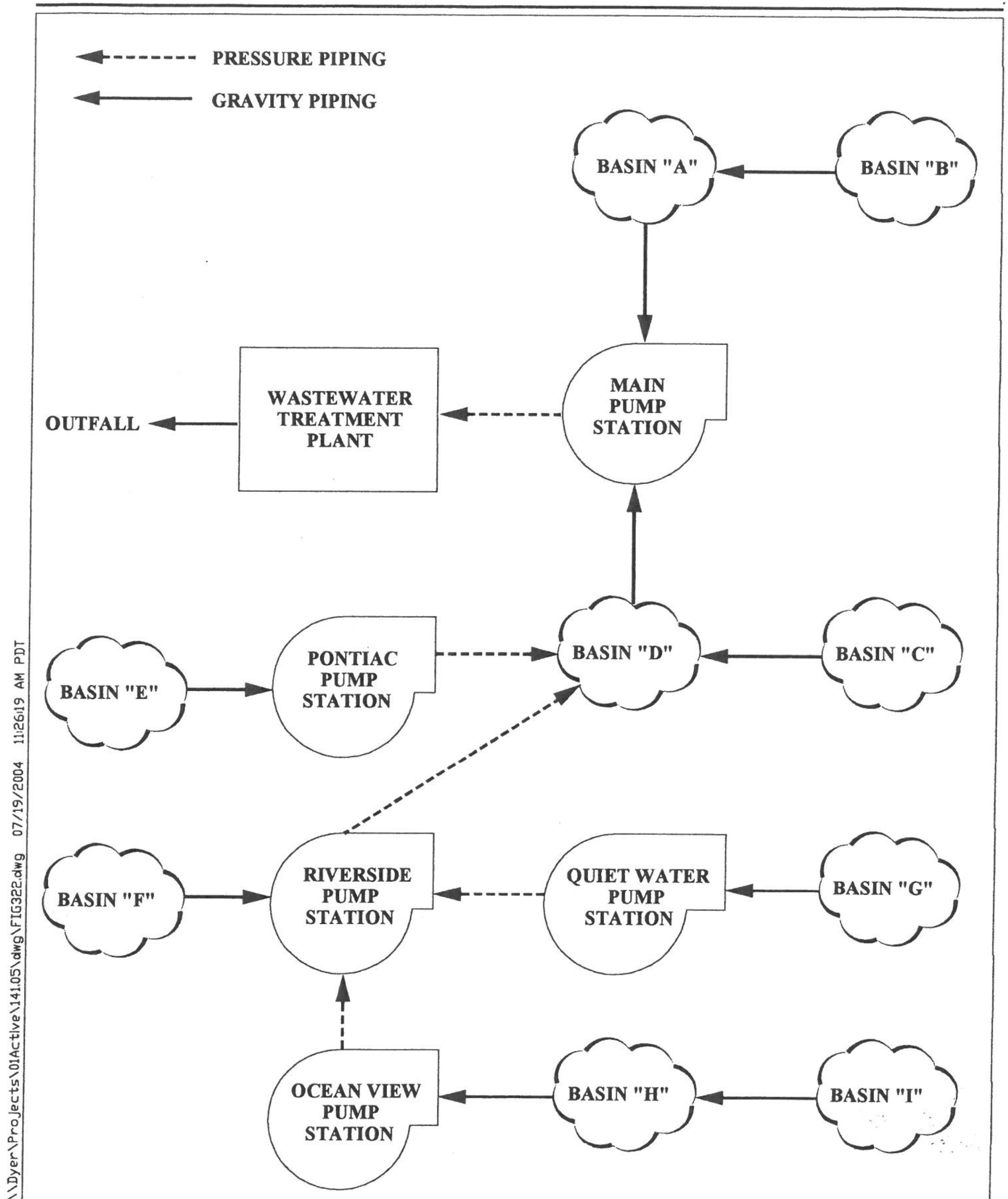


NOTE: ALL PIPE IS 8" UNLESS OTHERWISE SPECIFIED

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: AUGUST, 2004	EXISTING WASTEWATER SYSTEM & BASINS	3.2.1
PROJECT NO.: 141.05		



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	*CITY OF YACHATS* *WASTEWATER SYSTEM FACILITIES PLAN*	FIGURE NO.
DATE: AUGUST, 2004 PROJECT NO.: 141.05	*WASTEWATER SYSTEM SCHEMATIC*	*3.2.2*

FIGURE 3.2.3
DRY WELL OF MAIN PUMP STATION

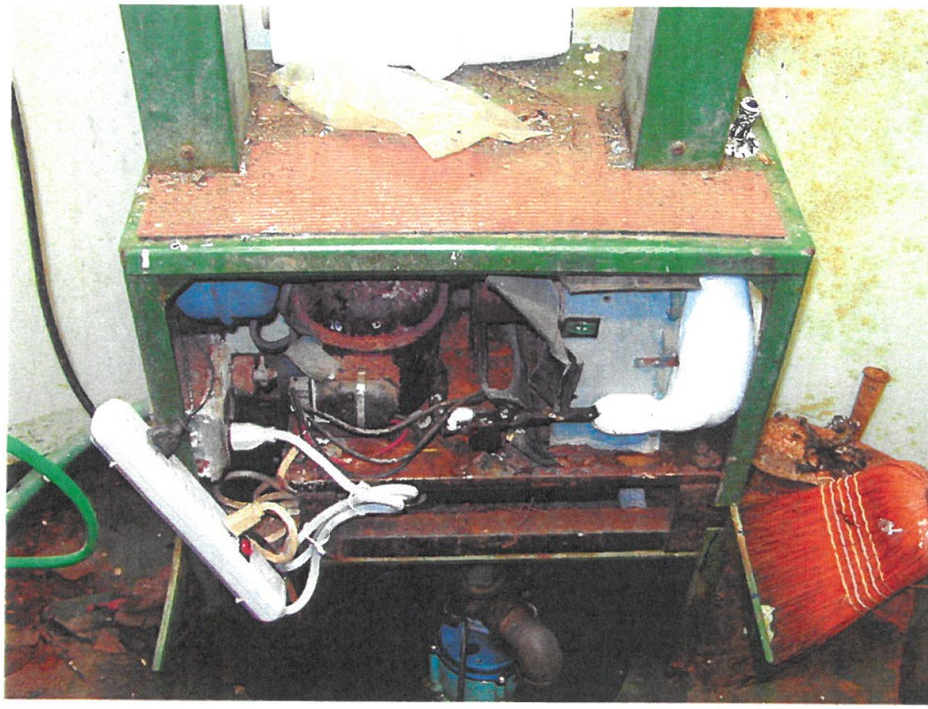


FIGURE 3.2.4
PONTIAC PUMP STATION

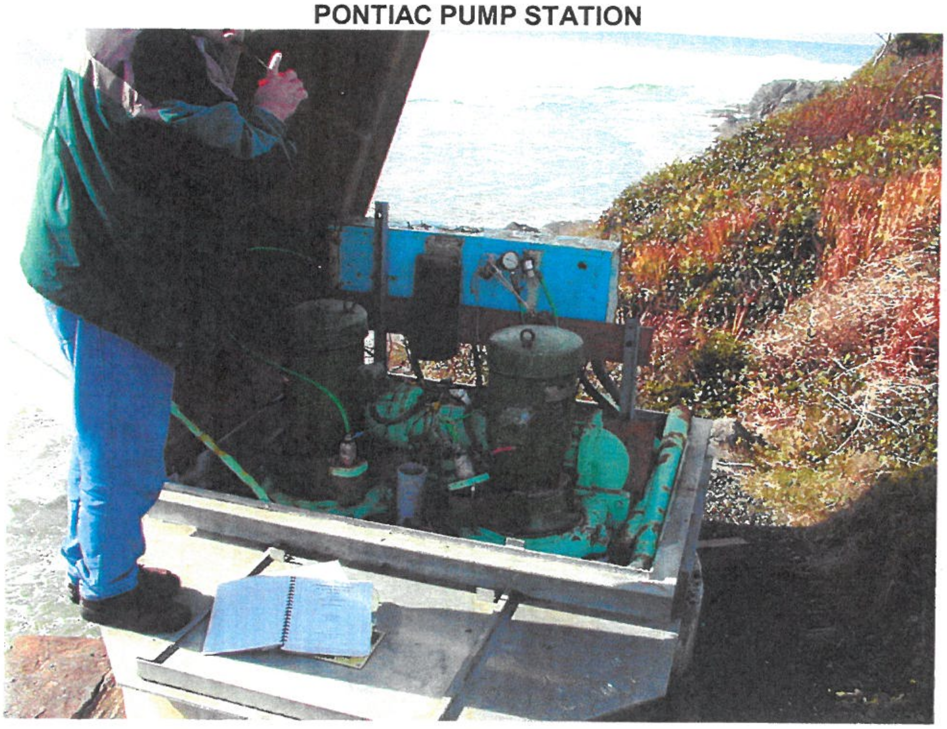


FIGURE 3.2.5
RIVERSIDE PUMP STATION

FIGURE 3.2.6
OCEAN VIEW PUMP STATION

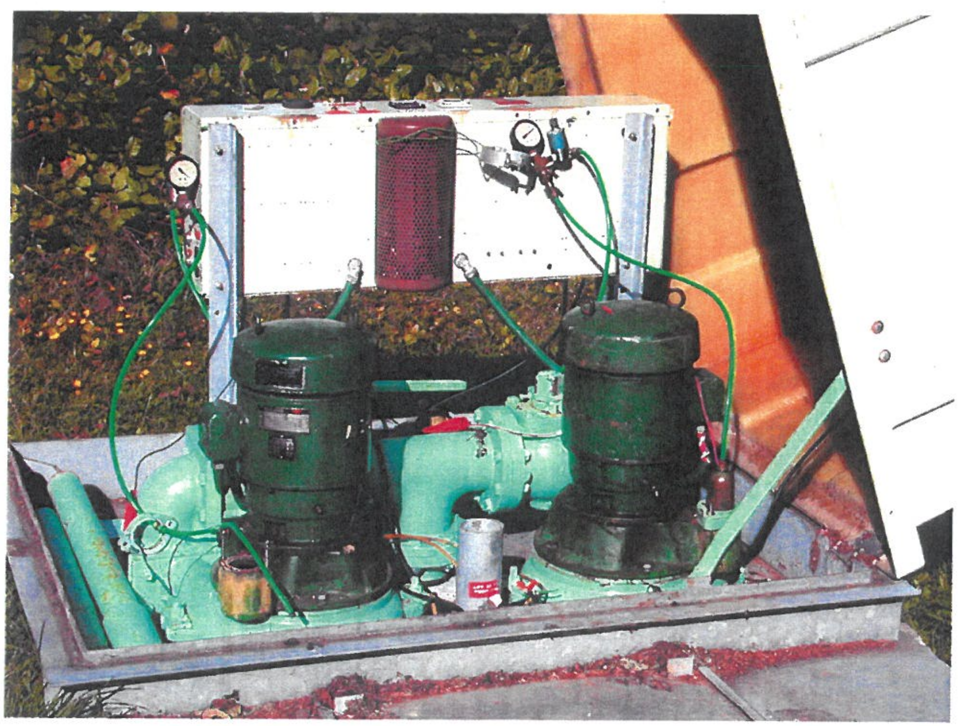


FIGURE 3.2.7
QUIET WATER PUMP STATION

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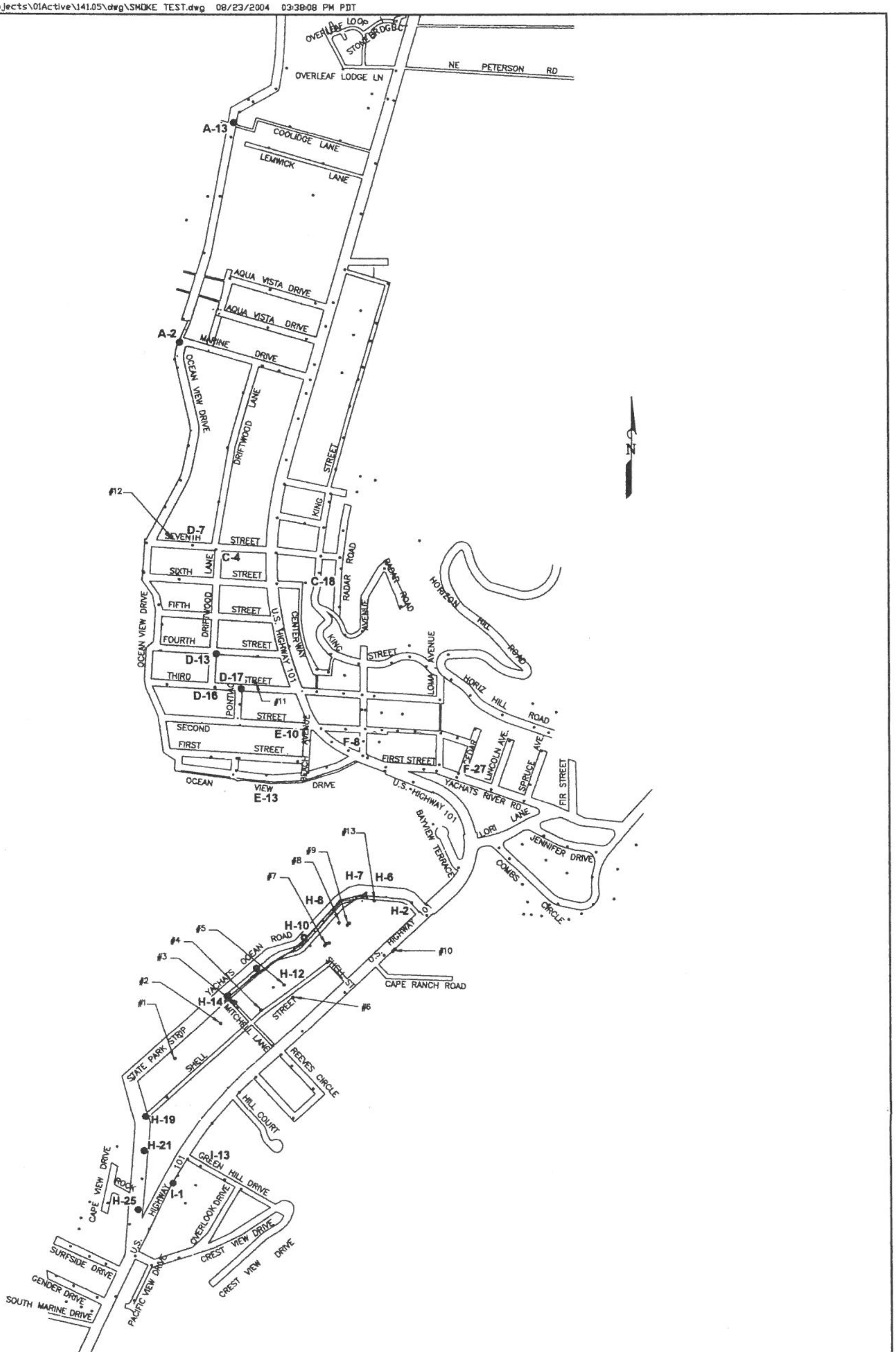
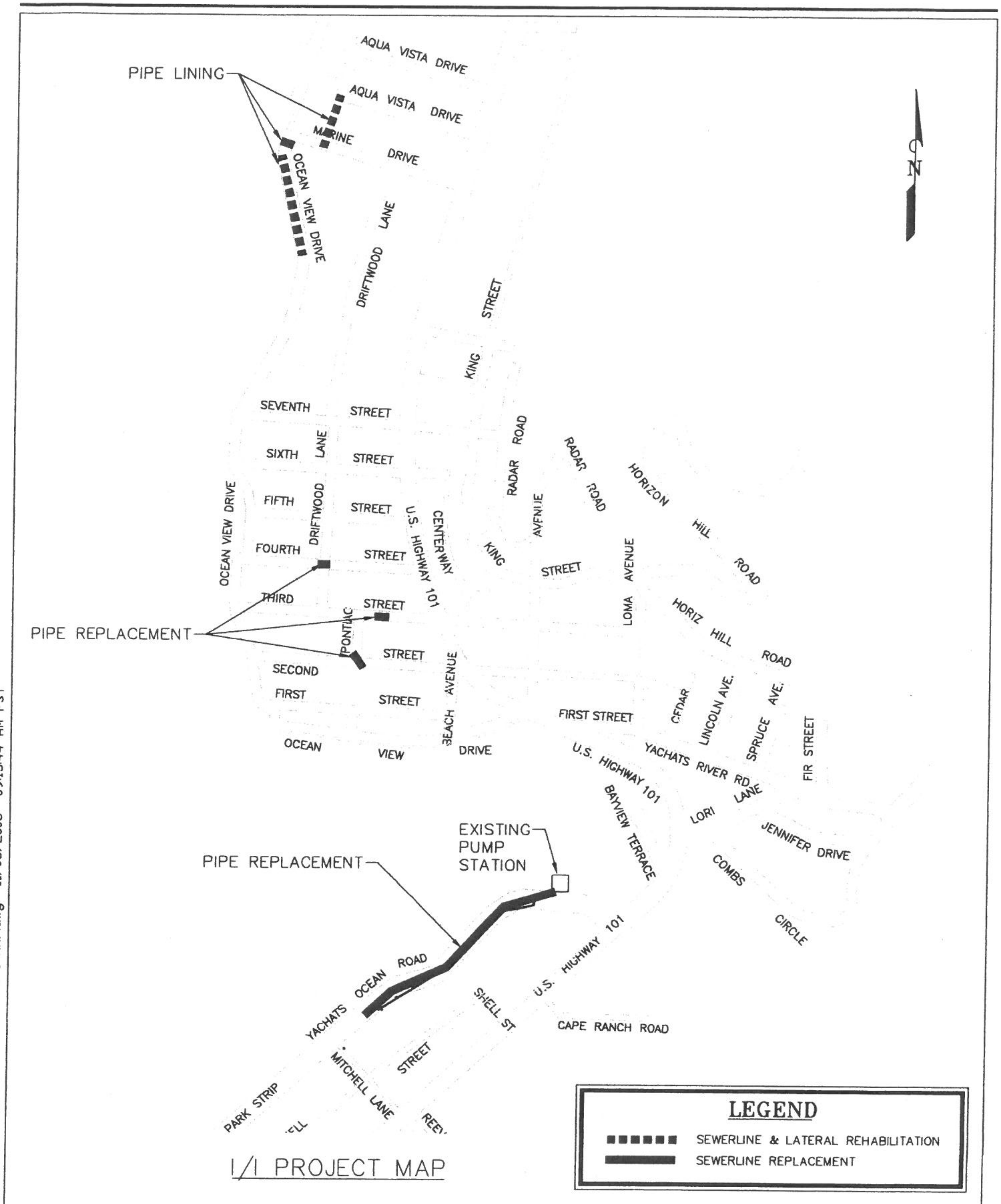


THE DYER PARTNERSHIP ENGINEERS & PLANNERS	WASTEWATER SYSTEM IMPROVEMENTS YACHATS SANITARY DISTRICT	FIGURE NO.
DATE: SEPT, 2004		
PROJECT NO.: 141.05	SMOKE TESTING RESULTS	3.2.8



I/I PROJECT MAP

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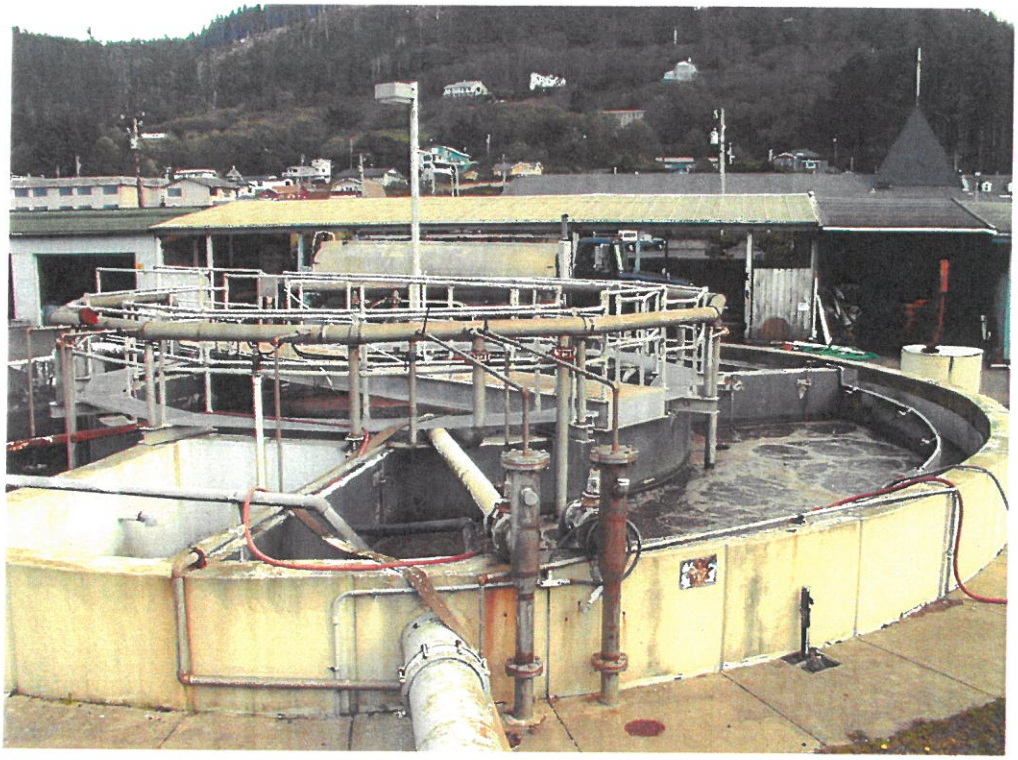
THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***W.W. SYSTEM FACILITIES PLAN*** ***CITY OF YACHATS***	**FIGURE NO.**
DATE: NOV., 2003 PROJECT NO.: 0510.05	***I/I PROJECT MAP - FALL 2003***	***3.2.9***

FIGURE 3.3.1
YACHATS WWTP, AERATION BASINS & DIGESTERS



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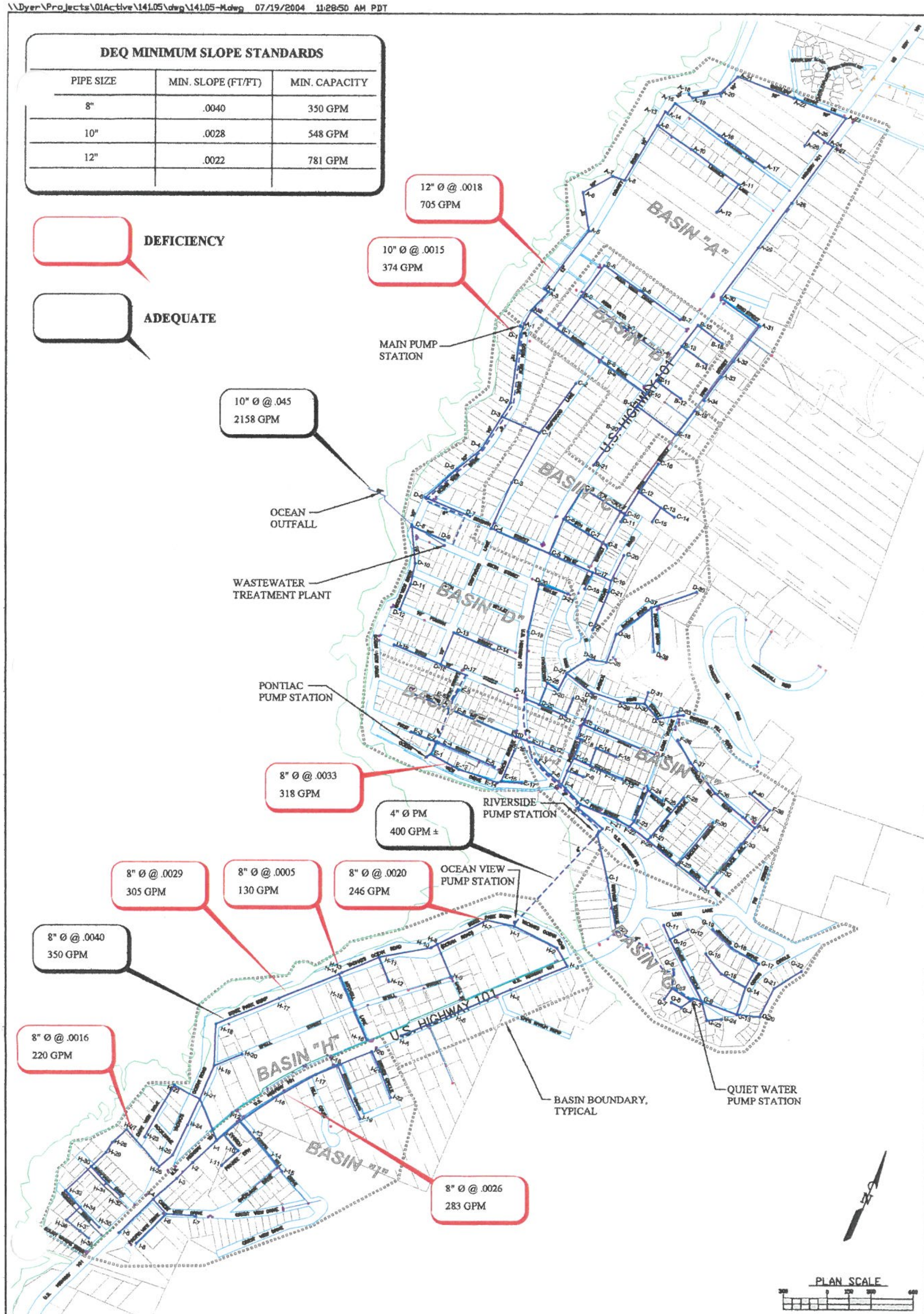
DEQ MINIMUM SLOPE STANDARDS

PIPE SIZE	MIN. SLOPE (FT/FT)	MIN. CAPACITY
8"	.0040	350 GPM
10"	.0028	548 GPM
12"	.0022	781 GPM



THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: SEPTEMBER, 2004 PROJECT NO.: 141.05	WASTEWATER SYSTEM - FLOW RATES AND DEFICIENCIES	3.6.1

Wastewater Flowrates and Characteristics

Section

4

Wastewater Flowrates And Characteristics

Section 4

4.1 Wastewater Flowrates

Dry weather and wet weather flows and infiltration and inflow (I/I) are important in the design of wastewater collection, treatment and disposal facilities. The MMDWF usually determines the maximum organic loading of the major treatment process units. The MMWWF determines the size and capacity of the major process units necessary to provide the desired degree of treatment. The PIF determines the hydraulic capacity of pipelines, pumps, channels, and inlet structures and the reserve capacity of units such as clarifiers and disinfection facilities. As a coastal vacation destination, the population of Yachats varies dramatically with the seasons. For the purposes of this report, the dry weather population was set at 2,040 and the wet weather population at 1,347. The seasonal population fluctuation does not affect overall flows to the facility, but does change the gallons per capita per day (gpcd) figures that are used to project future flows.

The data used for this report is taken from the Discharge Monitoring Reports (DMRs) for the WWTP. The staff records the readings on the influent meter and checks the rain gauge at the plant daily. The wastewater is sampled and BOD and TSS tests are run weekly. Rain data for 1997 only is from the Climate Research Center rain gauge in Newport. The remaining rain data is from daily readings of the rain gauge at the wastewater facility. The data includes at least one abnormally dry year (2000) and one winter with a storm that exceeded the five-year storm rainfall (December 1998). One data point for January 18, 1997 was discarded as a potential error. The flow for that day, 1.18 MGD, exceeded all other flows in the data set with a recorded rainfall in Newport of only 2.54 inches the day before and only 0.64 inches on the day of the reading.

I/I improvement work that took place in November 2003 is anticipated to reduce plant flows. This work has occurred so recently that there has not been time to accumulate a large body of data to document actual flows. Four months of wet weather data and one month of dry weather data is available and will be presented, but most data used in this report is from before the rehabilitation work was completed.

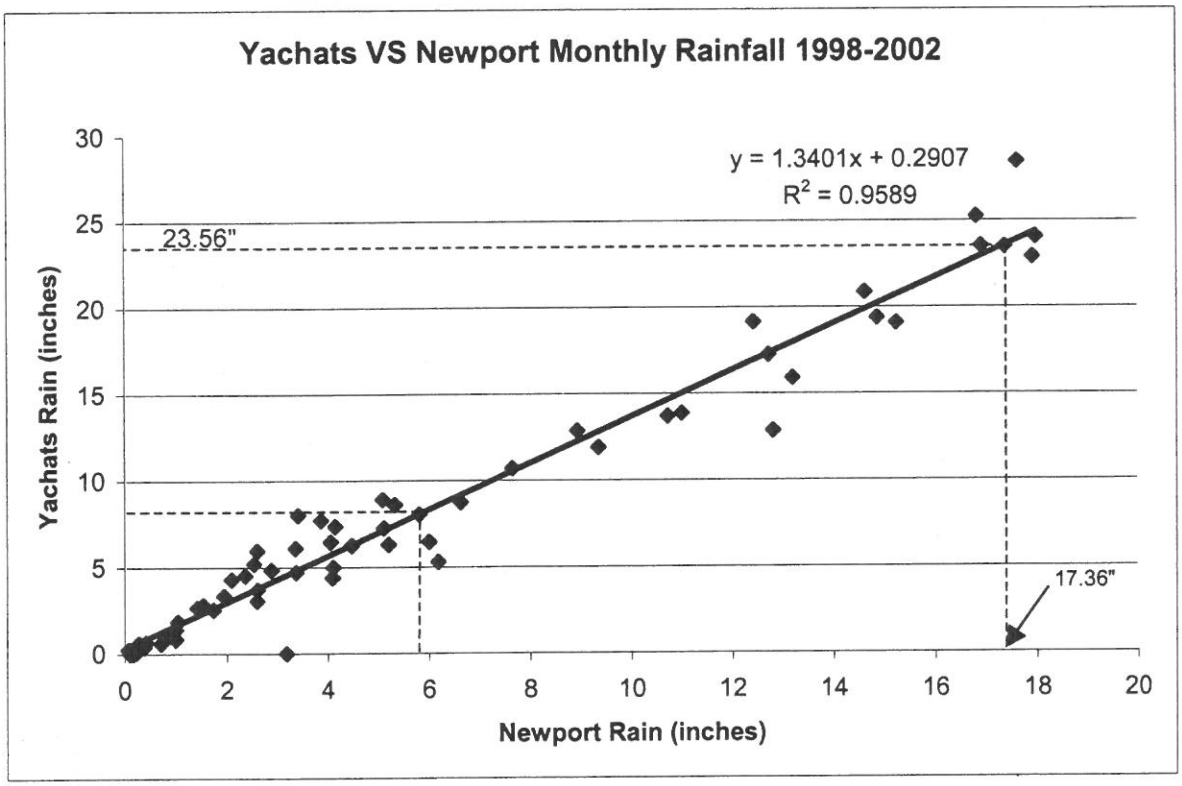
DEQ Guidelines for Flow Projections

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 copy of this document is included in Appendix A.

Precipitation Rates for Calculations

Rainfall amounts vary considerably based on location and Yachats appears to have consistently more rain than Newport, 24 miles to the north, making the use of the Newport climate data suspect. Monthly and daily rainfall data is available for Newport from the Oregon Climate Service and for Yachats from daily readings of the rain gauge at the WWTP. The monthly total rainfall data for each community was graphed and linear regression was used to fit a line to the data. There is a very close relationship (R = 0.98) between rainfall in the two communities as illustrated in Figure 4.1.1. Using the slope of the linear regression line, it is estimated that rainfall in Yachats is about 1.34 times the corresponding rainfall in Newport. Applying that factor to the 80% monthly January rainfall for Newport, obtained from the US Weather Bureau Climatological Summary No. 20, of 17.36-inches gives a corresponding 80% monthly January rainfall in Yachats of 23.6-inches. The May 90% rainfall figure of 5.73 inches per month for Newport corresponds to an 8-inch rainfall in Yachats.

FIGURE 4.1.1
YACHATS RAINFALL VS. NEWPORT RAINFALL



WWTP Dry Weather Flow

ADWF

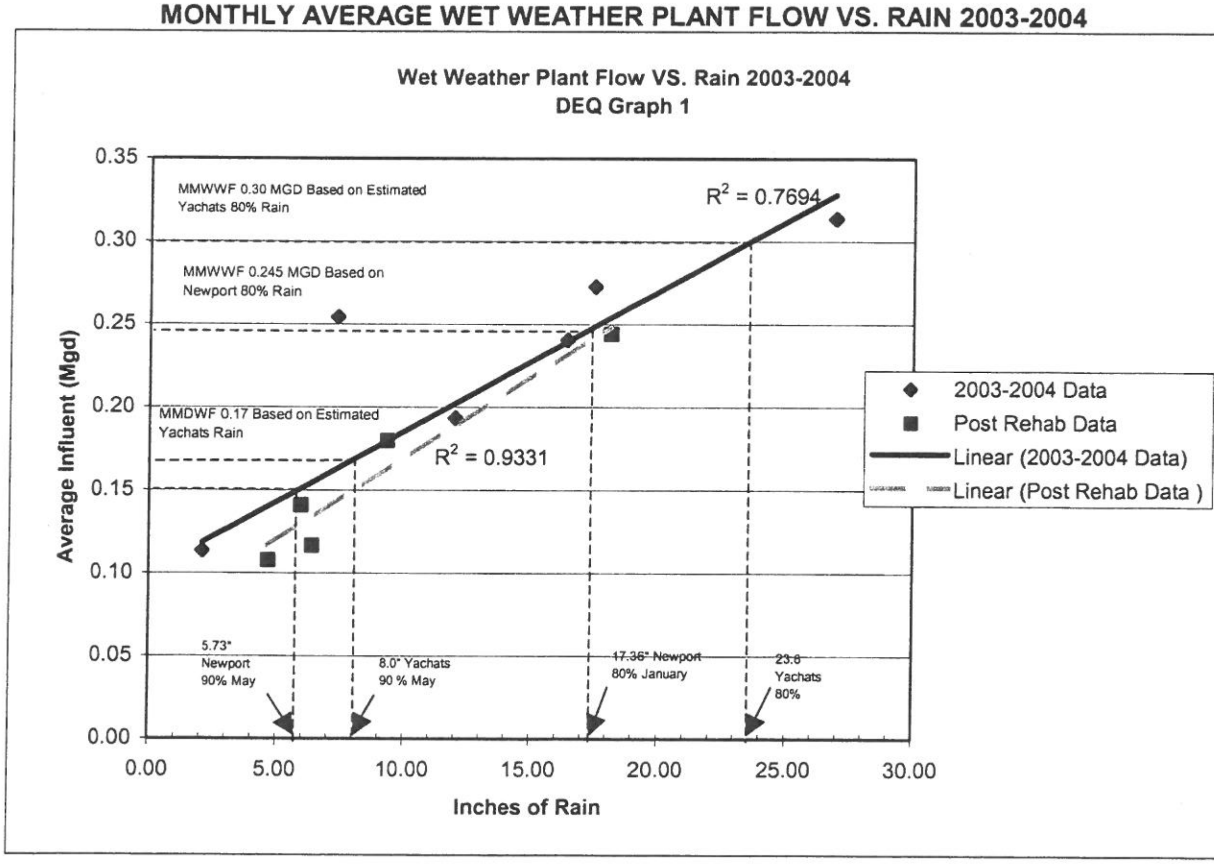
The average dry weather flow (ADWF) was determined to be 0.14 MGD from analysis of treatment facility flow records for the months of May through October beginning in May 1997 and ending in May 2004. However, due to the high summer transient population, the peak summer month flows occur in July and August and averaged 0.17 for the year 2003 and this number will be used in the Facilities Plan. The collection system rehabilitation project should not significantly affect dry weather flows, so lack of post rehabilitation dry weather data is not anticipated to affect plant sizing.

The ADWF can be divided into two components: base sewage flow and base infiltration, although not part of the EPA method for I/I evaluation. The base sewage flow is the portion of the treatment plant flow attributed to sanitary sewage and was estimated based on the City's water consumption records. The average water consumption for Yachats residents is estimated to be 68 gpcd based on 1998 wet weather water records. The base domestic sewage flow to the treatment plant is estimated to be 0.14 MGD. In determining projected flows, allowance must be made for unavoidable infiltration that is dependent upon such factors as the quality of material 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 comparing the difference of the ADWF and the base sewage flow. For summer 2003, the base infiltration is calculated to be approximately 0.03 MGD or 13 gpcd.

MMDWF

The Maximum Monthly Dry Weather Flow (MMDWF) was determined, following DEQ guidelines, by graphing 2003 through 2004 wet weather (December-May) flow for the average daily flow for each month versus the total monthly rainfall (DEQ Graph 1). Linear regression was used to fit a line to the data. The Yachats May 90% rain total was calculated above to be eight-inches. This number was plotted against the regression line to obtain the 10-year high dry weather flow of 0.168 MGD. The graph is illustrated in Figure 4.1.2.

FIGURE 4.1.2
MONTHLY AVERAGE WET WEATHER PLANT FLOW VS. RAIN 2003-2004



WWTP Wet Weather Flow

AWWF

The average wet weather flow (AWWF) was determined from analysis of treatment facility flow records for the months of November through April beginning in January 1997 and ending in April 2004. The AWWF for Yachats is calculated to be 0.22 MGD or approximately 159 gpcd. The average wet weather flow for January 2004-April 2004 is 0.17 MGD.

MMWWF

The maximum month wet weather flow (MMWWF) was determined in a manner similar to that employed for determination of the MMDWF following DEQ guidelines. With linear regression analysis of average monthly flow versus rainfall, a MMWWF of 0.30 MGD was calculated as shown in Figure 4.1.2. Extrapolating the post rehabilitation data on the same graph also gives a MMWWF of 0.30 MGD.

DEQ guidelines suggest that the MMWWF represents the highest monthly average attained during the winter high groundwater period, and has a 20% change of occurring in any one year. Since there is data available for eight years of winter flow, the highest 20% of the monthly wet weather averages were used as a check on the calculated MMWWF. The average of the nine highest monthly flows for the eight-year period is 0.32 MGD, which is in line with the MMWWF of 0.30 MGD obtained from the graphical method.

Peak Week

DEQ guidelines use the peak week flow to calculate the Peak Instantaneous Flow (PIF). For this study, the peak week flow was taken as the average of the eight highest seven-day periods of flow that occurred during the eight-year wet weather data set. The peak weekly flow is 3.91 million gallons per week for a daily average of 0.56 MGD.

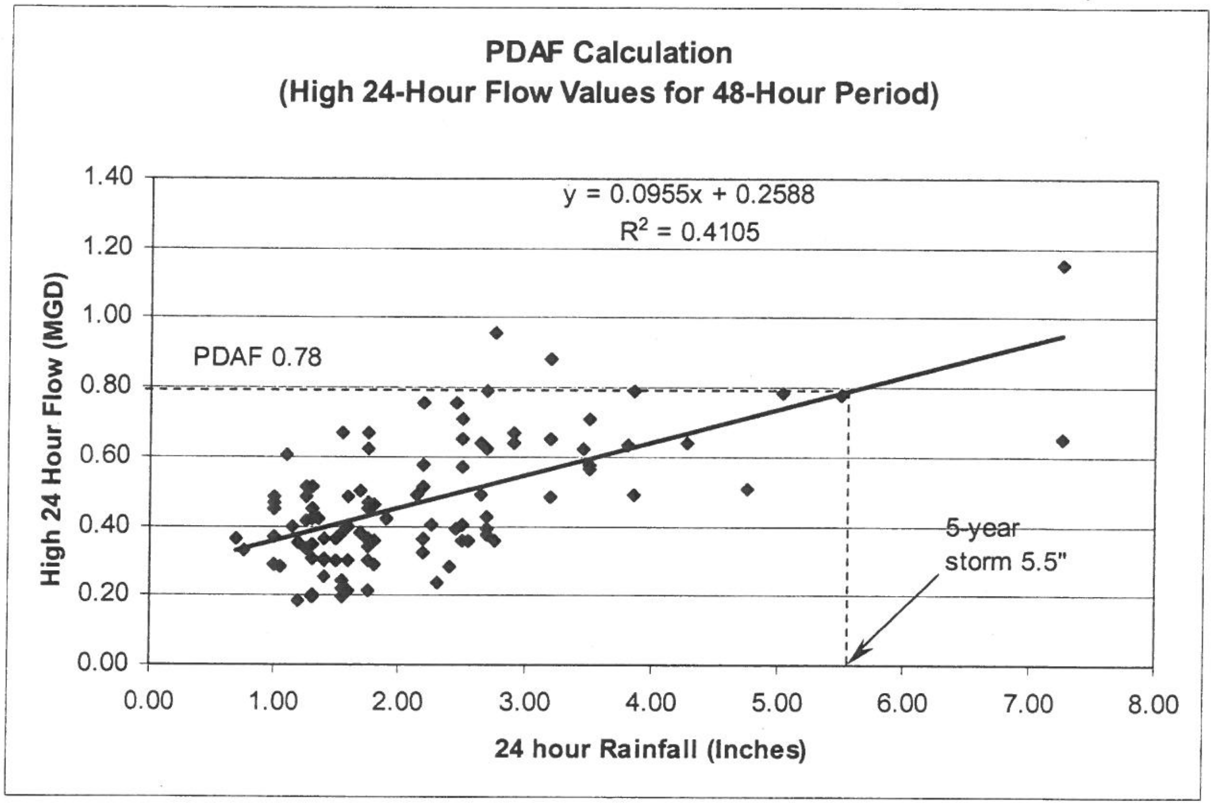
PDAF

The peak daily average flow associated with a five-year storm ($PDAF_5$) was calculated from a linear regression of daily flows and associated rainfall from November through April 1997-2004. DEQ recommends using 24-hour data to match plant flow data, but notes that 48-hour data may be more useful than 24-hour data in some cases. As the flows at the WWTP frequently were higher on the day after a high rainfall, even when there was no rain on the second day, a 48-hour period was examined to capture the higher flows. Storms with rain exceeding two inches total per two-day period were selected as the target data. To assure that flows represented high groundwater conditions a minimum of one-inch of rainfall was required in the preceding week. The 24 hour rainfall for the first day was used for the rain quantity and the higher of the 24 hour flows for that day or the next day was used for the flow. The five-year, 24-hour rainfall of 5.5 inches was taken from NOAA Atlas 2, Volume X, Figure 26 (see Appendix B). The resulting PDAF is 0.78 MGD as shown in Figure 4.1.3.

Peak Day

The peak day flow was calculated as a check on the Peak Daily Average Flow (PDAF). The peak day flow is the highest flow expected to occur on average of once every year. Eight years of winter flow data are available (1997-2004). The eight highest 24-hour flows on record from the DMRs were averaged to calculate the peak day flow, which equaled 0.886 MGD.

FIGURE 4.1.3
HIGH RAIN – HIGH GROUNDWATER FLOWS VS. RAINFALL (DEQ GRAPH 2)



The average flow, maximum daily flow and PDAF were used to calculate the PIF based on the probability of occurrence, using logarithmic probability paper, as outlined by DEQ (1996). 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 1.34 MGD. The plotted graph for this calculation is included in Appendix C. A summary of measured flowrates as developed from flow data from 1998 to 2004 is provided below in Table 4.1.1.

TABLE 4.1.1
YACHATS WWTP EXISTING FLOW RATES & LOADS

Parameter	Design	Current 2004	
Population	935	2040/1357 (1)	
MMDWF	0.197 MGD	0.17 MGD	83 gpcd
MMWWF	-	0.30 MGD	221 gpcd
ADWF	0.174 MGD	0.17 MGD	81 gpcd
AWWF	-	0.22 MGD	159 gpcd
Base Sewage	-	0.14 MGD	68 gpcd
Base Infiltration	-	0.03 MGD	13 gpcd
Peak Average Month	0.288 MGD	0.32 MGD	236 gpcd
Peak Average Week	0.439 MGD	0.56 MGD	413 gpcd
Peak Average Day		0.88 MGD	648 gpcd
Peak Day	0.773 MGD	1.15 MGD(2)	847 gpcd
$PDAF_5$	-	0.78 MGD	575 gpcd
PIF	1.9 MGD	1.55 MGD	1,142 gpcd
BOD Avg. Day	206 ppd	315 ppd	220 mg/l
BOD Max. Month	535 ppd	522 ppd	222 mg/l
TSS Avg. Day	243 ppd	261 ppd	182 mg/l
TSS Max. Month	681 ppd	490 ppd	369 mg/l

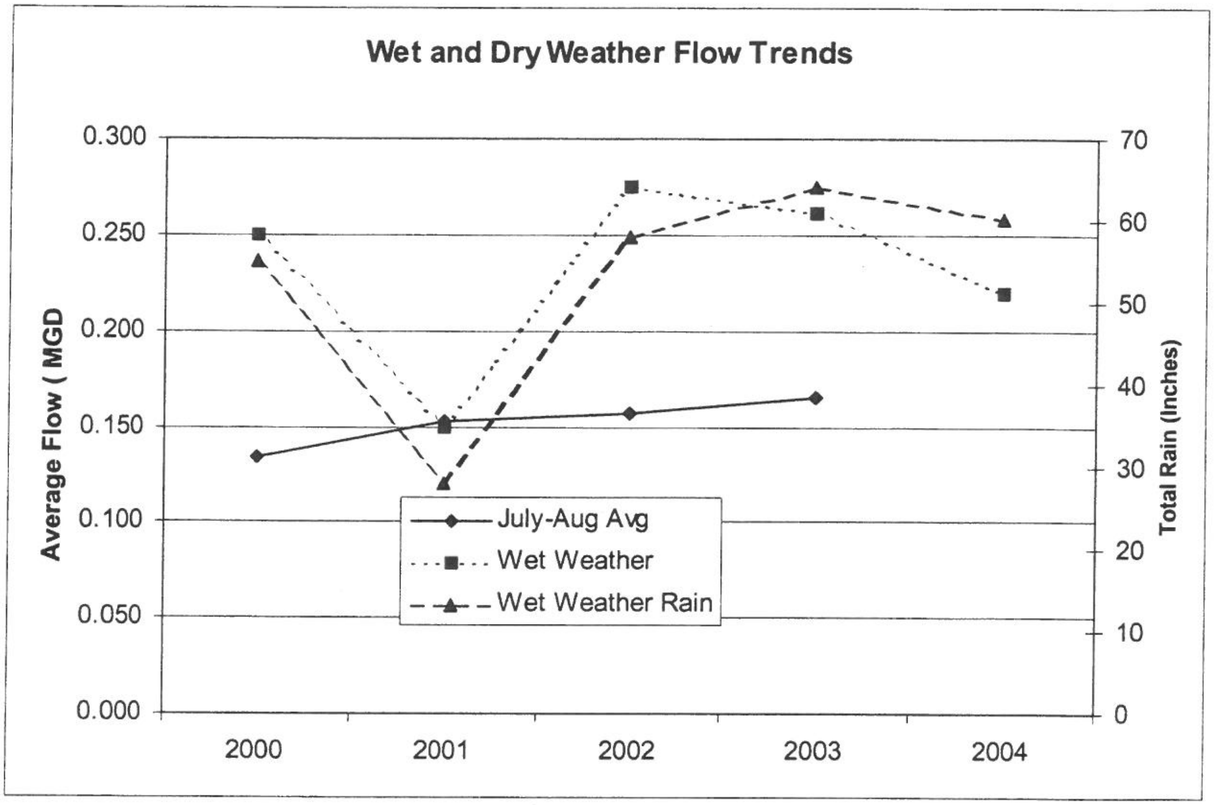
(1) Dry season population/wet season population
(2) Day after a 50-year storm

Flow Trends

Yachats receives very little of the total annual rainfall from June through September. Therefore the flows in the sewer system during this period tend to follow the population fluctuations. Monthly average flows at the WWTP for June are lower than in May, reflecting the reduction in rain and consequent I/I. Flows then increase in July and August, dropping off again in September. This profile reflects the transient population, as the period between July 4 and Labor Day is the peak of the coastal tourism industry.

Wet weather flows are heavily influenced by rain and the condition of the system, with the highest flows occurring between December and March. Figure 4.1.4 is a graph of the dry and wet weather flow data available for 2000 through 2004. The wet weather flow (December through March average) has a strong correlation to annual rainfall for the years 2000 through 2002. Flows for 2003 are lower in relation to rainfall than in previous years, probably due to the City completing an aggressive inflow reduction program. Flows for 2004 are even lower in relation to rainfall following the completion of pipe lining and replacement in the fall of 2003. Dry weather flows (July August) rise steadily between 2000 and 2003, reflecting the increasing summer peak population.

FIGURE 4.1.4
WWTP PLANT FLOW TRENDS 2000-2004



4.2 EPA – I/I Analysis

The WWTP is operating at close to the original design capacity during dry weather flows and exceeds the plant capacity during wet weather flow. The current off-peak population of 1,360 exceeds the original design population for the plant by 34%. The close correlation between plant flows and rainfall, indicate that I/I is a primary factor in the hydraulic overload.

Plant records indicate that that the historical peak day is approximately 1.15 MGD (800 gpm) and the PIF is approximately 1.55 MGD (1080 gpm). The base sewage flow is approximately 0.13 MGD (90 gpm). I/I under peak day conditions was approximately 1.0 MGD. That is to say, on a day where the system is experiencing peak day flows, about one million gallons of water enter the collection system as I/I.

For existing developments, flow rate data can be obtained by direct measurement. For areas of future development, methods for estimating flow rates must be utilized. For planning purposes with the potential new development, estimates of wastewater flow rates must be used. It is expected that I/I quantities in new system expansions will be less than the I/I measured in the existing system.

EPA Non-excessive Infiltration

The EPA has developed a "litmus test" to assist communities in determining if inflow and/or infiltration (I/I) are excessive within a wastewater system. The test requires that system flows be analyzed under various conditions and compared to benchmarks that have been established for acceptable sanitary sewage flow rates.

Excessive infiltration is analyzed by investigating plant flows during periods of high groundwater with little sustained rainfall. Seven to 14-day periods during winter months of high groundwater (December through April) are 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 be non-excessive I/I.

For the City of Yachats, thirteen, one-week periods during the winter months from 1998 through 2003 were analyzed. Little or no rainfall was measured during the periods of study. Because the periods under study fall in the winter or rainy season, it is safe to assume that groundwater levels are high. Under these conditions, the resulting flows were determined to average approximately 153 gpcd. The results indicate that approximately 33 gpcd were present in the system above the EPA Guideline of 120 gpcd. Corrective action was taken in November 2003 to repair piping that was suspected of contributing to system infiltration. Two data periods of high groundwater no rain are available after the construction was completed. The flows from that data set average 87 gpcd, which is considered to be non-excessive I/I. Therefore further infiltration projects are not recommended at this time. It is recommended that the data for the 2004/2005 high groundwater period be analyzed to confirm the low infiltration result.

EPA Non-excessive Inflow

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. The average per capita flow for the system is calculated and compared to the EPA maximum flow criteria of 275 gpcd. Under these conditions, flows above 275 gpcd are considered to be excessive I/I.

For the City of Yachats, 41 days of rain at or above 2-inches occurred during winter months from 1998 through 2004. Each storm event resulted in between two and seven inches of rainfall in a 24-hour period. Under these conditions, the resulting system flows were determined to average 380 gpcd. Based on the established EPA criteria, the results indicate that approximately 105 gpcd would be considered as excessive I/I. Only one 24-hour 2-inch rainfall occurred after completion of the I/I construction project. Plant flows averaged 316 gpcd for that day, which is less than the previous average but still exceeds the EPA criteria of 275 gpcd. While the City has had some success with inflow reduction, inflow is generally cost effective to abate and further follow up is recommended.

Based on established EPA guidelines, the City of Yachats does not have a significant infiltration problem, but still has excessive inflow. The EPA I/I analysis is summarized in Table 4.2.1. A more detailed summary of the analysis and I/I flow maps are provided in Appendix C.

TABLE 4.2.1
THE CITY OF YACHATS – I/I ANALYSIS SUMMARY

Description of Flow Condition	Flow Rate (gpcd)	EPA Criteria (Maximum Flow)
Base Sewage	68	N/A
Infiltration (High Ground Water)	153	120
Inflow (High Rainfall levels)	316	275

4.3 Wastewater Composition

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 the influent wastewater represent the combined wastewater from these sources. Treatment plant DMRs were reviewed for the years from 2002 to 2004 to determine the BOD and TSS levels within the existing wastewater influent.

WWTP Influent Concentration and Loads

The BOD and TSS influent concentration and loads are summarized in Table 4.3.1. The unit loading factors, pounds per capita day (ppcd) were based on a wet weather sewered population of 1,357 persons and a dry weather sewered population of 2,040 persons. The information provided in Table 4.3.1 is based on the information provided within the DMRs. The accuracy of the findings depend wholly on the accuracy of the DMR reports themselves.

Untreated domestic wastewater typically consists of 110 to 400 mg/L BOD and 100 to 350 mg/L TSS. In comparison, both the BOD and TSS concentrations in the City of Yachats' influent wastewater are in the middle of the range for typical levels. However, BOD and TSS peak loading frequently exceeded the typical ranges.

The average BOD and TSS unit loading at the WWTP are within the acceptable ranges for similar communities. Unit loading for influent BOD and TSS typically ranges from 0.08 to 0.25, and 0.09 to 0.26 respectively.

TABLE 4.3.1
CITY OF YACHATS – WWTP INFLUENT CONCENTRATIONS AND LOADS

2002-2004 Data	WET WEATHER		DRY WEATHER	
PARAMETER	Average	Range	Average	Range
BOD				
mg/L	183	90 - 322	265	109 - 390
ppd	322	29 - 1109*	307	66 - 743
ppcd	0.24	0.06 - 0.73	0.15	0.05 - 0.15
TSS				
mg/L	137	56 - 272	174	80 - 370
ppd	268	35 - 959	254	45 - 787
ppcd	0.20	0.06 - 0.3	0.12	0.04 - 0.19

* This is the 2nd highest value for the period, the high value of 1704 was out of range of other data

4.4 Unit Design Factors

Unit design values for wastewater flow and loads must be established for future planning and design purposes. These values must have enough flexibility to allow for changes in the characteristics of the service area. The analysis of wastewater volume and composition in the previous Sections will provide the foundation for the unit design values discussed below.

Wastewater Flows

As discussed in Section 4.2, various flow parameters must be determined to characterize the volume of wastewater within the City wastewater system. Base sewage, infiltration, MMDWF, MMWWF, peak daily weekly, and monthly flows, and the PIF were all calculated or derived from existing flow records. A summary of the unit design values was provided in Table 4.1.1.

Wastewater Composition

Fluctuations in loading rates may have a significant effect on the design and process control of a wastewater treatment plant. Data was reviewed to determine representative peaking factors for BOD and TSS loading. Estimated peaking factors for maximum day, maximum month, along with a summary of unit design values, are presented in Table 4.4.1. Supporting calculations are presented in Appendix C. Data for the period 2002-2004 was used to calculate the values used in this plan.

TABLE 4.4.1
UNIT DESIGN VALUES - WASTEWATER COMPOSITION

Parameter	BOD	TSS
Average load, ppcd (off-peak)	0.24	0.15
Average load, ppcd (peak)	0.20	0.12
Peaking Factors		
Maximum Month	1.7	1.9
Maximum Week	2.2	2.4
Maximum Day	3.5	3.7

4.5 Projected Flowrates

Yachats' population is projected to increase by 86% by 2029 (based on projected peak population calculations from Section 2.3), which does not mean that the sewer system in terms of area served or lineal feet of pipeline will increase by the same amount. There are several subdivisions within the city limits that have not been built out. There are also several areas within the city limits with homes on septic tanks that may be served by line extensions or alternative individual systems. The high cost of sewer extensions has the effect of encouraging infill along existing service lines, with rapid growth along areas of new line extensions. The size of the collection system will grow at a lower rate than the population. The restricted growth rate of the physical system would not affect the base sewage generated by the population, but it does limit the amount of pipe available for infiltration.

While the collection system does not expand proportionately to the population, base sewage will. Unit values calculated in Section 4.1 for the current population will be used to forecast these flows, with 68 gpcd calculated for base sewage.

Infiltration

The method proposed by Metcalf and Eddy calculates infiltration for sewers based on different peak infiltration curves for old and new sewers. The curve represents declining peak infiltration per acre as the service area increases. A chart showing the relationship between service area and peak infiltration is included as Figure 4.5.1.

FIGURE 4.5.1
I/I CURVES FOR SEWERS

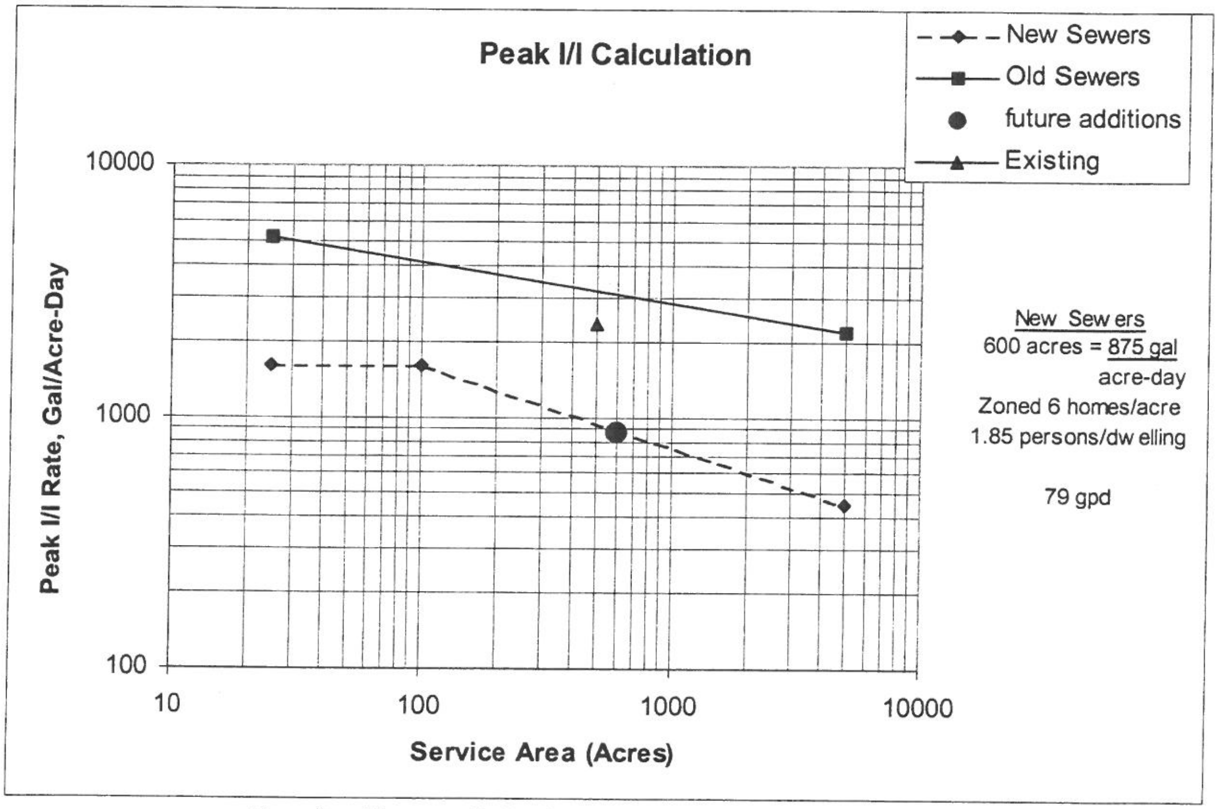


Figure from Wastewater Engineering Treatment and Reuse by Metcalf and Eddy

The I/I value before the sewer improvement project in December 2003 was above the Old Sewers curve, an indication of excessive I/I. The existing sewered area is about 600 acres and the current peak I/I is about 1.4 MGD, resulting in an I/I value of 2,350 gallons per acre-day and putting Yachats' I/I below the curve for Old Sewers. Peak I/I is projected to grow to 1.6 MGD by 2029 based on current flow data.

The service area is not likely to greatly exceed 600 acres in the planning period. Using the new sewer curve and 600 acres gives a peak infiltration rate of 875 gallons per acre-day. Dividing this number by six homes per acre, the current zoning on undeveloped land, and 1.85 persons per home from the population analysis in Section 2, gives 79 gallons per capita per day for new sewer infiltration. This figure is used in calculating the wet weather infiltration rates for future population growth.

Dry weather infiltration was calculated as the existing base infiltration plus 20 gpcd times the projected increase in population. A projected base infiltration rate for 2029 was developed using the current 13-gpcd average for the existing population.

Flowrate Calculation

The increase in base sewage, base dry weather infiltration and wet weather infiltration were calculated using the projected population increase (2,524-1,357 = 1,167 for wet weather and 3,874-2,040 = 1,834 for dry weather) multiplied by the factors discussed above. These were added onto the existing ADWF, AWWF, MMDWF, and MMWWF to project the flows for 2029.

4.6 Projected Wastewater Composition

It is estimated that the current sewered equivalent population is around 1,350 in the off-peak season. By the year 2029, the estimated equivalent population inside the city limits is projected to be 2,524. This estimate includes extending sewers to the 45 homes within the City limits that currently use existing on-site septic tank systems, infill development within the existing City limits and an increased tourist population. Future wastewater loads to the treatment plant are approximated using the unit wastewater strength values from Section 4.2.

The system treats mainly domestic waste, with most of the commercial use on the system associated with the lodging and restaurant trades. Projected BOD and TSS loads have been calculated on a per capita basis and are summarized in Table 4.6.1.

TABLE 4.6.1
PROJECTED WASTEWATER LOADS TO PLANT (LBS/DAY)

		CURRENT 2004		PROJECTED 2029	
All Units PPD	DESIGN	PEAK	OFF PEAK	PEAK	OFF PEAK
BOD					
Avg. Day	206	307	322	582	600
Max. Month	535	509	522	966	995
Max. Day		743	1109	2052	2114
TSS					
Avg. Day	243	254	268	482	499
Max. Month	681	490	419	905	936
Max. Day		787	959	1770	1830

The WWTP is operating above capacity for average BOD and TSS loads. Swings in influent concentrations that exceed the plant design have been treated, largely within permit limits, due to the skill of the plant operators.

The projected 2029 load for the system is well over the daily average design load for the existing treatment plant for both BOD and TSS. Current population levels, when the transient population is included, exceed the design population for the facility. The population is expected to almost double within the 25-year study period. The projected loads for the WWTP are summarized in Table 4.6.2.

TABLE 4.6.2
SUMMARY OF PROJECTED WWTP FLOWS & LOADS

Parameter	Projected 2029*	
Population	3,874 (Peak)	
MMDWF	0.33 MGD	85 gpcd
MMWWF	0.51 MGD	132 gpcd
ADWF	0.33 MGD	84 gpcd
AWWF	0.43 MGD	110 gpcd
Base Sewage	0.26 MGD	68 gpcd
Base Infiltration (wet)	0.12 MGD	31 gpcd
Peak Month	0.55 MGD	141 gpcd
Peak Week	0.95 MGD	247 gpcd
Peak Day	1.96 MGD	506 gpcd
PIF	2.64 MGD	682 gpcd
BOD Avg. Day	600 ppd	.24 ppcd
BOD Max. Month	995 ppd	.39 ppcd
TSS Avg. Day	499 ppd	.20 ppcd
TSS Max. Month	936 ppd	.37 ppcd

*Projected is based on current flows (2003/2004) and does not include an allowance for further I/I reduction.

Basis of Planning

Section

5

Section

5

Basis of Planning

5.1 Design Criteria

Design criteria for future conveyance system expansions are based on topography and the estimated future flows discussed in Section 4. 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 in Section 6 are discussed below.

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. The improvement plan for serving the properties within the UGB will be based on a design period of 25 years for pump stations. Gravity collection line sizing will be based on ultimate build-out. Treatment facility recommendations will be based on a 25-year planning period.

Collection System

Gravity Sewers

Collection systems must be designed considering 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. The minimum diameter of sewers should be 8-inches for maintenance purposes. Short, non-extendable 6-inch sections up to 250 feet are permissible. Pipe sizing above 8-inches should be based on anticipated flows and master planning, not minimum slope considerations. Manholes should be spaced no more than 500 feet apart for sewers up to 24-inches in diameter. Manholes should also be used where sewer alignment, slope, or pipe size changes. To facilitate self-cleaning, a drop should be incorporated in the manhole base. Flow channels in manholes should be designed with a 0.1-foot drop from inlet to outlet. The minimum drop for an outlet at right angles to an inlet of the same diameter should be 0.2 feet. Manholes should have a minimum inside diameter of 48-inches at the bottom and have a 23-inch minimum opening. Flat-top manholes should be used when the depth to the invert is six feet or less; otherwise standard eccentric cone type manholes should be used. Pipe inverts over two feet from the bottom of the manhole should have a drop elbow and pipe.

Minimum pipe slopes are established to ensure flow velocities high enough for self-cleaning of the pipe. Slope is the key criterion in designing a wastewater collection system to avoid sulfide problems.

Sewers designed with long runs at minimum slope are prone to sulfide generation due to long residence times, poor oxygen transfer, and deposition of solids. Current conventional design practice recommends that a minimum velocity of two feet per second (fps) be achieved regardless of pipe size to maintain a self-cleaning action in sewers. It is desirable to have a velocity of three fps or more whenever practical. Minimum slope for service laterals should be two percent (¼-inch drop per foot).

Standard methods of determining the slope for self-cleaning velocities are based on pipes flowing at least half-full. Where flows are expected to be less than half-full on a regular basis and adequate grade exists, a slope should be used that will provide velocities of three fps for full or half-full pipes. In general, minimum slopes should be established based on the information summarized below in Table 5.1.1.

TABLE 5.1.1
SLOPES FOR SEWERS (BASED ON MANNING'S N = 0.013)

Nominal Pipe Diameter (in)	Minimum Slope (2 fps)	Recommended Slope (3 fps)
4	0.02	0.02
6	0.0060	0.0110
8	0.0040	0.0075
10	0.0028	0.0056
12	0.0022	0.0044
15	0.0015	0.0033
18	0.0012	0.0026

Force Mains

Most force mains should have a nominal diameter of at least 4-inches to pass larger solids. In general, velocities of at least 3.5 fps are desirable in small force mains to help maintain self-cleaning action. Larger force mains should convey higher velocities periodically. In no case should the velocity in a force main be less than 2.5 fps. Very high velocities in force mains will result in high friction losses and larger pump motors being required. Velocities above eight fps are usually considered excessive. The design should also address transient or pressure surges due to sudden velocity changes, especially in long force mains. Minimum flows required to obtain recommended force main velocities are shown in Table 5.1.2.

TABLE 5.1.2
MINIMUM FORCE MAIN FLOWS (GPM)

Force Main Diameter (in)	Flow for 2.5 fps Velocity	Flow for 3.5 fps Velocity	Flow for 5.0 fps Velocity
3	55	77	110
4	98	137	196
6	220	308	441
8	392	548	783
10	612	857	1,224
12	881	1,234	1,762
14	1,200	1,679	2,399

The number of high points in a force main should be kept to a minimum. Air and other gases can become trapped at high points reducing the pipes capacity. A means of releasing air or gases trapped at high points is usually required. Sewage air relief valves are commonly used to release trapped air and gases at high points that are not at the end of the force main. Sewage air relief valves may not be required if the force main is small in diameter or length, or velocities are sufficient to move trapped air and gases.

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 pump station installation must be able to handle the peak flows in the system without bypassing. 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 wetwell 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 sulfide generation, wetwells should be as small as possible while still allowing for future growth. Wetwell detention times of 30 minutes or less are recommended to avoid sulfide generation[1]. 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 wetwell level sensor.

Pressure Sewers

Pressure sewers use individual pumps on each property. Typical equipment may include a grinder pump (GP) or a septic tank effluent pump (STEP). The major difference between the two systems is in the onsite equipment and layout. GP systems have a small pump and basin. STEP systems typically have a 1,000-gallon septic tank with a pump conveying the supernatant into the system. Pressure sewers generally use smaller diameter pipe and are installed shallower than conventional gravity sewers and usually result in lower construction costs in less populated areas. Pressure sewers are considerably independent of slope and ground topology. Because the mains are pressurized there is no infiltration.

Service connections in pressure sewer systems are typically 1.25-inch diameter. Cleanouts are used to provide access for flushing. Automatic air release valves are required at and slightly downstream of summits in the sewer profile. GP systems should be designed so that a pipe velocity of three to five fps is achieved at least once every day. GP effluent is generally about twice the strength of conventional wastewater (e.g., BOD and TSS of 350 mg/L). STEP effluent is pretreated and has a BOD_5 of 100 to 150 mg/L and SS of 50 to 70 mg/L. Both can be assumed to be anaerobic and potentially odorous if subjected to turbulence.

STEP systems require pumpout of interceptor tanks at 3 to 5 year intervals. Owing to their tendency to accumulate grease in their tankage, GP units are often pumped as part of the annual preventative maintenance check. Energy costs are borne by the homeowner and range from $1.00 to $2.50 per month depending on the horsepower of the unit. Total O&M costs are estimated at $100 to $200 per year per unit.

[1] EPA/625/1-85/018 "Odor and Corrosion Control in Sanitary Sewer Systems and Treatment Plants"

Wastewater Treatment Facility

Primary consideration will be the degree of treatment required to meet the discharge requirements and 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 discharge requirements can be met during changing influent conditions and also allow construction and connection of new process units as needed.

Reliability

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 high degree of manual labor and specialized instrumentation should be avoided in most cases. Redundancy is also a key factor in reliability. This facility is rated as an EPA Reliability I facility.

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 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. Consequently, the selection of a treatment process or 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/period 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/intensity of use, type/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 rainfalls and be sized to treat the mass loads projected for the facility. The following guidelines were used in this plan (Gasik 2002):

- All units should be able to handle the peak hourly flows without overflowing or damaging equipment.
- The headworks should be sized for peak hourly flows.
- Primary clarifiers, when present, should be sized for peak daily flows.
- Aeration basins should be sized using modeling to generate desired treatment. Typically, 10 mg/L at MMDWF (Summer) and 30 mg/L at MMWWF (Winter).
- The secondary clarifiers should be sized for either the peak day with both 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. 1200 for winter and 800 for summer)
- The disinfection system should be sized for peak hour 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 suspended solids level of the incoming mixed liquor and the exiting biosolids in addition to the holding time in the digester and the amount of plant influent. The assumption is made that sludge is held for 60 days and that biosolids are removed at 2% solids.

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

5.2 Regulatory Environment

The federal and state governments strictly regulate collection, treatment and discharge of sanitary wastewater. Changes in regulations may drastically affect the design, operation and costs of treatment facilities. An overview of current regulations and known changes is discussed in this section.

Present Regulatory Requirements

NPDES Permit
The City of Yachats owns and operates its wastewater system under the jurisdiction of National Pollutant Discharge Elimination System (NPDES) waste discharge permit, No. 100812. The Oregon Department of Environmental Quality (DEQ) pursuant to ORS 468B.050 issued this permit. 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.

The NPDES permit is divided into five separate schedules: Schedule A - waste discharge limitations not to be exceeded, Schedule B - minimum monitoring and reporting requirements, Schedule C - compliance conditions and schedules, Schedule D - special conditions, and Schedule F – General Conditions. The City is required to collect and analyze, and report on the items or parameters pertaining to the WWTP's influent and effluent. A summary table of these monitoring requirements is provided in the City's NPDES permit, which is in the Appendix. The City is also required to provide notification of cause and estimation of flow associated with any sewage bypasses, record all applicable equipment breakdowns, and report the method of sludge disposal.

The requirements pertaining to the City's WWTP effluent discharge to the Pacific Ocean are given in Table 5.2.1. Mass load limits specified in the City's permit are based on an average dry weather design flow (ADWF) of 0.15 MGD. The Pacific Ocean is not considered water quality limited at Yachats. The discharge is located at a rocky outcrop with strong tidal and wave action. There are no shellfish harvesting areas within the mixing zone.

TABLE 5.2.1
NPDES PERMIT WASTE DISCHARGE LIMITATIONS

Parameter	May 1-Oct 31		Nov 1-Apr 30		Year-round
	BOD	TSS	BOD	TSS	Other
Monthly Average (mg/l)	20	20	30	30	-
Weekly Average (mg/l	30	30	45	45	-
Monthly Average (ppd)	25	25	37.5	37.5	-
Weekly Average (ppd)	37.5	37.5	56	56	-
Daily Maximum (ppd)	50	50	75	75	-
Minimum Removal (%)	85	85	85	85	-
Fecal Coliform Organisms /100 ml	-			-	200 monthly/400 weekly
pH	-			-	6<pH<9

Under Schedule C (Compliance Schedules and Conditions) of the permit, the City was required to submit the following.

- Institute a continuing program to identify and reduce I/I into the sewer collection system.
- Submit an annual report detailing sewer collection maintenance activities that have been done in the previous year and those planned for the following year.
- Submit a plan and schedule to upgrade the lime stabilization facilities.

The City has compiled with the submission of the plans and reports.

MAO

The City and DEQ signed a Mutual Agreement and Order (MAO) in June 2003 to establish a schedule and plan for rectifying deficiencies in the collection and treatment system. Temporary treatment limits are set in the MAO as detailed in Table 5.2.2.

TABLE 5.2.2
MAO WASTE DISCHARGE LIMITATIONS

Parameter	Year-Round		
	BOD	TSS	Other
Monthly Average (mg/l)	35	35	-
Weekly Average (mg/l	45	45	-
Monthly Average (ppd)	37.5	37.5	-
Weekly Average (ppd)	56	56	-
Daily Maximum (ppd)	No Limit	No Limit	-
Chlorine Residual			2.2 mg/l daily-1.8 mg/l monthly avg.
Fecal Coliform Organisms /100 ml	-		200 colonies

Other requirements of the MAO are that the City submit plans and schedules for I/I improvements to DEQ by August 13, 2003, implement the plans, and submit a wastewater optimization study by October 13, 2003. The City has until December 2004 to submit this facilities plan and then is required to follow through with securing funding and constructing an upgrade to the wastewater treatment plant within a timeline that is dependent on DEQ approval of the facilities plan and construction drawings.

OAR

In addition to the above requirements, the water quality standards, as defined in OAR 340-41-285, shall not be exceeded except in the following defined mixing zone: 100 feet beyond the point of discharge. The WWTP discharges directly into the Pacific Ocean at a point of rocky shoreline, without public access. Tidal and wave motion create a mixing action that immediately dilute the effluent.

Yachats is located in the Mid Coast Basin as designated by DEQ for water quality standards, but the effluent is discharged to marine waters, which follow the statewide standards. The statewide standards from the Water Quality Criteria Summary (Table 20) are included in Appendix A. Ammonia toxicity is highly dependent on temperature, pH, and species as outlined in Ambient Water Quality for Ammonia (Saltwater) 1989, an EPA guide adopted by DEQ as the criteria for ammonia in marine waters. Marine water quality standards include the following:

- pH between 7.0 and 8.5
- No background change in temperature above 0.3 °C
- No background change in dissolved oxygen
- Fecal coliform median concentration below 14 colonies of per 100ml
- Toxic substances may not exceed the limits in Table 20

A mixing zone study has not been completed for this outfall due to the inaccessibility of the waters surrounding the outfall. However a biological assessment of the outfall zone and computer model of the mixing zone is recommended prior to design of a facility upgrade. This assessment would assist in setting limits for ammonia and chlorine.

Oregon Administrative Rules regulate the disposal of sludge from public sewer facilities. Under rule 340-050-0070, sludge may not be land applied during flooding or periods where the groundwater is closer to the surface than one-foot. The current disposal site is an upland pasture without flooding or groundwater concerns.

DEQ Design Standard

DEQ issued Oregon Standards for Design and Construction of Wastewater Pump Stations in 2001, which is the current version. The EPA Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability was used to determine the minimum number and sizing of components using the guidelines for reliability level one facilities.

Other

Wastewater treatment facilities, including pump stations, are also regulated under the 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. The Main Pump Station qualifies as a Permit Required Confined Space and requires special equipment and multiple personnel present for entry.

Future Regulatory Requirements

OAR 340-41-026 (2) requires that, unless otherwise approved by the Environmental Quality Commission, growth and development shall be accommodated within the existing permitted loads by the application of increased treatment and control efficiency. While the WWTP normally operates below the average dry weather flow permit level of 0.15 MGD, high levels of I/I regularly cause plant winter effluent flows to exceed 1.0 MGD.

OAR 340-041-0034 (3) sets forth the following policy guidelines for future sewer planning:

- Each sewer utility is to develop a financing plan for new or modified sewer works.
- The financing plan should assure ability to construct facilities in a timely fashion with locally derived funds.
- Sewer Utilities are not to assume grant assistance in addressing planning and construction needs.

5.3 Basis For Cost Estimate

The cost estimates presented in this Plan will include four components, each of which is discussed in this section. The estimates presented herein are preliminary and are based on the level and detail of planning presented in this Study. As projects proceed and as site specific information becomes available, the estimates may require updating.

Construction Costs

The estimated construction costs in this Plan are based on actual construction bidding results from similar work, published cost guides, 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. Estimates will be based on preliminary layouts of the proposed improvements.

Future changes in the cost 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 fifteen years are summarized in Table 5.3.1.

Estimates in this Plan are based on year 2004 costs. Future yearly ENR indices can be used to calculate the cost of projects for their construction year based on the annual growth in the ENR index. Without using the future ENR Index, costs for construction performed in latter years should be projected on an increase of three percent per year.

TABLE 5.3.1
ENR INDEX – 1990 TO 2004

Year	Index	% Change
1990	4,732	2.54
1991	4,835	2.18
1992	4,985	3.10
1993	5,210	4.51
1994	5,408	3.80
1995	5,471	1.16
1996	5,620	2.72
1997	5,825	3.65
1998	5,920	1.63
1999	6,060	2.36
2000	6,222	2.67
2001	6343	1.93
2002	6538	3.07
2003	6694	2.39
2004	7126*	6.45
	Avg. Annual %	2.62%

*July figure, annual is not yet available

Contingencies

A contingency factor equal to 15% of the estimated construction cost has been added to account for uncertainties present with respect to growth scenarios and topography. In recognition that the cost estimates presented are based on conceptual design, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties which cannot be foreseen at this time but may tend to increase final costs.

Engineering

The cost of 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, start-up 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 cost 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 costs for design and construction of this project will average between 18% and 20% of the construction cost.

Legal and Administrative

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

Operation and Maintenance Costs

O&M costs are difficult to predict since they depend on many things including the owner's policies, varying costs of labor and materials, specific maintenance required, and repair crew time required. In addition, future power costs are usually unknown. For the estimates used in this Plan, annual pump station operation and maintenance costs are taken as five percent of the construction cost (excluding power costs). STEP system O&M costs are $145/year per tank plus $500 per mile of piping. Grinder pump system O&M costs are taken as $225/year per tank plus $500 per mile of piping. Power costs are estimated using a cost of seven cents per kW-hr. Gravity sewers are anticipated to be cleaned/flushed once every five years at a cost of five cents per foot. Additionally, annual O&M funds include an allowance to TV inspect 25% of the sewer length in 20 years at cost of $1.50 per foot.

Annual O&M costs listed for STEP systems include power consumption costs equal to $15 per year per tank. STEP tanks will require pumping about every three to six years. Grinder pump basins should be cleaned every one to three years to remove accumulated grease. Grinder pump power costs are about $30 per year per pump.

Development and Evaluation of Alternatives

Section

6

Development and Evaluation of Alternatives

Section **6**

6.1 Existing Piping System Improvements

An evaluation was made of the existing system, both in condition and capacity. Current deficiencies have been identified. I/I measurements made to date have been summarized and improvement recommendations developed along with estimates of expected I/I reduction. Cost estimates for specific measures are included in Appendix D.

Pipe Capacity

As discussed previously in Section 3.1, some existing gravity sewer pipe sections have insufficient slope to handle flows potentially generated by future population growth. Two pipe sections were at or above capacity for flows during a peak flood event. The first section runs from the Ocean View Pump Station south approximately 1,700 feet to Manhole H-17 and was upsized as part of the sewer improvements completed in December 2003. The second pipe section runs between Manhole A-1 and Manhole D-1, adjacent to Main Pump Station on Ocean View Drive and has not been corrected. Reducing I/I should enable the system to handle current flows without surcharging in the manholes. However, as flows increase, the system will be at risk of overflowing during peak rains. DEQ records of collection system overflows document that flows exceed capacity on a consistent occasional basis during wet weather.

Options include lining the pipe to reduce friction, thereby increasing pipe capacity, replacing the pipe with larger pipe, installing new pipe at steeper slopes, and installing an additional pump station and force main to reduce the load on the sections of pipe with low slopes.

Ocean View Drive

At a slope of 0.0015, the capacity of the main line along Ocean View Drive, between manholes # D-1 and A-1, is 374 gpm flowing full. I/I measured in this line was 120 gpm during a moderate rainfall in February 2002. With 150 gpm discharged from the Ocean View P.S., 150 gpm from the Riverside P.S., high I/I, and domestic usage, the capacity of this line would be exceeded, causing surcharging of manholes. The projected flow in this line for the year 2029 is about 1,000 gpm.

Options:

1. **No action, maintain existing pipe configuration:** This line is capable of handling current peak flows with minor surcharging of the manholes, providing no blockages or pipe deterioration is present. Additional sewer connections would increase flows, increasing surcharging and the likelihood of an overflow. DEQ recommends against allowing manholes to surcharge, due to the buildup of solids on manhole walls causing unsanitary conditions. A sewage spill is unlikely at this location unless the elevation of adjacent private laterals is low enough to cause sewage backups into private homes.

2. **Install larger pipe:** The estimated cost to replace the existing 10-inch pipe with 14-inch pipe for 80-feet of length is about $39,000. This would increase capacity to about 1,100 gpm, adequate for future flows.

3. **Install new pipe at steeper slopes:** Installing the pipe at a steeper slope would involve replacing about 230 feet of pipe and a manhole in addition to deepening the wet-well at Main Pump Station. The construction cost, scope of work, and disruption to services are much larger than Option # 2, and so Option # 3 was not pursued.

4. **Line the pipe:** Lining this section of pipe increases the capacity to about 450 gpm, which is inadequate for future flows.

5. **Install additional pump station:** This option was not considered due to high capital and maintenance costs as compared to resizing the pipeline.

Grease

Yachats has a large number of restaurants relative to the size of its collection system. DEQ records indicate that Yachats had problems with grease blockages in 2001 that were attributed to the food service sector. At least one blockage was the cause of a raw sewage spill. The wastewater treatment plant experiences heavy grease loading, which interferes with the biological activity of the treatment process, fouls the equipment and creates a heavy BOD load on the plant. Future sewage spills or upsets at the WWTP may result in DEQ noncompliance penalties of $3,000 to $6,000.

The ordinance regarding grease in the public sewers is found in City Code Section 8.08.040. The ordinance prohibits discharges of grease at levels over 100 mg/l into the sewers and requires grease traps where considered necessary by the superintendent. Plumbing code requires the installation and proper maintenance of grease traps at all food preparation facilities that could discharge grease into a sanitary sewer. Vacation rentals are required to have grease disposal receptacles, which are available free from the City to rental owners and other sewer customers.

For many municipalities, restaurants are the number one offender for releasing grease into the collection system, resulting in grease accumulations and high BOD concentrations in the wastewater. Typical restaurant wastewater is three to four times as strong as residential wastewater, and restaurants may produce up to 75% of the grease entering the sanitary sewer. Even with a grease ordinance in place, most rural communities lack the manpower to enforce the ordinance. Also, it is often difficult politically to enforce an ordinance against the main economic industry in an area dependant on tourism. The problem is made worse by the high turnover of labor in the food industry, where there may be little continuity or training when it comes to maintaining grease traps.

Grease traps quickly become ineffective when the accumulated grease exceeds 75% of the rated capacity for the unit. Proper maintenance requires manually removing the grease, either by scraping or pumping on a regular basis. Flushing the grease with hot water or use of enzymes and emulsifiers merely passes the problem straight to the collection system. Traps may require cleaning as often as every two or three days in a restaurant with deep fryers or as infrequently as quarterly for a bakery with an in ground grease interceptor. To avoid odors and sanitary problems traps located in kitchens should be emptied at least monthly and in ground interceptors should be emptied at least every three months. Newer grease traps may have an automatic grease removal mechanism that senses the grease level and melts the top layer to allow it to run off into an adjacent storage vessel. These traps require only a periodic removal of solids build up from the trap floor.

Options for dealing with grease are divided between prevention and clean up. The first step in any grease remediation program is to inventory the food service facilities and evaluate existing grease trap performance and maintenance. The grease ordinance for the sanitary system should be reviewed to see if it requires adequate protection of the system and offers a reasonable level of enforcement.

Prevention Options:

1. **City staff to inspect grease traps once a month**. With the estimated 17 facilities in town that would require inspection and assuming 30 minutes per site visit, the City would need to budget 10 hours per month for inspections at a cost of approximately $3,000 per year. Part of this cost could be recovered by imposing fines on facilities that have not maintained their grease traps. Inspection and enforcement is the most effective method of preventing grease from entering the system, but requires a high investment in manpower that the City may not have available. Facility owners may also see it as intrusive.

2. **Restaurants self-report grease trap servicing**. Developing a report form and notifying facilities would take an estimated 8 hours of in-house labor at an approximate cost of $280. Reviewing monthly reports and sending out reminder notices would take an estimated two hours per month at an estimated cost of $850 per year. If City staff has records that indicate how often a facility should service their grease traps, then self-reporting may be effective. Self-reporting relies on the facility operators to be trained and cooperative and is most effective after a period of inspections where City personnel help operators establish the required servicing schedule.

3. **Educate food service operators**. Producing an in-house informational handout customized to the Yachats community, using information available on the Internet and print sources is estimated to take about three days at a cost of $850. Samples from other communities are included in the Appendix. An individual site visit to each facility to go over the handout and demonstrate grease trap cleaning techniques would take approximately 24 hours at a cost of $850.

4. **Educate homeowners**. Most homeowners see the sewer system as an unlimited disposal site for liquid waste, including grease drippings. An annual flier sent out with sewer bills about appropriate sewer use could reduce the residential contribution of grease. The cost to develop and print fliers is about $250. Postage costs depend on the current format for mailing sewer bills, ranging from stuffing a flier in the existing envelope to providing and printing special envelopes. Assuming 650 sewer accounts and $0.50 for postage and stationary costs, the estimated annual costs for a flier is $325. Sample fliers from other jurisdictions are included in the Appendix.

5. **Provide City contracted pumping services**. Contract with a private company to manually or mechanically remove grease from the traps at City food service establishments on a regularly scheduled basis. The cost would be billed back to the food service facility as part of the sewer bill. Typical cost for pumping an in-kitchen trap is $20 to $30. The grease removal contractor could start with a monthly pumping at all facilities and adjust the schedule to fit the needs of individual restaurants. It is expected that overall grease removal costs would be lower with a citywide contract than with

current practices. This would entail about four hours per month of staff time to do the billing breakdown. A change in the sewer ordinance would be required, including pubic comment and legal fees. A budget figure of $1,200 for legal fees, and 40 hours of staff time at $25 per hour give a start up cost of $2,200. Ongoing annual staff time is estimated at $1,200. Given the cooperation of the food service facilities, this option would minimize grease in the wastewater system. City controlled grease removal services are likely to be seen as intrusive by food service operators at the initiation of the program.

Grease Clean Up Options:

1. **Cleaning sewer lines**. Most food service facilities are concentrated between 1st Street and 6th Street, within two blocks of Highway 101, with a few facilities located to the north along the highway. Approximately 3,000 feet of eight and ten inch diameter sewer pipe are adjacent to these facilities and likely to become contaminated with grease. Sewer line cleanings costs about one-dollar per lineal foot, for an annual grease-cleaning budget of $3,000.

2. **Manually cleaning wet-wells**. Grease balls accumulate in wet-wells and may be manually scooped out with a long handled net. Manual cleaning is recommended at least monthly. Budgeting two hours of in-house labor per pump station at three pump stations (Quiet Water excluded) and four hours at Main Pump Station would cost approximately $3,000 per year.

3. **Pumping wet-wells**. Even with manual cleaning it is recommended that a sewer cleaning service pump the wet-wells semi-annually to remove grease accumulations. The estimated cost is $300 per wet-well per pump out. Annual cost is approximately $2,400 per year for four pump stations.

4. **Emulsifier Cleaners**. Emulsifiers, degreasers, and products marketed as enzymes dissolve grease from grease traps, pipes and wet-wells. These products have only a temporary effect, and grease may resolidify downstream in the collection system and treatment plant. These products also raise the BOD load on the treatment plant. Manual cleaning is recommended over these chemical treatments.

6.2 Existing Pump Station Improvements

There are capacity, condition and safety issues at all but one pump station. Three pump stations, Main, Ocean View, and Riverside are undersized for handling future flows. Main Pump Station includes confined space issues that make it difficult to maintain. It is also suffering from corrosion. Pontiac Pump Station has a vertical drop to the ocean with no guardrail or fall protection for workers, in addition to broken cowling supports. There are no built in generators, so system operators must rely on two portable generators for power outages. Ocean View Pump Station has minimal storage and should have a generator connected during any outage over one hour. Ocean View operates in series with Riverside and Main Pump Stations, so both of these require a generator when Ocean View is operating during a power outage. This situation leaves the City short one generator. Options for correcting the problems with these stations are discussed below.

Main Pump Station

The rated capacity of each pump is 540 gpm at 47 feet of dynamic head. The pumps running together have a combined capacity of 1080 gpm. Current flows peak at 1600 gpm with measured 24-hour flows averaging 820 gpm. DEQ guidelines require redundancy in pumping capacity, with each pump capable of handling the entire flow. Main Pump Station is over capacity for current peak flows with both pumps running, and does not have redundancy for even a 24-hour peak day. The station has a below grade wet well with limited access that qualifies as an OSHA confined space. This means that two personnel, harnesses, and hazardous gas detection gear are required every time the station is entered. The station is due for replacement of its corrosion protection anode.

Options:

1. **No action, operate the pump station in existing condition**: The pump station is currently undersized to meet peak hourly flows. This is not a recommended option.

2. **Build new above ground PS**. This option involves filling in the existing wet-well and constructing a new wet-well with variable speed duplex submersible pumps and an adjacent pump house with a permanent back up generator. The advantages are that maintenance will be reduced, the confined space access problem for this station will be eliminated, and the City will have capacity projected to meet the needs for the next 25-years. The disadvantages are the capital cost and the need to find a suitable location adjacent to the existing station. Estimated construction cost is approximately $430,000, including land acquisition.

3. **New Pump Station without generator**. This option is the same as option #2, but with a manual transfer switch and connection for a portable generator instead of a permanent generator. Estimated construction cost is $334,000.

4. **Refurbish Pump Station & replace pumps**. To meet future capacity needs, larger pumps are required, which will not physically fit in the existing dry-well. Therefore this option was not pursued.

Ocean View Pump Station

The rated capacity of this pump station is 100 gpm at four feet of dynamic head. A pump down test in October 2000 revealed that the pumps were only producing flows of 73 gpm. Peak hourly flow for this station is approximately 200 gpm under current conditions and is estimated at 400 gpm for 2029. The flat slope of the pipe adjacent to the pump station provides about 100 minutes of storage under average flow conditions, but only 20 minutes with peak flows. DEQ records document overflows at this station in 1996 and 1997.

Options:

1. **No action, operate the pump station in existing condition**: The pump station is currently undersized to meet peak hourly flows. This is not a recommended option.

2. **Replace pump station and river crossing, install permanent generator**. This option involves removing the existing packaged pump station from the wet well and replacing it

with a new pump station with duplex submersible pumps. A new 6-inch PVC force main would be installed across the Yachats River, at the U.S. Highway 101 bridge, to replace the existing 4-inch cast iron force main. A permanent generator with an automatic transfer switch would be installed in an enclosure next to the pump station. The existing wet-well and auto dialer would be retained. The advantages are that this option offers the largest capacity for growth and the best protection against overflows. The disadvantages are the capital cost, estimated at $336,000 and the additional maintenance required for a fixed generator.

3. **Replace pump station & river crossing, no generator**. This option is the same as Option #1 above, but with a connection for a portable generator. The advantages are a lower capital cost over Option #2, estimated at $278,000, the same capacity as Option #2, and avoidance of maintaining a generator in the field. However, this station has little capacity for storage in the event of a power outage and during a five-year storm could overflow in as little as 15-minutes. Most coastal power outages occur during storms, so this is an event that could occur relatively frequently.

4. **Replace pump station, keep river crossing, no generator**. This option reduces capital costs, but increases electric costs for running the pumps by about $500 per year. Pumping at a higher velocity will increase head loss in the pipeline, leading to higher internal pressure. High-pressure places stress on the existing force main and higher velocity could cause erosion of the pipeline material, leading to premature failure. The maximum flow that the existing pipeline can handle is 200 gpm, which meets current needs, but not projected future loads. The existing pump station with upsized impellors and both pumps running has a capacity of over 150 gpm, so there is little to gain by replacing the pump station without replacing the pressure main. The estimated cost for replacing the pump station only is about $108,000.

Riverside Pump Station

Riverside Pump Station is in good shape and is operating at design capacity. The station currently runs longer hours than would be predicted, based on the estimated flows to this station. This may indicate high I/I levels in Basin F. The concern for Riverside Pump Station is capacity. Peak winter storm flows are estimated to exceed the capacity of the station. This is backed up by combined pump run times frequently exceeding 24 hours per day in winter. Projected peak flows for 2025 are expected to reach 400 gpm.

Options:

1. **No action, operate the pump station in existing condition**: The pump station is currently undersized to meet peak hourly flows. This is not a recommended option.

2. **Replace the Station with a new packaged pump station**. Smith and Loveless is the manufacturer of the existing pump station. Their product line includes new stations that will bolt into the existing mounting plate with eight bolts. The electric service would need to be upgraded, but the rest of the existing station and wet-well would remain without changes. This measure assumes the reuse of the existing autodialer and alarm components. The advantage of this option is that the City will have a new station, with a life expectancy of 20 years. The disadvantage is the capital cost, estimated at $107,000.

3. **Refurbish the Station and install larger impellors**. With larger impellors and 5 Hp motors, this station is capable of providing the estimated 400 gpm required for future flows. The advantage of upgrading the existing station is a lower cost than complete replacement. The disadvantage is that the City will still have a 30-year-old station, which already has corrosion problems. The estimated cost to upgrade the existing equipment is about $43,700.

Pontiac Pump Station

Pontiac Pump Station is adequately sized for current and projected future flows. The main concern for this station is a lack of fall protection and safety railing to protect workers. City workers recently relocated the electrical components of the station to a remote site to provide protection from the elements. The metal fittings remaining on the station are corroded and the cowling supports are broken. The estimated cost to install a fiberglass railing on the ocean side of the station anchored to a concrete pad and replace the broken cowling supports is $3,500 based on 15 linear feet of railing.

Quiet Water Pump Station

Quiet Water Pump Station is in good operating condition and adequately sized for current and projected future flows.

6.3 Treatment Facility Improvements

Based of the projected flows and loads presented in this Study, a major expansion project will be required at the treatment facility. The collection system experiences excessive I/I, which has caused the WWTP to exceed its design hydraulic capacity. The mass load treatment capacity of the WWTP has been reached by the existing population, and is inadequate for future needs. DEQ requires a redundant clarifier and back-up pumps for Class II wastewater treatment plants, which this facility lacks.

The WWTP is difficult to operate, despite the skills of the trained staff. There is no metering of the return activated sludge (RAS), which means that operators must rely on timing the pump runs to estimate the micro-organism return to the aeration basins. The influent meter readings are also suspected to be inaccurate. This meter is the basis for all calculations of plant flow and mass loads, in addition to effluent flows. The two digester tanks do not have decant valves, which would allow supernatant to be drawn off and a thicker sludge to be developed. Clarifier maintenance is difficult, as there is no backup clarifier to take the load and allow shut down for repairs and cleaning. The existing lab equipment has exceeded its useful life.

With moderate improvements and operational changes, the WWTP is capable of serving the needs of the current population. Implementing these short-term projects will enable the plant to operate more efficiently, and buy time for planning and construction of the upgrades needed to meet future wastewater flows.

Short Term Projects

Update Laboratory

The existing laboratory lacks basic equipment necessary to analyze the wastewater stream. Several pieces of existing equipment are not working, or are unreliable. The plant will not run at maximum efficiency without daily information on suspended solids, BOD levels, digester temperature, and dissolved oxygen levels. This alternative includes the purchase of necessary meters and analysis equipment, glassware and disposables, laboratory training, a fume hood, a dishwasher, and a refrigerator. The estimated cost is $50,000

Automatic Sampling Stations

Calculations of the amount of BOD and TSS entering and leaving the plant are based on sampling of the raw sewage influent and the treated effluent. Grab samples are currently taken of the influent and effluent streams. A more representative sample may be obtained by using an automatic sampling station that takes a composite sample over a 24-hour period. Grab samples are taken during the WWTP working shifts, when BOD and TSS levels tend to be at their highest. Daily mass loads based on the grab samples will be likely to be higher than those based on composite samples. Since a WWTP is designed based on the current mass load, accurate sampling may mean a smaller plant and associated lower construction costs. Estimated cost to purchase two samplers and install power outlets for each is $19,000.

New Effluent Meter

Main Pump Station runs in an on/off configuration. This control strategy means that raw sewage is delivered to the headworks in short high-flow bursts, while treated effluent flows out the other end of the plant at a fairly steady rate. The chlorinator is tied to the influent meter as a way of determining how much chlorine to use. This discrepancy in flows results in uneven chlorination, since the effluent flow does not match the influent reading. However, currently the staff overrides the automatic control and manually controls the chlorine levels, which provides more consistent chlorination, but results in over chlorination at night. The influent meter is also suspected of being inaccurate.

Installing a new effluent meter would allow for better control of chlorination, saving staff time and chlorine costs. A direct effluent reading will be lower than the influent reading, allowing the City to more accurately calculate total mass loads discharged. DEQ requires metering of the bypass discharge. Having both an influent meter and effluent meter will allow the City to calculate any bypass at the plant. The estimated cost for installing a new effluent meter and reconfiguring the chorine controls is $23,000.

Supernatant Decanting

Waste sludge flows from the clarifier to Digester #2. There it is aerated until there is room in Digester #1. An airlift pump moves the sludge into Digester #1 where it is alternately aerated and settled. After each settling period, the supernatant, the clear liquid that separates in a layer on top of the digester, is siphoned off and pumped back to the aeration basin, creating more room in Digester #1. The original design for this facility did not provide for decanting, except in a small chamber adjacent to the digesters. The plant operators have pieced together a pipe and hand winch to allow decanting from Digester #1. Ideally each digester would have a pump or telescoping valve to allow the supernatant to be decanted. When each digester may be individually decanted, that space becomes available for more sludge, reducing the needed tank size.

The recommendation is to add supernatant decanters to Digesters #1&2. Estimated construction cost is $10,000.

Operations Changes

With an adequate laboratory and accurate effluent readings the staff will be able to control the treatment processes of the plant much more efficiently. By daily testing the suspended solids in the mixed liquor (aeration basins) return sludge and waste sludge, the amount of return and waste may be accurately calculated. The residence time of sludge in the clarifier may be tracked. Accurate return and wasting help prevent denitrification and the associated odors, and maximize the treatment capacity of the plant. Calculations for RAS and WAS are detailed on pages 1-16 to 1-19 of the O&M manual for the facility.

The existing RAS pumps do not have meters, but the WAS/scum pump does have a meter and may be used for RAS by adjusting valves on the return and waste piping system. Operating staff would then be able to read the meter and have an accurate measure of the amount of return. Currently there is no way to directly measure return to the aeration basins. Return levels should be adequate to maintain a sludge blanket of no more than three feet in the clarifier. Adjusting the v-notch weirs will help even out flow in the aeration basins. The RAS can be introduced directly into the influent stream to get better mixing.

The staff currently uses lime to stabilize the treated sludge. Holding sludge at 15°C for 60 days may also produce a Class B bio-solid. (A DEQ formula is available for retention times for varying temperatures.) Daily tracking of digester temperature would allow the staff to estimate if the sludge meets Class B standards. The new laboratory equipment will enable the staff to test for volatile solids reduction to verify the 38% reduction required for a Class B bio-solid. Achieving the 38% reduction would mean that lime is not required for stabilization. It is likely that lime stabilization could be eliminated for most if not all of the year. Manual application of lime to the digesters is a messy, hazardous, and time-consuming task.

The plant was designed to recycle floating material (scum) from the clarifier back to the aeration basin. With the high levels of grease in the Yachats system, the aeration basins cannot break it down, allowing it to flow back into the clarifier. The grease does not get removed from the system and could contaminate the effluent. By routing the scum to the digester, where material resides for 60 days or longer, the grease may be digested by the plant microorganisms and broken down.

Scum is skimmed off the clarifier and flows to a scum well. The WAS pump is used to pump the scum to the aeration basins. The scum may be rerouted to the digester by closing the valve on the scum return line and opening the valve on the WAS line.

Long Term Projects

The projected flows for the study period exceed both the hydraulic and treatment capacity of the WWTP. The predicted peak hourly flow is 2.64 MGD for the year 2029. This is just under twice the design hydraulic flow of the existing plant. Options for correcting treatment deficiencies are based on the flows and rainfall relationships for the winter of 2003/2004.

Existing BOD and TSS mass loads on the plant are at the construction design treatment capacity and future loads are expected to exceed the capacity of the plant to produce an effluent within permit limits. Projections are based on current levels, without considering a reduction from the I/I repairs.

BOD and TSS are more dependant on population than flow, so this gives a conservative estimate. The treatment capacity of the existing plant will not handle the projected load, so the plant must be either expanded or replaced. The existing clarifier is in excellent condition and the digester/aeration basin structure is in good condition. Therefore reuse of this equipment in a plant expansion will be considered when evaluating each alternative.

The WWTP is a reliability Class II treatment plant with discharge limitations as listed in Table 5.2.1. Options considered for the facility assume that the existing permit effluent discharge concentration limits are maintained. While changes to the facility are designed with the goal of maximizing the treatment efficiency of the plant, major increases in population may require application for an increase in daily mass load limitations. At this time a mass load increase is not anticipated.

Headworks

While the influent meter is sized to handle future flows, the remaining headworks equipment lacks the capacity to meet future needs. The elevation of the headworks provides for only 2.4 feet of drop from the screen outlet to the clarifier, making it difficult to add new treatment components to the WWTP and maintain gravity flow from the headworks. Options include operating the existing equipment, upgrading the existing mechanical screen and adding a pump station between the headworks and aeration basin, and building a new headworks with a higher elevation.

Options

No action, operate the existing equipment. The screen and grit removal equipment are in good operating condition, however they are undersized for current flows, so reuse of this equipment is not considered an option.

Build new headworks. Building a new headworks, sized to handle projected future flows and with an elevation suitable for providing gravity flow to components required for future plant expansions is estimated to cost $594,000 including the cost of extending the forcemains to the new location. One advantage of this option is a discharge elevation high enough to serve not only the expansion currently contemplated, but also the addition of future components. Other advantages include the opportunity to select the optimum site for a headworks serving an expanded plant, less disruption to plant operations during construction and proper sizing of the screen and grit chamber to handle future flows.

Upgrade existing headworks. Removing the existing screen and installing a mechanical auger screen sized for future flows is estimated to cost approximately $215,000. This cost includes a structure to cover the headworks and a chute for rag disposal directly into the dumpster. The grit removal equipment would still be undersized for peak hourly flows and grit would likely wash into the system during major rainstorms. A pump station to provide the required hydraulic flow from the existing headworks to the new aeration basin is estimated to cost an additional $345,000, for a total upgrade cost of $560,000. The advantage to this option is the lower capital cost due to reuse of the existing structure and force main. The disadvantage is the new headworks pump station adds equipment to be maintained and the cost of power to run the pumps. Additional back up power would be necessary for the pump station and the headworks would still need to be upsized before the end of the study period.

Discussion of alternatives. As the headworks would need to be upsized during the study period, it is recommended to replace the headworks as part of the overall plant upgrade and site the headworks to fit the upgraded plant layout. The following alternatives will be analyzed assuming a new headworks is part of the project.

Biological Treatment

The existing biological treatment of the WWTP consists of the aeration basins, clarifier and digesters. The peak day design capacity for the aeration basins is 535 ppd of BOD. This is adequate for current flows, but does not meet the projected treatment load for the year 2029 of 2,100 ppd. The existing clarifier does not meet DEQ redundancy requirements and is undersized for the current peak daily flow. The existing digesters are sized to meet current loads, but need additional capacity to meet projected loads. The separate units of the biological treatment system are interdependent on each other and will be grouped together when considering treatment options.

Various alternative liquid stream treatment methods were examined for the wastewater plant as detailed below.

Options

Conventional Activated Sludge. The conventional activated sludge process is very flexible and can be adapted to almost any type of biological treatment problem. The activated sludge process is typically accomplished using two process units: an aeration basin and a clarifier or settling basin. Clarified wastewater is introduced into the aeration basin where it is mixed by the use of diffused or mechanical aeration to maintain a completely aerobic state. The solution of wastewater and microorganisms, or mixed liquor, flows from the aeration basin to the clarifier where the solids settle. A portion of the settled solids or sludge is recycled back to the aeration basin and a portion is wasted, typically to a digester. The clarified effluent is usually removed from the top of the settling basin for further treatment (e.g. disinfection) and disposal.

Many versions of this basic process are in use today and are specifically tailored to a particular wastewater stream and its effluent limitations. If a new facility were to be constructed, the aeration basin would be able to operate in a number of modes: complete mix, step feed, and contact stabilization. By providing an inlet channel with four discharge points (e.g. at the beginning, one eighth, one quarter, and one half the length of the basin) the process could be operated in any of the modes previously mentioned. To meet current regulatory standards, two aeration basins would be required. These basins could act as one or independently of each other. Return activated sludge from the clarifiers would be mixed with the influent at the head of the aeration basins.

Following the aeration basins, two circular clarifiers would be required to satisfy the redundancy requirements. Pumping facilities would be required for the transport of returned and waste activated sludge. Some type of sludge stabilization will be required for the wasted activated sludge.

Key advantages of conventional activated sludge systems include their widespread use (and thus familiarity) and flexibility. Conventional activated sludge systems are capable of producing BOD and TSS concentrations effluent quality generally ranging from 10 to 30 mg/l, depending upon the specific process train. The disadvantage of these systems is the cost and operation associated with the redundant treatment components (two primary/secondary clarifiers, two aeration basins).

Sequencing Batch Reactor (SBR). As the name implies, the SBR process is operated in a periodic manner (batch) and utilizes a single tank for both biooxidation and sedimentation of suspended microorganisms. Because of the batch operation, there is normally more than one SBR tank utilized for a continuous wastewater stream.

A typical operation sequence consists of five steps: fill, react, settle, decant, and idle. The treatment sequence begins with the introduction of wastewater into a partially filled tank containing settled mixed liquor from a previous cycle (fill phase). In the react phase, aeration/mixing are provided for a length of time sufficient to produce an effluent of the desired quality. With some SBR units, the fill and react phase are combined in an aerated fill step. After the react phase, the mixed liquor is then allowed for quiescent settling phase, after which the clear supernatant liquid is then subsequently decanted as effluent. Once the decant phase is completed, the system is ready for refilling. During the settle and decant phases in one tank, the other tank is undergoing the fill and react phases. Because the process continually runs through cycles, automated controls are utilized to operate the treatment process.

Key advantages of the SBR process includes its simplicity and reliability, high operational flexibility, capable of very high and consistent effluent quality due to quiescent batch settling (<10 mg/l BOD, TSS), requires less operator attention than most other mechanical systems, and ideally suited to wide flow variations.

Membrane Bioreactor. Membrane bioreactors combine the activated sludge treatment process with a membrane system to provide enhanced organics and suspended solids removal. With suspended growth bioreactors, this process has been operating successfully at the full-scale level for over 20 years (Brooks et al. 2001). In suspended growth bioreactor system, membranes are placed either within or downstream of a biological reactor. Flow passes through the membranes, while rejected solids (including mixed liquor suspended solids, MLSS) remain in the biological system. Using membranes for MLSS separation allows biological systems to operate without secondary clarification and thus, at a higher mixed liquor concentration (two to four times higher than conventional systems). The end result is that membrane bioreactors provide greater biological treatment capacity for a given reactor volume.

Key advantages of the membrane bioreactor process include production of high quality effluent (<10 mg/l BOD and TSS), elimination of secondary clarification, and expansion of treatment capacity without significantly increasing site requirements. Key disadvantages of this system include high initial capital costs for the membranes, periodic replacement of the membranes (every 5-7 years), and limited operating experience within the United States for secondary wastewater treatment.

Selection of Treatment Alternative

The three types of liquid stream treatment described above were examined for suitability and cost. Flow diagrams for each treatment method are presented below followed by a summary of the analysis for each method.

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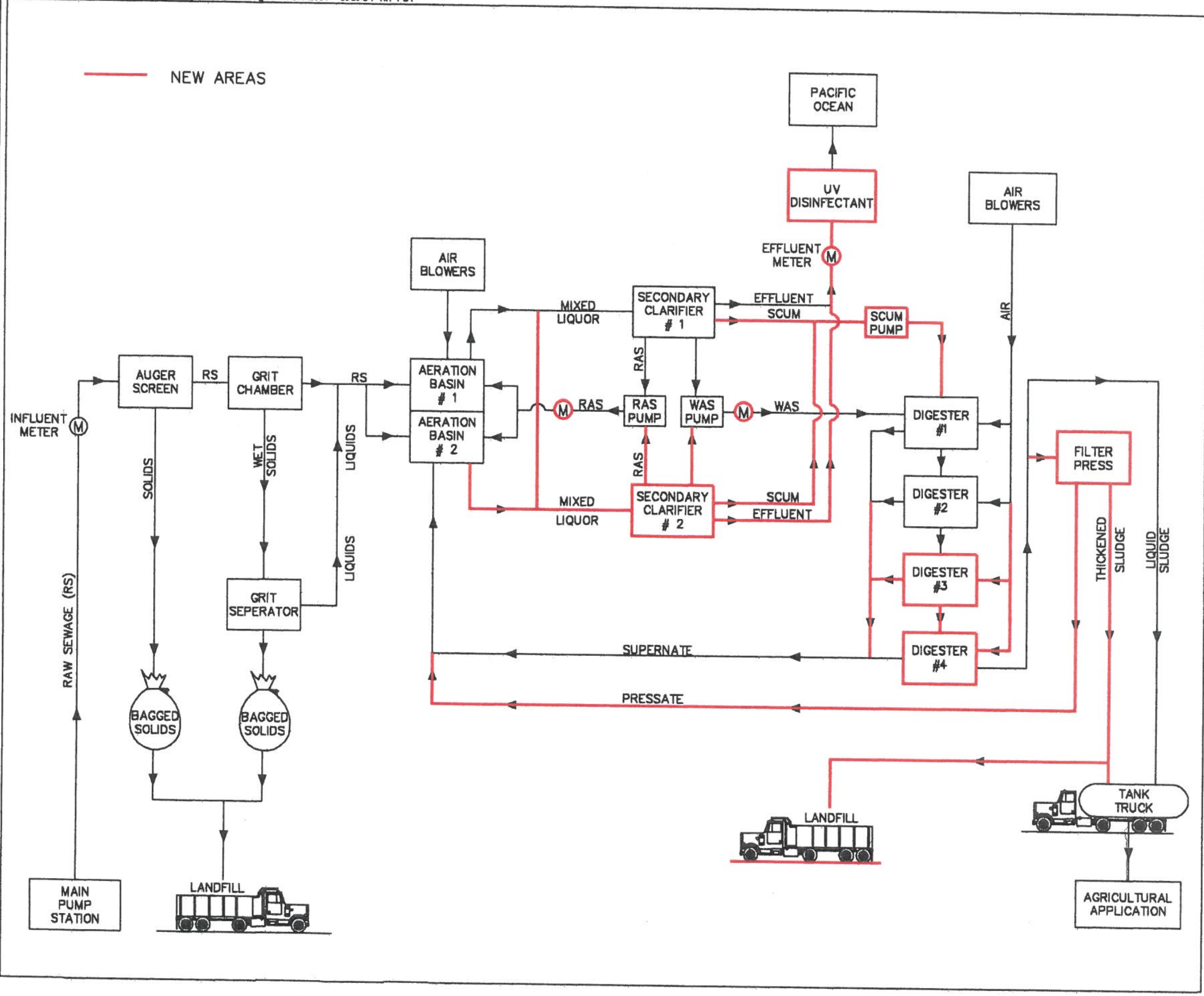

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

DATE: SEPTEMBER, 2004
PROJECT NO.: 141.05

CITY OF YACHATS
WASTEWATER FACILITIES PLAN
ALTERNATIVE NO.2 - ACTIVATED SLUDGE PLANT UPGRADE

FIGURE NO. 6.3.1

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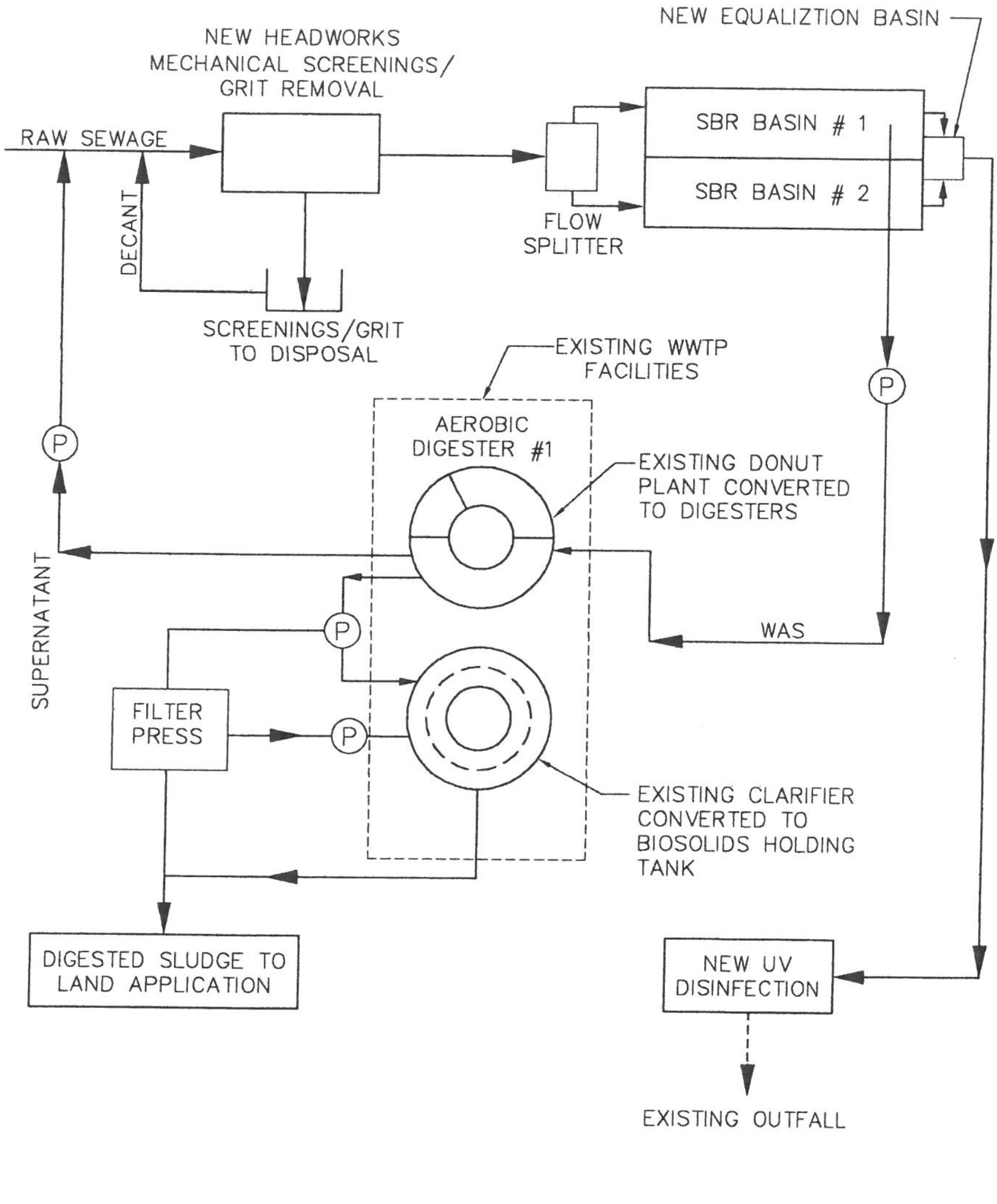

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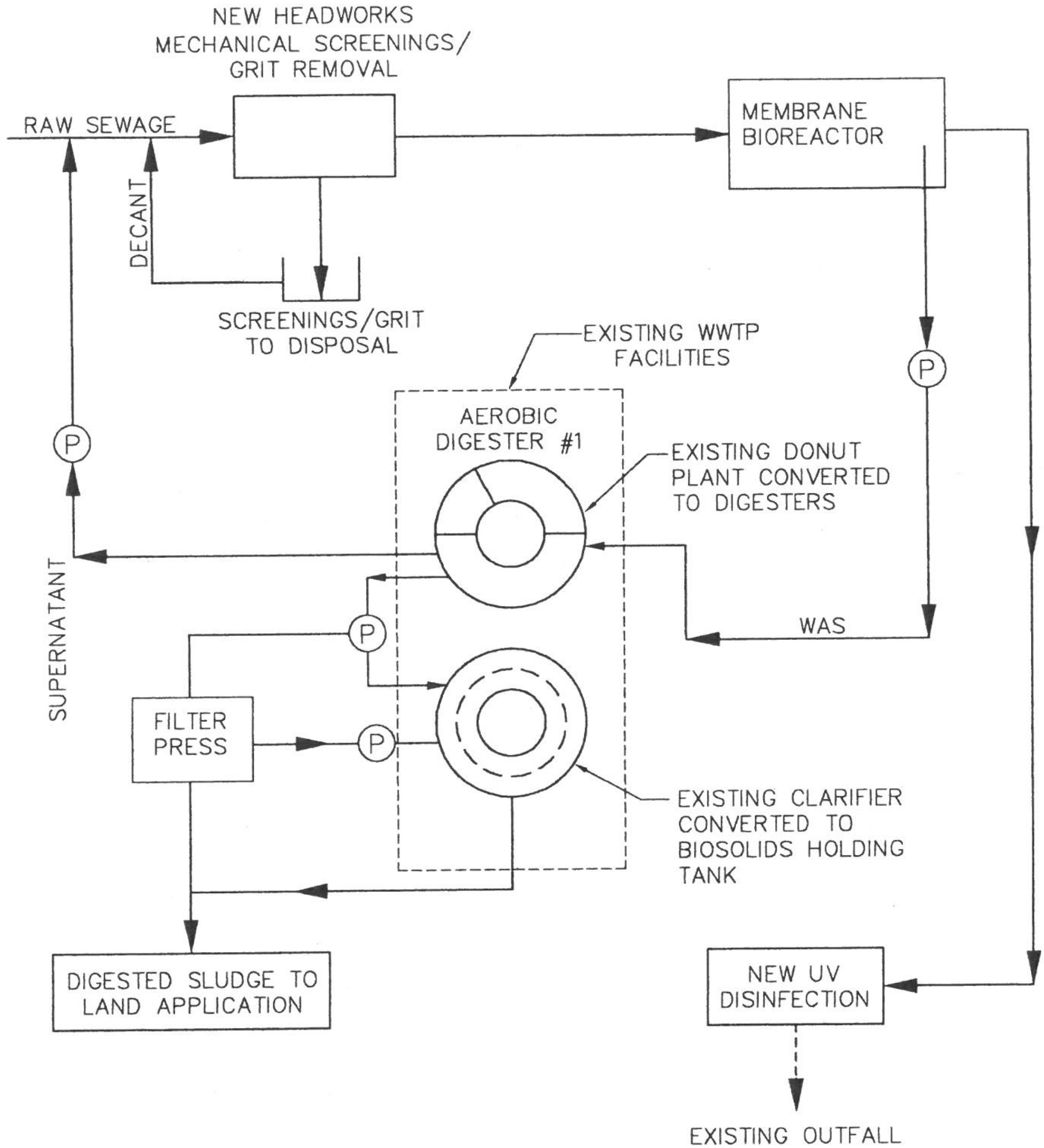
THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS*** ***WASTEWATER FACILITIES PLAN***	FIGURE NO.
DATE: SEPT., 2004 PROJECT NO.: 141.05	ALTERNATIVE NO. 3 – NEW ON SITE SBR PLANT	***6.3.2***



\\Dyer\Projects\01Active\141.05\dwg\FIG 6.3.2.dwg 09/07/2004 10:21:30 AM PDT

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS*** ***WASTEWATER FACILITIES PLAN***	FIGURE NO.
DATE: SEPT., 2004 PROJECT NO.: 141.05	ALTERNATIVE NO. 4 -- NEW ON SITE MEMBRANE PLANT	***6.3.3***

No Action

Alternative 1 is to leave the system as-is. The system is currently operating above the design hydraulic capacity and at the mass load capacity. Twice in 2001 the plant did not meet the permit requirements for Fecal Coliform. As mass loads rise with increasing population, it will become increasingly difficult to maintain effluent levels within permit limits. Continuing to operate the facility without reducing flows or improving treatment capacity is not an option.

Sequencing Batch Reactor (SBR)

Alternative 3 would involve construction of an SBR and equalization basin on the existing site. A new headworks would be constructed and the existing donut plant would be converted to digesters. Use of the existing clarifier as an equalization basin was examined and discarded, as the bottom elevation would not allow for effluent flow without pumping. However the clarifier could be converted to a biosolids holding tank in the future when solids levels exceed the holding capacity of the existing donut plant.

After preliminary treatment, the wastewater would then flow by gravity to a flow splitter that would divide the flow entering the SBR basins. The two-cell design is based on the type of SBR that contains a baffled inlet, which allows inlet flow even during the settling cycle without impairing treatment effectiveness. For maintenance purposes, all the inlet flow can be diverted to one of the basins. In SBR systems that do not have this capability, three tanks could be required; one tank could be off-line for maintenance while the other two would be used for treatment. There are several commercial SBR manufacturers in the United States, some of which use a pure batch system and others that are designed for continuous feed.

Each SBR basin would consist of a concrete rectangular structure with a top water and bottom water level of 18 and 13 feet (approximate), respectively. Total basin volume would be based on 20 hours of detention at MMWWF. In each basin, there would be a pre-react zone or installed mixers to inhibit filamentous growth that causes sludge bulking. Since each basin acts as an aeration basin and clarifier, no return activated sludge equipment is required. Scum would be removed by floating skimmers in each basin and sent back to the preliminary treatment process for dewatering and compaction. The waste sludge is pumped and measured from each basin to the aerobic digester with small submersible pumps. Common wall construction will be utilized to minimize the SBR footprint and construction costs.

Since the SBR is a batch process, the effluent flow rate during a decant cycle is greater than the influent flows. In lieu of designing the downstream processes for the higher decant flow rates, an equalization basin is typically installed to provide storage and allow for more uniform downstream flows. The equalization basin will also be made of concrete and will be sized to provide sufficient storage to handle the decant cycle discharge from the SBR. The overall dimensions for the SBR and equalization basin are 124 feet long by 62.5 feet wide and 21.5 feet high. This height allows for a liquid depth between 11.5 and 18 feet and appropriate freeboard.

The existing city shops would be replaced and the sludge drying beds removed to provide an optimal plant layout. An SBR would require a smaller footprint on the site than a conventional activated sludge plant. Construction of an SBR plant on the existing site is estimated to cost $2.4 million for the SBR and equalization basin portion only. Estimated O&M costs would be $144,000 per year.

Upgrade Existing Activated Sludge Treatment Plant
Alternative 2 would involve expanding the existing plant to accommodate existing and future flows through the year 2029. The existing tanks at the WWTP are in good to excellent condition, but undersized for existing peak flows. This alternative includes adding two new aeration basins and a second clarifier. The existing aeration basins would be converted to digesters.

Adding two aeration basins at 56,000 gallons each, meets the redundancy requirements for future projected flows. Since the plant capacity is calculated assuming that the largest clarifier is out of service, sizing the new clarifier to match the existing provides maximum future flexibility and a second 35 foot diameter clarifier is recommended. Converting the aeration basins to digesters would give a total digester volume of 157,800 gallons, which is just under the calculated volume of 161,000 gallons for projected treatment needs.

The cost for upgrading the liquid stream treatment only is approximately $2.4 million. Estimated O&M costs would be $138,000 per year.

Membrane Bioreactor
Alternative 4 consists of construction of a membrane bioreactor sized to produce an effluent with a BOD level of less than one mg/l during average wet weather flow. The bioreactor would have flat membranes with 240 cassettes of 40 membranes each. A new headworks would be constructed and the existing donut plant would be converted to digesters. The existing City shops would be replaced and the sludge drying beds and equipment storage building would be removed to provide an optimal plant layout.

This alternative requires the smallest footprint of all of the options considered. Estimated construction costs for a membrane bioreactor would be $4.2 million. A membrane plant requires a minimum of daily operator involvement and could be run with a half time operator. However after the eighth year the City would budget to replace 10% of the membranes each year on a rotating basis. Estimated O&M costs for the bioreactor portion of the treatment facility would be about $90,000 per year.

Evaluation Of Liquid Stream Treatment Alternatives.

For the matrix evaluation, a rating system was employed to compare the alternatives. This rating system consisted 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 for the matrix evaluation for liquid stream treatment are summarized in Table 6.3.1. Present worth values for each option are presented in Appendix D.

TABLE 6.3.1
MATRIX EVALUATION OF LIQUID TREATMENT ALTERNATIVES

Parameter	Upgrade Activated Sludge	SBR Plant	Membrane Bioreactor
Present Worth Cost	3	3	1
Flexibility	3	3	2
Capacity	3	3	2
Reliability	3	3	3
Operability	2	2	3
Ability to Construct	2	2	3
Environmental Factors	1	2	3
Community Impact	2	3	3
Total	19	21	20

While the membrane plant has less impact on the environment and on the community, the construction cost at about $1.7 million more than either the activated sludge or SBR plants make it cost prohibitive to a community of this size. The activated sludge and SBR plants have almost identical present value costs, while the SBR is capable of producing a better quality effluent. Therefore the SBR facility is selected for liquid stream treatment.

6.4 Disinfection

Three alternatives were identified and examined: no action, chlorination, and ultraviolet light disinfection. Chlorine is the most commonly used disinfectant in the destruction of microorganisms in water and wastewater. Ultraviolet light disinfection was considered as a potential improvement for the wastewater treatment plant.

No Action

With this alternative, the wastewater will continue to be disinfected via the existing gas chlorination system. Minimum chlorine contact times, based on DEQ guidelines, are 15 minutes at peak hourly flow and 20 minutes at peak daily flow. The design chlorine contact time listed in the O&M manual for the existing chambers is only 14 minutes for a peak daily flow of 0.77 MGD.

Current peak daily flow is 1.2 MGD, which gives a calculated contact time of just under nine minutes. Operators have compensated for the short contact time by increasing chlorine levels, which may increase fecal kill rates at the expense of higher chlorine residuals and operating costs. Even with the increased chlorine use, there were still two permit violations of fecal counts in 2001. Due to concerns about fecal counts, the hydraulic capacity of the existing channels, and high chlorine residuals, the "No Action" alternative is not recommended.

New Chlorination Basins

The existing chlorine induction equipment is sized to deliver 100 pounds per day. This rate is more than adequate to meet disinfection needs during the study period. The limiting factor on the chlorine system is the capacity and elevation of the existing chlorine contact chamber. The configuration of the existing basin precludes gravity flow of the effluent from a second clarifier for disinfection. Construction of a second basin to serve the new clarifier is estimated to cost $176,000.

The advantages of a standard chlorine system include the fact that it is an established technology, widely available, effective and reliable. The disadvantages are that residuals are toxic to aquatic life, chlorine may react with chemicals in the wastewater to produce toxic gases, and chlorine use presents safety, maintenance and fire hazards to personnel. DEQ is likely to require that the City add dechlorination to the system in the future as limits on discharges to marine waters are more tightly regulated.

Ultraviolet Disinfection

Ultraviolet disinfection is a process in which ultraviolet energy is introduced into water or wastewater for the destruction of microorganisms. For disinfection, an ultraviolet system would consist of a concrete or stainless steel channel, ultraviolet lighting banks, a flow pacing system, if required, and weirs or weighted control gates to ensure the lighting banks are always submerged.

While the ultraviolet disinfection is an effective method of disinfecting wastewater, the effectiveness of this process is dependent upon the penetration of the rays into water. Thus, the effectiveness of ultraviolet disinfection is heavily dependent upon the wastewater characteristics, the array of ultraviolet lamps, and the hydraulics of the ultraviolet reactor. Wastewater characteristics such as transmittance, suspended solids concentration, and presence of constituents that can absorb UV light decrease the intensity of light within the reactor and hence adversely affect performance. The key advantage of UV disinfection is that no residual is left in the treated effluent that would affect aquatic life in the receiving waters. The key disadvantage is that the performance of UV disinfection can be affected by characteristics of the wastewater stream such as color, suspended and colloidal solids, and chemical compounds (e.g. iron).

The main components of a UV disinfection system include mercury arc lamps, a reactor, and ballast. The source of UV radiation is either from low-pressure or medium-pressure mercury arc lamps. The optimum wavelength to effectively inactivate microorganisms is in the range of 250 to 270 nm. Low-pressure lamps, which are mostly used at small facilities, emit essentially monochromatic light at a wavelength of 253.7 nm. Medium-pressure lamps are generally used for large facilities and have approximately 15 to 20 times the germicidal UV intensity of low-pressure lamps. However, the medium-pressure lamps are more costly and operate at higher temperatures with higher energy consumption.

Other differences between low-pressure and high-pressure lamp systems include installation and cleaning. Low-pressure lamp systems are installed in concrete or fabricated steel open channels. Medium-pressure systems can either be installed in open channel or closed vessels (horizontal or vertical). Automatic lamp cleaning is possible with medium lamp systems, which reduces the labor costs as compared to manual cleaning for low-pressure systems.

Based on previous installations of both low-pressure and medium-pressure systems at small wastewater facilities, a low-pressure system is recommended for economy and reliability. Installation of a new UV disinfection system to serve the expanded WWTP is estimated at $371,000.

Advantages of a UV system are that there is no residual chemical left in the effluent when it is discharged, and no dangerous chemicals stored on site for disinfection. Disadvantages are that the effectiveness of the system is reduced by turbidity and by dirt build up on the lamps. Electricity prices have been unstable in recent years, and may be expected to rise faster than the cost of labor.

Selection of Disinfection Alternative

Costs have been developed for the chlorination system and the ultraviolet system and are presented in Table 6.4.1.

TABLE 6.4.1
PRESENT WORTH COSTS FOR DISINFECTION ALTERNATIVES[1,2]

Item	Chlorination	UV Disinfection
Capital	$175,000	$371,230
O&M	$126,172	$111,056
Salvage Value	<$10,235>	<$21,624>
Total	$291,637	$460,662

(1) – Based on disinfection designed for peak flow of 1.6 MGD.
(2) – Present worth costs were based on 6 percent interest over 25 years.

For the matrix evaluation, a rating system was employed to compare the alternatives. This rating system consisted 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 for the matrix evaluation are summarized in Table 6.4.2.

TABLE 6.4.2
MATRIX EVALUATION OF DISINFECTION ALTERNATIVES

Parameter	Chlorination	UV Disinfection
Present Worth Cost	3	2
Flexibility	3	3
Capacity	3	3
Reliability	3	2
Operability	3	3
Ability to Construct	3	3
Environmental Factors	1	3
Community Impact	2	3
Total	21	22

Environmental factors balance out the additional cost for constructing a UV system. The two systems have very close scores in the matrix evaluation. The recommendation is to construct a UV disinfection system based on potential future regulatory requirements.

6.5 Sludge Disposal

Biosolids originate as leftover waste materials, domestic septage and sewage sludge, which are generated from sewage treatment. Presently biosolids produced at the WWTP are aerobically digested and land applied on a DEQ approved site. Selection of the most viable biosolids stabilization alternative is depended upon the selected ultimate use and disposal of the biosolids. The following is a discussion of the biosolids stabilization and ultimate use/disposal alternatives.

Biosolids Stabilization

Biosolids stabilization is a treatment process, which converts sludge generated in the liquid stream treatment process to a stable product for ultimate disposal or use. This process reduces pathogens and vector attraction in the sludge and produces a less odorous product. The most common biosolids stabilization processes used in small communities are stabilization lagoons, facultative sludge lagoons, aerobic digestion, anaerobic digestion, and lime stabilization. While not typically utilized in small communities, composting is considered a potential stabilization alternative. The use of stabilization and/or facultative sludge lagoons were not considered viable options for biosolids stabilization since these facilities require relatively large amounts of land, which is at a premium in the vicinity of the WWTP.

The Yachats WWTP currently uses aerobic digestion for sludge stabilization, followed by the addition of lime, and land application of the majority of the treated biosolids. The digester capacity of the Yachats WWTP is adequate for existing biosolids production based on a 60 day holding time, 2% minimum sludge solids at removal after decanting.

Although the WWTP has adequate digestion space, biosolids disposal is a major operational limitation for the WWTP. While the existing farm site is permitted for year round application of biosolids, several factors limit the windows of opportunity for actual use. Conditions limiting biosolids application include soils too soft to support the spreading truck in winter, farm use of the site for hay crops in the summer, and run off during periods of heavy rainfall. These conditions restrict the available spreading season to the months of March, April and July through October. The retention time for the digester runs up to five months under this spreading schedule.

Basic Ultimate Use and Disposal of Biosolids Alternatives

The ultimate use or disposal of biosolids is perhaps the area of greatest uncertainty in sludge handling because of its dependency on solids marketability, land availability, and regulatory requirements. Another important consideration of an ultimate utilization or disposal option is public acceptance. The reluctance of the public to accept a biosolids disposal or processing facility in their area generally stems from concerns about odors and adverse health impacts. A public education and outreach may be necessary for successful biosolids use or disposal. Potential viable options for use and disposal of biosolids include disposal of biosolids at a landfill, land application of biosolids, and distribution and marketing of biosolids.

Land Application

Land application refers to any beneficial use project that applies biosolids to the land. Such land sites include primary agricultural land, pastures, tree farms, and old mines. Any biosolids to be land applied must be classified as nonhazardous and meet criteria for maximum concentrations of trace metals (e.g. cadmium, copper, lead, nickel and zinc). For application to agricultural lands, all biosolids must undergo treatment by a process which to significantly reduce pathogens. In addition to evaluating a biosolid with respect to its environmental suitability, a land application program will depend on the nutrient content of the biosolids, the land to which it will be applied, and the crops to be grown on the land. For most biosolids produced and land applied, the limiting factor is the nutrient content of the biosolids when it is applied as a fertilizer for a particular crop.

A land application program operating year-round cannot function without adequate permitted acreage available during all but the most inclement periods of weather. The farming practices and crops in a given area determine site availability. As a rule, it is advisable to hold permitted acreage equal to three times the amount actually needed in any given year to accommodate all the biosolids for a particular project. Usually, storage of biosolids will also be necessary at some time during the year. Paul Kennedy of DEQ is currently working with City personnel to obtain permits for winter application sites (2002). Additional acreage on the currently permitted sites could be eligible, but would require the purchase of an irrigation cannon to allow biosolids to be sprayed on the fields without driving the truck directly on the wet soils. The sprayer could be adapted onto the existing City spreading truck. .

The key advantages of land application are the ability to utilize wastewater biosolids for a beneficial use and the low capital outlay costs. The key disadvantages of land application are securing DEQ approved sites and providing sufficient capacity to store biosolids during the wet season. The current trend is for DEQ to discourage biosolids application in winter, due to the high rate of surface runoff. Land application analysis will include a minimum of six months storage option to allow for future restrictions on wet weather application.

Landfill Disposal

Landfill disposal is generally less desirable alternative than land application for beneficial use. If a suitable site is convenient, a sanitary landfill may be used for the disposal of biosolids if landfill and regulatory officials permit this practice. The economics of hauling biosolids usually indicate that the dewatering for volume reduction will result in justifiable savings. While this process is more expensive and does not take advantage of the beneficial uses of biosolids, disposal at a landfill is a viable option when weather conditions or regulatory requirements limit land application.

The City currently has no access to a local landfill site for biosolids. Coffin Butte Landfill (Corvallis), Short Mountain Landfill (Eugene) are the landfills in closest proximity that accept municipal biosolids. DEQ regulations discourage biosolids disposal at a landfill if other viable alternatives exist. In addition to the lack of landfill access, the cost of hauling and disposal fees at a landfill would be substantial.

Hauling to Another Municipal Facility

DEQ guidelines require WWTP facilities to be built with capacity to meet projected growth for 20 years from the date of construction. This means that new facilities tend to have surplus capacity for a few years. The City of Florence also has surplus capacity, but only will take biosolids on an emergency basis.

Distribution and Marketing of Biosolids

Compost and heat-dried (Class A) biosolids may be distributed and marketed to end-users such as the agricultural and horticultural industries, landscape contractors, and homeowners. Each municipality must develop its particular distribution and marketing strategy based on surveys of potential users and competing products. Some municipalities have chosen to market the product through a broker or distributor. Such items such as product quality, selling price, storage, responsibility for unsold product, and other risk-sharing decisions should be included in any contracts. Promotional and demonstration programs are usually required to promote public attention and acceptance, and inform potential users of the product's potential use and availability.

The distribution and marketing of processed wastewater biosolids is usually done by rather large municipalities (e.g. Portland, Newberg) that produce considerable amounts of biosolids. These municipalities usually have the resources to successfully develop a product market. Yachats currently produces a Class B biosolid and would need to further process the waste to achieve a Class A. A Class A material could be used directly by the City for fertilizing plantings in parks, at City Hall and at the local schools. Surplus could be given away to the public or farmers.

EPA approved methods of achieving a Class A biosolid include composting, irradiation and heat treatment. Yachats lacks adequate space for composting, the public acceptance for irradiation, or an inexpensive energy source for heat treatment. With the current economic and regulatory climate, producing a Class A biosolid is not cost effective.

Biosolid Storage

Yachats currently has the digester capacity necessary to meet the existing sludge load, but lacks adequate capacity to treat the biosolids projected during the study period. The recommended expansion of the secondary treatment system will provide additional digester space to meet treatment requirements. The agricultural application sites have a calculated life exceeding the expected life of the treatment plant, and capacity to handle the projected nitrogen loading under existing regulations. Yachats lacks storage capacity to hold digested biosolids during wet weather and crop growing periods.

Biosolids can be stored within the wastewater treatment process units, biosolids treatment process units, or in separate specially designed tanks. Wastewater treatment units can store biosolids for short-term storage (few hours to 24 hours). For longer detention times, biosolids treatment units, such as aerobic or anaerobic digesters, facultative sludge lagoons, are used for storage. Separate tanks are usually used for obtaining longer detention times than biosolids treatment units. These separate holding tanks often use mixing and/or aeration to prevent septicity, odors, and solids suspension. Mixing may be accomplished using diffused air, and top-entry or submersible mechanical mixers. Other odor control measures include either chemical addition of chlorine, hydrogen peroxide, or iron salts, and maintenance of an aerobic surface layer (e.g. facultative sludge lagoon).

Facultative Sludge Lagoons

Typically in small communities, facultative sludge lagoons have been recommended and implemented for biosolids storage. However, the use of a facultative sludge lagoon in Yachats for biosolids is not considered viable due to lack of appropriate sites and available property in the vicinity of the treatment plant.

Drying Beds

Drying beds are contained structures with the floor sloping to a drain system. A layer of gravel is built up over the drains, and a layer of sand applied over the gravel and the surfaces of the beds are flooded with digested biosolids. The liquid content of the biosolids drains through the sand and gravel and is returned to the headworks of the plant. Dewatered biosolids are scraped off after each application, along with the top layer of the sand, using a small front-end loader. The biosolids are hauled by dump truck and disposed of by landfill or land application with a manure spreader. The solids content of the finished biosolids may vary from 15% to 70%, with 16% used as an estimate for study purposes.

Yachats has approximately 1,400 square feet of sludge drying beds that were built with the original 1973 treatment plant, similar to beds in use by the City of North Bend. The drying beds have a capacity of about 150,000 gallons per year, based on a 25 day drying cycle. Yachats has an advantage in that the beds are covered, a requirement for efficient wet weather use in areas with over 40 inches of annual rainfall.

One advantage is that the City already owns drying beds, so no capital outlay or construction is necessary. Another advantage includes a reduced volume of material, with the associated reduction in trucking miles and time. Disadvantages include odor concerns and multiple handling of the material; it must be spread, scraped up, loaded into a truck and then tilled in at the application site. Use of the drying beds also requires access to a small front-end loader, dump truck and manure spreader. The assumption for this alternative is that a used manure spreader may be purchased for about $3,500 and that the City already owns the remaining necessary equipment.

Tanks

Tanks for holding biosolids need to be large enough to get through the period between land application seasons and make provisions for odor prevention. Yachats would need a tank capacity of approximately 200,000 gallons to hold a five-month production of biosolids. Odor control is done by use of aeration or by covering the tank and filtering the exhaust air. Construction cost for a tank is estimated at $573,000.

The advantages of a tank are that there is minimal labor involved in the use of a storage tank and an aerated tank would continue a certain amount of aerobic digestion. The disadvantages of a tank are the high capital construction cost and the large space a tank would occupy. A 200,000-gallon storage tank would have a diameter of 46 feet and would be a tight fit at the existing site.

Filter Press Thickening

A filter press is used to decrease the total volume of sludge and the moisture content, reducing the required storage space. Digested sludge is treated with polymer to allow flocculation and easier dewatering. The filter press produces liquid pressate, which is pumped back to the headworks for further treatment and a dewatered sludge with a solids content of approximately 16 % solids. The sludge drying beds may be used as a storage area for the thickened biosolids or the biosolids may be spread over a layer of sand in the beds to further reduce the moisture content.

The filter press reduces the sludge volume by about 75 %, which lowers the storage volume required to hold the biosolids and the number of trips eventually necessary to haul biosolids off site. However, the biosolids will no longer be in a liquid state that can be pumped or sprayed. Removal of the thickened sludge will require a front loader or other mechanical means of loading and a manure spreader for land application, increasing the handling labor.

Selection of Biosolids Disposal Alternative

Sludge at Yachats is currently aerobically digested and land applied to local farms. Anticipated capital and O&M costs were compiled for biosolids dewatering, holding, and land application. The results of cost analysis were that land applying digested biosolids is the most cost effective disposal method. All alternatives were analyzed with the assumption that biosolids would be land applied directly from the digester for 50 % of the year.

Wet Weather Land Application

Yachats currently holds a permit to dry weather apply biosolids to 35 acres of cropland on a local farm. Yachats land application permits are all on the same parcel of land. There is a strong concern that if this property changes ownership, that the City will be left with no disposal options.
The WWTP operator is applying to DEQ for a permit to winter apply biosolids to portions of that farm. Expected restrictions include applying only during light to no rain days and application without driving the spreading truck on the fields. These restrictions would require the use of an irrigation spray gun and pipe at an approximate cost of $3,500. DEQ has also indicated that wet weather application of biosolids is scheduled to be phased out in the near future. (Kennedy 2003) Staff time to complete the permit process, estimated at about 40 hours, would be $1,200.

There will still be times when extended rainfall will prevent land application. DEQ requires six months of biosolids storage for new facilities that land apply biosolids. The conversion of the aeration basins into digesters would create storage for approximately 75,000 gallons, six months at current flows, however all of the digester space will be needed for active digestion by 2029.

Sludge Drying Bed

Yachats has approximately 1,400 square feet of covered sludge drying beds that are not used. These beds have an estimated capacity to dewater approximately 150,000 gallons of sludge if used year round. In actual practice, the beds would most likely be used for six months out of the year, with a capacity of 75,000 gallons. The projected future output of the WWTP is 220,000 gallons in six months, more than the sludge beds can dewater. This option would make a good back up to increase holding capacity during prolonged periods when land application is restricted, but does not have the capacity to hold five months (November to March) biosolids production.

Filter Press Dewatering

A filter press suitable for a community the size of Yachats can process sludge at about 400 pounds of dry solids per hour. The projected future solids load for the WWTP is about 1,350 pounds per week. A filter press would only need to run about four hours per week to dewater the digester biosolids to 16%. The resulting "cake" could then be stored in the sludge drying beds until land application is possible. The beds could hold approximately 100,000 gallons of dewatered biosolids and possibly more if additional dewatering occurs through evaporation and percolation through the sand bed. The estimated cost for installing a filter press is $207,550. The City of Myrtle Creek completed construction of a new wastewater facility this year and has a used belt press for sale for $10,000. Purchase of this used press would bring the estimated cost of installing a belt press to about $52,000

Present Worth Value

The present worth value of each alternative was calculated based on the estimated construction and O&M costs. A comparison of total present worth costs, based on six percent over 20 years, for the alternatives is summarized in Table 6.5.1. Additional information on the cost estimates for these alternatives is given in Appendix C. Estimates of capital costs for the proposed alternatives range from approximately $3,500 to $2075500.

TABLE 6.5.1
ALTERNATIVES FOR BIOSOLIDS STORAGE AND USE

Number	Alternative	Annual O&M Costs[1]	Capital Construction Cost	Present Value Cost ($)
1	Wet Weather Land Application[2]	$18,200	$3,500	$213,400
2	Sludge Drying Beds[3]	$27,135	$3,500	$270,050
3	Land Application w/ Storage Tank	$18,200	$573,000	$781,700
4	Filter Press & Store in Sludge Beds	$28,640	$207,550	$406,850
5	Used Filter Press & Store in Sludge Beds	$29,640	$52,000	$300,940

(1) Costs are based on 300,000 gallons of biosolids per year, the current level.
(2) This option is expected to be disallowed by DEQ during the study period. It is presented here as a baseline for current costs.
(3) Existing beds do not have capacity to treat projected biosolids volume through the study period.

Flexibility

The sludge drying beds require a minimum of three weeks to cycle a batch of dewatered sludge, making them fairly inflexible to use. Wet weather application is dependant on site conditions and weather. Prolonged heavy rains could greatly reduce the flexibility of land application. The filter press is limited mainly by storage capacity and so offers the most flexibility. The expansion of the WWTP to meet treatment needs will provide approximately 30 days of sludge storage in addition to capacity needed for treatment. This additional storage combined with any of the alternatives provides adequate system flexibility.

Capacity

The capacity of wet weather application is limited by nitrogen uptake and by metals accumulations for each acre of land. Calculations based on the analysis of the previous three years biosolids production from the WWTP demonstrate that there is adequate capacity at the existing permitted land application sites. The sludge drying beds have the capacity to dewater about 150,000 gallons a year, when used year round. The capacity during the five month wet weather season would be about 62,500 gallons. This is adequate for the next 5 to 10 years, but not for the entire study period.

The screw press had adequate capacity to thicken the projected output for the WWTP. However, the existing sludge drying beds have a storage capacity of only 50,000 gallons. Additional storage sites would be needed, or modifications made to the existing beds to increase storage by the end of the study period.

Reliability

Wet weather application is fairly reliable, but extremely rainy weather, bad road conditions or equipment failure could disrupt this alternative. Sludge bed dewatering relies mainly on percolation of moisture through the sand bed, but additional drying is still reliant on low humidity, warm temperature and wind evaporation. Bed dewatering is also sensitive to operational conditions. The introduction of new sludge into a partially dewatered batch may upset the process and create odor problems. Filter press operation is considered reliable, but is dependant on the level of maintenance and skill of the operator. The current WWTP staff has the required skill level for operation.

Operability
All alternatives use equipment and processes that are familiar to the plant operators. Thickened biosolids would require use of a dump truck, front loader, and manure spreader, equipment that is currently not used at the WWTP. Some training would be required in operation of the filter press or drying beds.

Ability to Construct
None of the alternatives require extensive construction.

Environmental Factors
Wet weather land application sites would be carefully screened to avoid runoff due to rain or ground water contamination. Use of the sludge drying beds or screw press would have negligible environmental impacts under normal operation.

Community Impact
Use of wet weather sites would have no community impact greater than the current method, although regular removal of biosolids from the digester would help maintain a consistent solids balance and possibly reduce odor problems. The number of trucks leaving the plant would be the same. Use of a filter presses poses no community impact, but storage of the thickened sludge or use of the sludge drying beds might cause an odor problem. Thickened sludge would require fewer trips for disposal, reducing the number of trips from the WWTP by 25%.

Summary
For the matrix evaluation, a rating system was employed to compare the alternatives. This rating system consisted 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 for the matrix evaluation are summarized in Table 6.5.2.

TABLE 6.5.2
MATRIX EVALUATION

Parameter	Wet Application	Drying Beds	Filter Press
Present Worth Cost	3	2	1
Flexibility	2	2	3
Capacity	3	2	2
Reliability	2	2	2
Operability	2	2	2
Ability to Construct	3	3	3
Environmental Factors	2	3	3
Community Impact	3	2	3
Total	20	18	19

Based on the above analysis, wet weather application is considered the highest-ranking alternative. The other alternatives use the WWTP site for storage, a factor that introduces both the possibility of odor concerns in adjacent neighborhoods and restrictions on capacity. On-site alternatives would require a small-scale test project to see if the process could be conducted without causing odor problems. The digester has adequate onsite storage for the next five years, but beyond that period the city would need to consider use of the existing clarifier for solids storage.

Biosolids disposal for the Oregon coast is in a state of flux. A stricter regulatory climate limits disposal options, and the growth in small communities has increased the total volume of biosolids needing disposal sites. Larger communities, that have been able to take biosolids from outside their jurisdiction in the past, are now turning away outside users. Yachats is currently dependent on one property owner for disposal of the City's entire biosolids production, and that owner is over 90 years old. DEQ requires that communities in Western Oregon include in their facilities plans an option for not land applying during wet weather months. These factors could cause major changes in the options available for biosolids disposal in the next five to ten years.

The City should plan on reevaluating disposal options within the next five years. It is recommended that the annual operating budget for the WWTP include $3,500 set aside for staff time and outside services for developing biosolids disposal sites and options. It is also recommended that the City incorporate sludge dewatering equipment into the wastewater plant upgrade to be prepared for future restrictions.

6.6 Summary of Complete Wastewater Treatment Alternative

In the sections above alternatives were presented and evaluated for each component of the wastewater treatment facility. The recommendations are to continue to use the existing site and construct an SBR facility with a new headworks, UV disinfection system. The existing donut plant would be reused for digester space and the clarifier would be used for future biosolids storage. A further evaluation of the selected plan is presented in Section 7.

Recommended Plan

Section

7

Section

7

Recommended Plan

7.1 Existing Piping System Improvements

Existing I/I Recommendations

The City has recently completed a comprehensive I/I rehabilitation project. Daily flows registered at the wastewater facility support a reduction of about 30% of the PIF as compared to flows registered before the improvements. A follow up system flow test and assessment and smoke test are recommended as part of the pre-engineering report for a facilities upgrade.

Pipe Capacity Recommendations

Ocean View Drive

Install larger pipe: The estimated cost to replace the existing 10-inch pipe with 14-inch pipe for 80-feet of length is about $39,000. This would increase capacity to about 1,100 gpm, adequate for future flows.

Grease

The recommended approach for reducing grease in the system is a combination of the options discussed in Section 6. The City has already implemented working with residential and transient rental owners to reduce grease through a grease collection container handout and a transient grease container ordinance. The next step is involving the food service owners in addressing the problem. A meeting with food service personnel and the Public Works Director, including a tour of the WWTP and grease laden piping, would establish the extent of the problem. Combine this with an education program and handout customized to the community needs. The second step is monthly grease trap inspections for six months to determine an adequate cleaning schedule. Inspecting from July through October should catch the tourist season high peaks. Follow this with a City provided grease removal contract and annual spot inspections. The four months of inspections provides a database to determine the contract removal schedule. This is likely to require overtime for City personnel during the four-month start up period. Develop a flier to go out with sewer bills for residential customers. Cost for starting and maintaining a grease prevention program are summarized in Table 7.1.1.

TABLE 7.1.1
COST ESTIMATE SUMMARY FOR GREASE PREVENTION PROGRAM

Description	Estimated Cost
Four month inspection	$1,000
Developing Handout	$850
Educational Site Visits	$850
Residential Flier	$570
Setting up Grease Removal Services	$2,200
Staff time for grease Removal Billing	$1,200
Total First Year	$6,670
Total Each Following Year	$2,375

A grease prevention program is anticipated to reduce grease accumulations to the point where line blockages due to grease from the food service industry are minimized or eliminated. Grease traps still allow approximately 10 to 20% of food service grease into the system, so a regular cleaning program is recommended to maintain line capacity. The recommended cleaning program includes annually cleaning approximately 3,000 feet of line, manually dipping out each pump station monthly, and pumping the wet-wells semi-annually. This schedule will need to be adjusted to suit local conditions based on the success of the prevention program. The budget cost for grease cleaning is $8,400 per year.

7.2 Pump Station Recommendations

Main Pump Station

Build new above ground PS. This option involves filling in the existing wet-well and constructing a new wet-well with variable speed duplex submersible pumps and an adjacent pump house with a permanent back up generator. The advantages are that maintenance will be reduced, the confined space access problem for this station will be eliminated, and the City will have capacity projected to meet the needs for the next 25-years. The disadvantages are the capital cost and the need to find a suitable location adjacent to the existing station. Estimated construction cost is approximately $430,000 including land acquisition.

Ocean View Pump Station

The recommendation for Ocean View is to install new upsized impellors on the pumps in the summer of 2002 and to budget for implementing Option # 2 in the next five years. Installing a generator is recommended due to the short time to overflow for this station.

Replace pump station and river crossing, install permanent generator. This option involves removing the existing packaged pump station from the wet well and replacing it with a new pump station with duplex submersible pumps. A new 6-inch PVC force main would be installed across the Yachats River to replace the existing 4-inch cast iron force main. A permanent generator with an automatic transfer switch would be installed in an enclosure next to the pump station. The existing wet-well and auto dialer would be retained. The advantages are that this option offers the largest capacity for growth and the best protection against overflows. The disadvantages are the capital cost, estimated at $336,000 and the additional maintenance required for a fixed generator.

Riverside Pump Station

Replace the Station with a new packaged pump station. Smith and Loveless is the manufacturer of the existing pump station. Their product line includes new stations that will bolt into the existing mounting plate with eight bolts. The electric service would need to be upgraded, but the rest of the existing station and wet-well would remain without changes. This measure assumes the reuse of the existing autodialer and alarm components. Estimated construction cost is $107,000

Pontiac Pump Station

The estimated cost to install a concrete pad and fiberglass railing on the ocean side of the station and replace the broken cowling supports is $3,500 based on 15 linear feet of railing.

Quiet Water Pump Station

There are no recommendations for this pump station.

Recommended pump station improvements and costs are summarized in Table 7.2.1.

TABLE 7.2.1
SUMMARY OF PUMP STATION RECOMMENDATIONS

Pump Station	Project Description	Estimated Cost
Main	Replace Station	$430,000
Ocean View	Replace Station & Forcemain	$336,000
Ocean View	Replace impellors & Seals	$2,000
Riverside	Replace Station	$107,000
Pontiac	Install Railing, Fall Protection & Cowling Supports	$3,500
Quiet Water	No Recommendations	$0
Total		$878,500

7.3 Treatment Facility Expansion

The existing flows and mass loads of the WWTP are at the design treatment capacity. An aggressive I/I program by the city has reduced peak flows by 30% to just below the design hydraulic capacity. The recommendation is to upgrade the WWTP capacity to meet current and future projected flows for the year 2029 by building a new SBR liquid treatment plant and converting the existing donut plant to digesters. The addition of new headworks and a new UV treatment system would provide adequate capacity through the study period. The existing clarifier would be reused as a biosolids storage tank.

All WWTP component capacity for the year 2029 is based on a peak hourly flow of 2.7 MGD as calculated from data for the 2003/2004 wet weather period.

The City owns approximately 1.5 acres surrounding the existing WWTP, a site shared with the Library and City shops. With careful planning, there is adequate space on this site for the planned expansion, and future expansions as the population of Yachats grows. The existing City shops and sludge drying beds would need to be removed and a replacement shop built elsewhere on the site. A plan view of the proposed wastewater treatment plant upgrade is shown in Figure 7.3.1.

Capacities of the existing and proposed WWTP conditions are summarized in Table 7.3.1. The total cost for the expansion is estimated at $4.7 million. The proposed plant expansion is sized for the projected population in 2029.

TABLE 7.3.1
YACHATS WWTP COMPONENT DESIGN SPECIFICATIONS

Component	Type	New or Existing	Capacity Now	Capacity Proposed
Influent Pump Station	Non-clog Pumps	New	1040 gpm	1875 gpm
Influent Flow Meter	Ultrasonic	Existing	7.0 MGD	7.0 MGD
Effluent Flow Meter		New		5.0 MGD
Influent Screen	Auger	New	2.0 MGD	3.0 MGD
Grit Removal	Centrifugal Vortex	New	2.5 MGD	3.0 MGD
Grit Washer	Screw Classifier	Existing	1,100 lbs/hr	1,100 lbs/hr
SBR Basin 1	Complete Mix	New	5,414 CF	51,125CF
SBR Basin 2	Complete Mix	New	5,414 CF	51,125 CF
Equalization Basin	Rectangular concrete	New	-	13,500 CF
Filter Press	Low pressure belt press	New	-	5 ft width
Digester 1	Aerobic Digester	Existing	5,000 CF	5,000 CF
Digester 2	Aerobic Digester	Existing	6,124 CF	6,124 CF
Digester 3	Aerobic Digester	Converted	-	5,414 CF
Digester 4	Aerobic Digester	Converted	-	5,414 CF
Chlorine Contact Chamber	Dual Channel	Existing	7,925 CF	0
Chlorinators (2)	Vacuum Gas	Existing	100 lbs/day	0
UV Disinfection Chambers	Low Pressure	New	-	3.0 MGD
Biosolids Storage Tank	Existing Clarifier	Existing	35 ft Dia	35 ft Dia
Outfall	10" Ocean Outfall	Existing	3.1 MGD	3.1 MGD
Sludge Tank Truck	Spreader	Existing	3,000 gallons	3,000 gallons
Generator	Diesel	Existing	60 kW	*
Generator	Diesel	New	-	100 kW

* Existing generator used for Main Pump Station

7.4 Biosolids Disposal

A large concern facing the WWTP operating staff is the timely removal and disposal of biosolids from the WWTP digesters. The conversion of the aeration basins to digesters will provide immediate surplus sludge storage. The additional storage should be enough to avoid wet weather application of sludge for about five years after the WWTP expansion. However, completion of the plant expansion is not planned for three years from this date, and population increases will reduce the surplus storage by 2010 to the point where biosolids must be removed from the digester in the winter. The recommended biosolids measure for dealing with disposal is to install sludge dewatering equipment and use the surplus clarifier for biosolids storage in wet weather. Installation of a belt filter press is estimated to cost $205,000.

The City should continue to pursue opportunities to increase the flexibility for biosolids disposal. A recommended annual budget for staff time and incidental costs associated with pursuing additional permit sites and on-site biosolids storage options is $3,500.

7.5 Project Cost Summary

Capital and operating costs for the recommended projects are summarized in Table 7.5.1. The estimated project cost total, including construction, engineering, contingency and administration is approximately $5.9 million.

TABLE 7.5.1
CAPITAL COSTS OF RECOMMENDED PROJECTS

#	Project Description	Annual O&M*	Capital
1	Ocean View Drive		$39,000
2	Grease Prevention	$2,375	$6,670
3	Grease Removal	$8,400	$0
4	Main Pump Station Replacement		$430,000
5	Ocean View Pump Station Replacement		$336,000
6	Riverside Pump Station Replacement		$107,000
7	Pontiac Pump Station Safety Improvements		$3,350
8	Upgrade WWTP Laboratory	$6,850	$50,000
9	New Effluent Meter	$1,000	$23,000
10	Supernatant Decanting		$10,000
11	Automatic Sampling Stations	$700	$19,000
12	WWTP Expansion*	$167,595	$4,850,480
13	Biosolids Irrigation Sprayer		$4,700
14	Manure Spreader		$3,500
15	Additional Biosolids Disposal Sites	$3,500	0
	Total	$190,420	$5,882,700

* O&M costs are incremental costs for changes above existing conditions.
O&M costs for projects, such as pump station replacements, are not anticipated to change.
** The City is already expending approximately this amount in staff labor, outside services, and sewer spill expenses related to grease accumulations.

A break down of project capital costs, including expansion projects, to show funding responsibility under current City policy is included in Table 7.5.2.

TABLE 7.5.2
ASSOCIATED SDC IMPROVEMENT COSTS

#	Project Description	SDC Eligible	Total Cost
1	Ocean View Drive	$39,000	$39,000
2	Grease Prevention	$0	$6,670
3	Grease Removal*	$0	$0
4	Main Pump Station Replacement	$215,000	$430,000
5	Ocean View Pump Station Replacement	$336,000	$336,000
6	Riverside Pump Station Replacement	$107,000	$107,000
7	Pontiac Pump Station Safety Improvements	$0	$3,350
8	Upgrade WWTP Laboratory	$0	$50,000
9	New Effluent Meter	$0	$21,000
10	Supernatant Decanting	$0	$10,000
11	Automatic Sampling Stations	$0	$18,000
12	WWTP Expansion	$4,850,500	$4,850,500
13	Biosolids Irrigation Sprayer	$2,350	$4,700
14	Manure Spreader	$1,750	$3,500
15	Additional Biosolids Disposal Sites		$0
	Total	**$5,551,600**	**$5,882,700**

*Grease removal is not considered a capital cost and therefore the associated costs are not included in this table.

Operations and Maintenance Costs

The operation and maintenance costs associated with the WWTP and the recommended improvements were estimated using the City's fiscal year (FY) 2002-2003 budget as tabulated in Table 7.5.3 as a basis.

TABLE 7.5.3
ESTIMATED O&M COSTS

SEWER	Actual Data Last Year	Adopted Budget this Year	Approved Budget Next Year
	2000-01	2001-02	2002-03
Personal Services	$ 103,532	$ 124,352	$ 131,384
Materials & Services	$ 93,322	$ 72,302	$ 80,699
Capital Outlay (Equipment & Improvements)	$ 16,718	$ 35,000	$ -
Debt Service	$ 54,335	$ 52,835	$ 51,310
Money in Savings for Future Improvements	$ 300,001	$ 214,685	$ 365,445
Contingencies		$ 27,262	$ 43,603
Total Requirements	$ 567,908	$ 526,436	$ 672,440

Personnel Services

The existing WWTP is monitored seven days a week through the combined efforts of the Wastewater Operator and Assistant Wastewater Operator. The current staffing is considered adequate for operation of the new treatment facilities. The City has a current budget of $131,384 for personnel services. This amount was Increase by $3,500 in the projected O&M costs.

Purchased Services/Operating/Repairs & Maintenance

These categories represent the general operating and maintenance items not including the City staff. This budget item includes maintenance and supplies, vehicle operating costs, insurance, electricity, office supplies, telephone, licenses/permits, education, audit/filing fees, and miscellaneous purchased services. The FY2002-2003 budget for these items was $80,700.

Other anticipated O&M expenses include electrical costs for aeration for operating more digesters, the filter press, and UV disinfection, and supplies for polymer and UV lamp replacements. There would be a slight decrease in chemical costs for chlorine and lime. The total increase in purchased services, operating, repairs and maintenance is estimated to be $12,385. Total estimated annual cost for purchased services, operating, repairs and maintenance is $93,085.

Capital Outlay/Sewer Construction Fund

The City currently utilizes the capital outlay and sewer construction funds for the purchase of new equipment and as a contingency for unforeseen expenses. The previous years budget expanded $381,000 for I/I corrections. The current combined budget for these items is $365,445 with the funds going to the Sewer Construction Fund. Most of these funds are carried over from the previous year, with an estimated $153,000 coming from current revenues per year. The purchase of new equipment is on hold pending the outcome of this facilities plan.

Debt Service

Between $45,000 and $56,000 of the net operating income of the wastewater system was used for debt service to pay a revenue bond. In addition the City has two general obligation bonds for the wastewater system. The total outstanding debt as of June 2004 was $378,760 and the annual total debt service was $87,110.

Summary

The projected annual O&M costs for the City's wastewater system are summarized in Table 7.5.4

TABLE 7.5.4
SUMMARY OF PROJECTED O&M COSTS

Budget Item	Amount
Personnel Services	$134,900
Purchased Services/Materials	$93,085
Debt Service	$87,110
Capital Outlay Fund	$153,000
Total Projected Budget	$468,095

7.6 Project Phasing

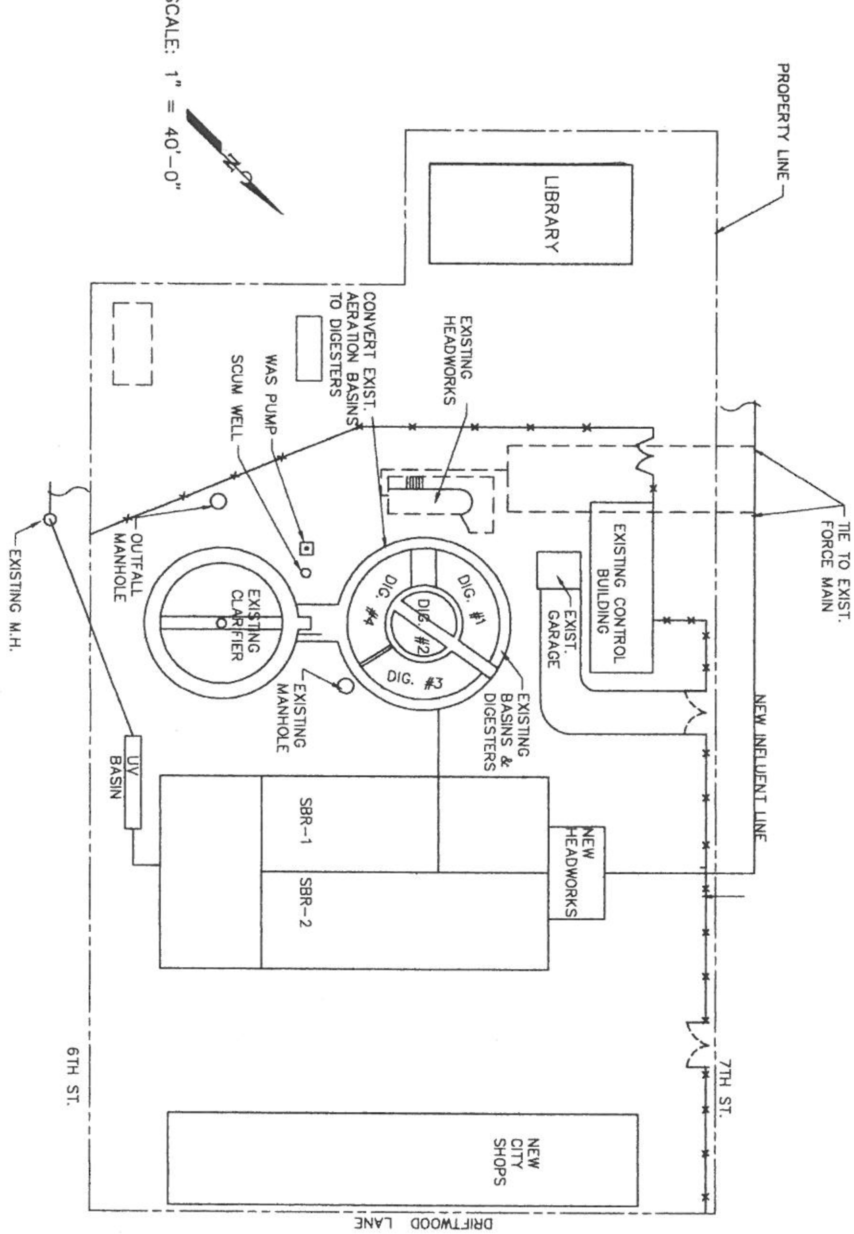
To provide sewer services to the City of Yachats in the most cost effective manor, facilities should be expanded to have adequate capacity for domestic sewage flows and a reasonable amount of I/I. Implementation of the recommended short-term measures will help maximize the existing capacity during the evaluation, design, and construction process.
The following is a tentative schedule identifying the key activities and approximate implementation date for the improvements. Project groupings are shown in Table 7.6.1. Locations of the projects are shown in Figure 7.6.1. Figure 7.6.2 is a graphical timeline of the schedule.

Project Schedule

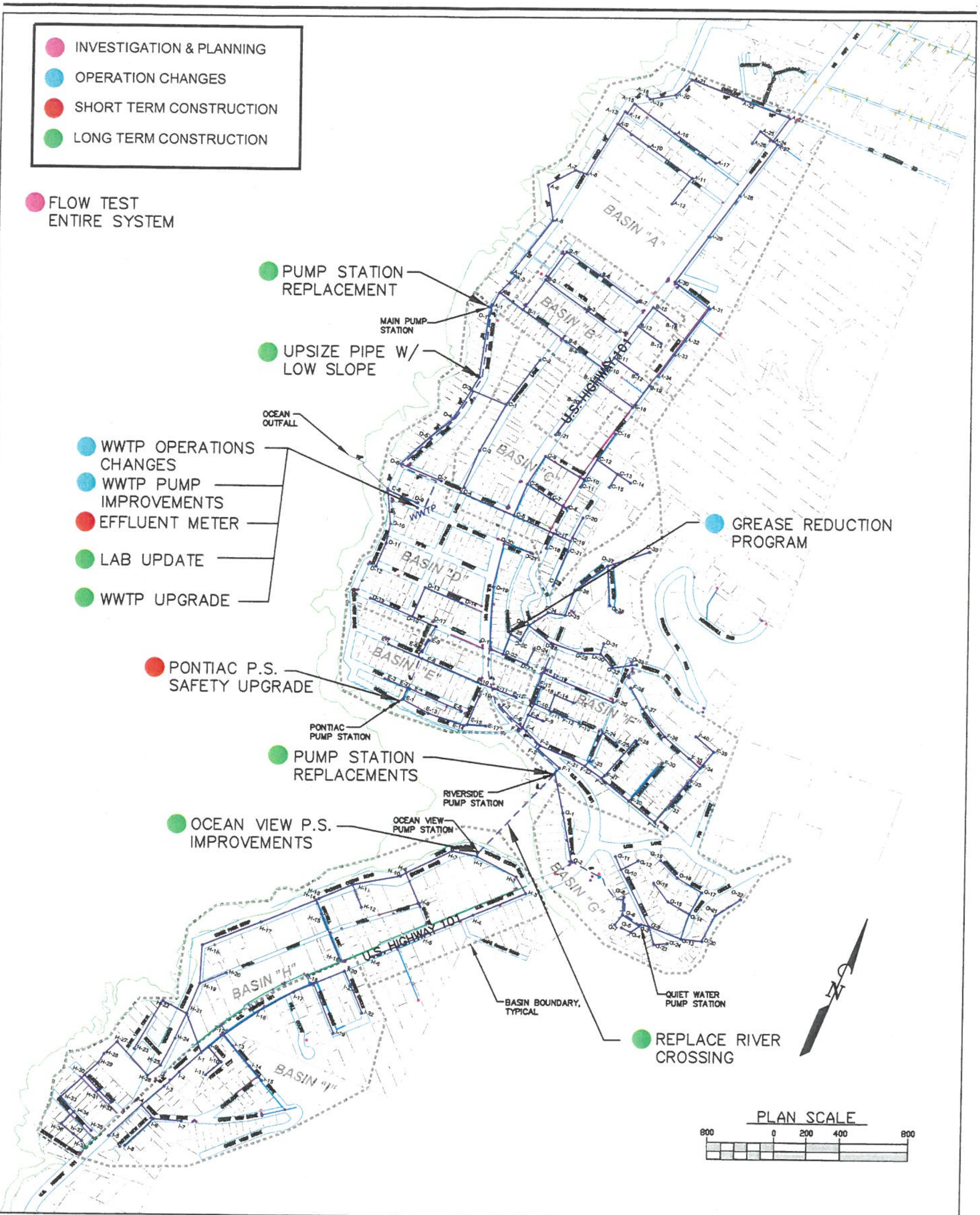
- Council Approval of Facilities Plan — November 2004
- WWTP operations changes — October 2002-December 2004
- DEQ approval of facilities plan — December 2004
- Flow inspection of collection piping — January 2005
- Pontiac Pump Station improvements — May 2005
- Start WWTP Expansion & Pump Station Improvements
  - Environmental Assessment — November 2004-January 2005
  - Application for Financing — November 2004-February 2005
  - Pre-design Report — February 2005-May 2005
  - DEQ Approval of Predesign Report & Environmental Assessment — July 2005
  - Design of WWTP project — July 2005 – February 2006
  - DEQ approval of plans — April 2006
  - Advertise for bids — May 2006
  - WWTP Expansion Construction — July 2006 – December 2007
  - River Crossing construction — October 2006
  - Facility Commissioning — December 2007 - February 2007
  - Performance Evaluation — December 2007 – December 2008

TABLE 7.6.1
PROJECT PHASES

Phase	Year	Project#	Project Description	
1	2005	2	Grease Prevention	$6,670
		7	Pontiac Pump Station Safety Improvements	$3,350
		14	Manure Spreader	$3,500
		10	Supernatant Decanting	$10,000
		11	Automatic Sampling Stations	$19,000
		13	Biosolids Irrigation Sprayer	$4,700
		15	Additional Biosolids Disposal Sites	
			Subtotal	**$47,220**
2	2005 to 2007	12	WWTP Upgrade	$4,850,480
		4	Main Pump Station Replacement	$430,000
		5	Ocean View Pump Station Replacement	$336,000
		6	Riverside Pump Station Replacement	$107,000
		1	Ocean View Drive	$39,000
		9	New Effluent Meter	$23,000
		8	Upgrade WWTP Laboratory	$50,000
			Subtotal	**$5,835,480**
Total				**$5,882,700**



THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS WASTEWATER FACILITIES PLAN	FIGURE NO.
DATE: SEPT. 2004		
PROJECT NO.: 141.05	PROPOSED SBR LAYOUT	7.3.1



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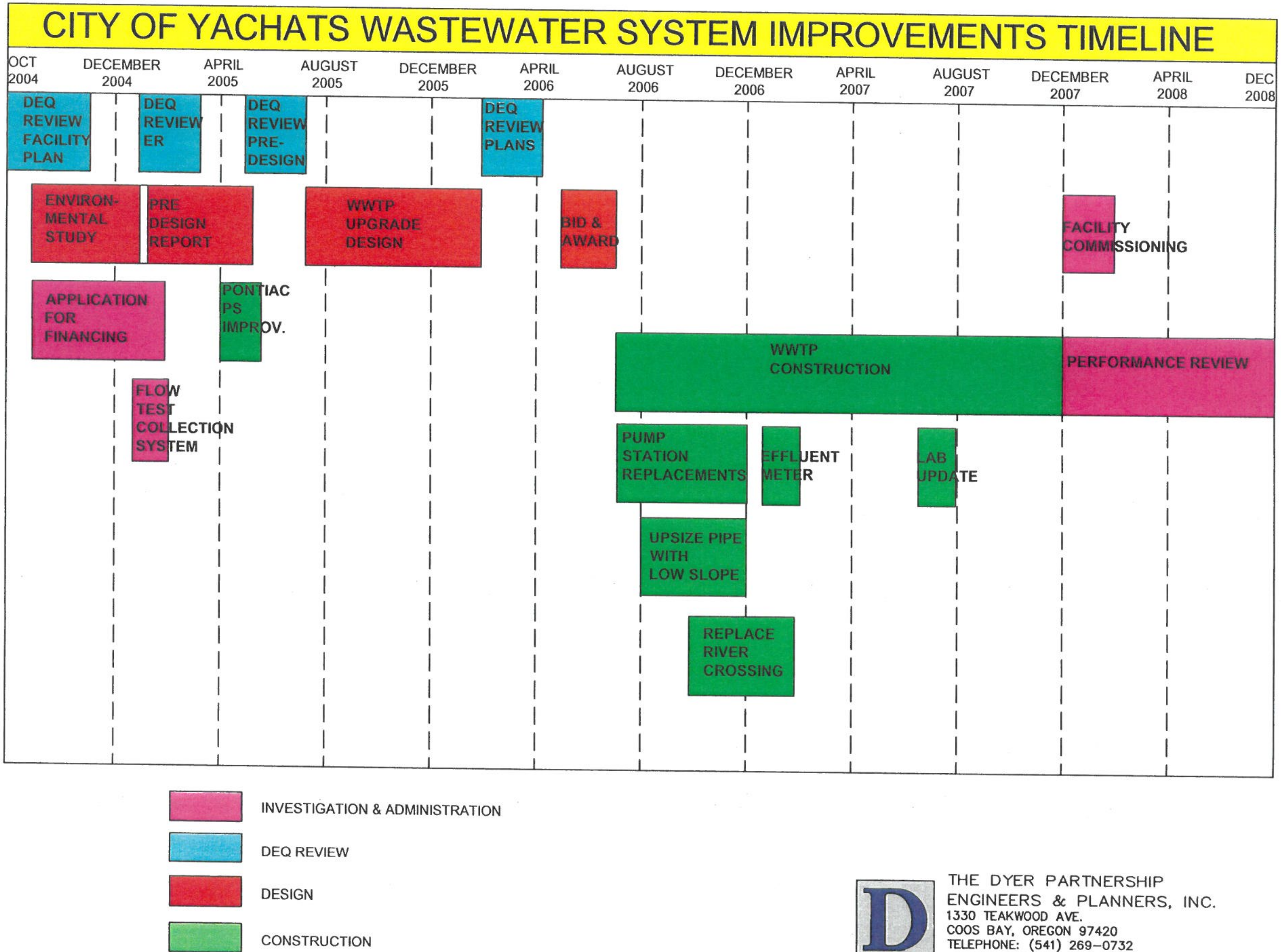
THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS***	FIGURE NO.
DATE: SEPTEMBER, 2004	***PROPOSED WASTEWATER IMPROVEMENT LOCATIONS***	***7.6.1***
PROJECT NO.: 141.05		

FIGURE 7.6.2



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Financing Options

Section

8

Section 8

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/State funding programs and local funding mechanisms that are appropriate for the recommended improvements are discussed. A recommended financing strategy for the proposed infrastructure system improvements is also presented along with a discussion of the potential impact to rate payers.

8.1 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 Yachats 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 was 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 that create or retain private sector jobs in both the near-term and long-term. Communities, which 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 the 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. While these programs are administered by a new agency, the program requirements are essentially the same. 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 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.
- Legal capacity to borrow and repay loans, to pledge security for loans, and to operate and maintain the facilities or services.
- Financially sound and able to manage the facility effectively.
- 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 to retire the indebtedness and maintain a reserve.
- Water and waste disposal systems must be consistent with any development plans of State, multi-jurisdictional area, counties, or municipalities 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 right-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 pay the market rate whose median household income (MHI) of the service area is more than the $34,608 (Oregon non-metropolitan MHI). The market rate is currently 4.625%.
>
> ***Intermediate rate.*** The intermediate rate is paid by those applicants whose MHI of the service area is less than $34,608 but greater than $27,686. The intermediate rate is currently 4.50%.
>
> ***Poverty line rate.*** Those applicants whose MHI of the service area is below $27,686 (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 4.50%.

Maximum grant amounts, based on MHI, are provided in Table 8.1.1. 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 8.1.1
MAXIMUM RURAL DEVELOPMENT GRANT FUNDS
BASED ON MEDIAN HOUSEHOLD INCOME

Median Household Income (MHI)	Maximum Grant [a]	Interest Rate [b]
<$22,205	45%	4.5%
$22,205 - $27,756	20%	4.5%
>$27,756	0%	4.625%

[a] MHI<27,2686 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 apply for quarter ending September 30, 2004.

The MHI in the City of Yachats, based on 2000 Census data, is $32,308. At this MHI, the City could be eligible for a grant of up to 20% of the total project cost. The City may also eligible for a RDA loan at the intermediate rate of 4.50%.

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.

Rural Utilities Service funds, for use in Oregon, are limited by an annual funding allocation. Because of the success of the Rural Utilities Service Grant and Loans and tightening of the Federal budget, it is becoming increasingly difficult to obtain sole funding from Rural Development for a large project. Rural Development staff believes the maximum amount of grant funding would consist of a 20 percent grant - 80 percent loan split between funds. Unless Rural Utilities Service receives an increase in funding, the amount of loan and grant funds for any given project is likely to be limited to approximately \$3.5 million and \$1.0 million, respectively.

Applications for financial assistance are made at area offices of the Rural Development. For additional information on Rural Development loans and grant programs call 1-541-673-0136 or visit the RUS website at http://www.usda.gov/rus/water/. The Oregon Rural Development website is http://www.rurdev.usda.gov/or/.

Technical Assistance and Training Grants (TAT)

Available through the USDA Rural Utilities Service (RUS) as part of the 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 1-541-673-0136 or visit the RUS website at http://www.usda.gov/rus/water/.

Oregon Community Development Block Grant (OCDBG) Program

The Community Development Program section of the Oregon Economic and Community Development Department (OECDD) administers the OCDBG Program. Funds for the program come from the U.S. Department of Housing and Urban Development. OCDBG funds under the Public Works category are targeted to water and wastewater systems. Oregon has approximately six million dollars targeted for public works projects in 2002.

To receive a grant the applicant must meet the following criteria:

- Be a City or County located in a non-metropolitan area of rural Oregon.
- Have over 51% of population considered low and moderate income in target area based on census data or a local survey.
- Have received less than $750,000 in grants from this program in the previous five years for wastewater projects.
- Have drinking water/waste disposal rates at or above 1.75% of the median annual household income for the target area.
- Have a local match of a minimum of 15% local funding.
- List the project on their top ten Needs and Issues Priority List.
- Use the funds to benefit current residents in a primarily residential area.

Eligible activities include the following categories:

- Public Works Water and Sewer Improvements
- Public Works Infrastructure for New Low/Moderate Income Housing
- Emergency Projects
- Projects which are necessary to bring municipal water and sewer systems into compliance with the requirements of the Safe Drinking Water Act or the Clean Water Act administered by the Oregon Health Division (OHD) or the requirements of water quality statutes, rules or permits administered by the Oregon Department of Environmental Quality (DEQ) or the Environmental Quality Commission (EQC)
- Projects where the municipal system has been issued a notice of non-compliance from the Oregon Health Division or the Department of Environmental Quality or it is determined that there is a high probability that within two years the system will be notified of non-compliance.

Public works project grants are limited to $750,000 for the combined total of all phases. Applications may be submitted year-round for Public Works grants under the OCDBG Program. Yachats has

32.1% of the population listed as low/moderate income based on the 1990 U.S. Census and is not eligible for funding under this program, unless a local survey shows that the area affected by the project has lower income rates that qualify. The 2000 census data will be released in July 2002 and will supercede previous census and survey data. Income levels for Yachats are not expected to meet the eligibility guidelines.

For additional information on the OCDBG programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/cdbg.htm.

Oregon Special Public Works Fund

The Special Public Works Fund (SPWF) program provides financing to local governments to construct, improve, and repair infrastructure in order to support local economic development and create new jobs locally, especially family wage jobs. In order to be eligible, the following conditions must be satisfied.

- The existing infrastructure must be insufficient to support current or future industrial or eligible commercial development; and

- There must be a high probability that family wage jobs will be created or retained within: 1) the boundary to be served by the proposed infrastructure project or 2) industrial or eligible commercial development of the properties served by the proposed infrastructure project.

The SPWF program is capitalized by the Oregon State Legislature through biennial appropriations from the Oregon Lottery Economic Development Fund, through bond sales for dedicated project funds, through loan repayments and other interest earnings. The Oregon Economic and Community Development Department (OECDD) administers the fund.

Eligible activities include wastewater treatment facilities and all facilities necessary for collecting, pumping, treatment and disposal of sanitary sewage and storm drainage. The following criteria are used to determine project eligibility.

- ***Firm Business Commitment***. In addition to creating or retaining of permanent jobs as a result of the project, there must be private and/or public investment in the project equal to at least twice the SPWF funding.

- ***Capacity Building***. The applicant is required to document: 1) recent interest benefited by the project, 2) there are ongoing efforts to market the area, and 3) the project will promote future economic development and creation of jobs.

All projects must principally benefit industrial or eligible commercial users.

The Department will structure a financing package that may include loans and/or grants. Final amount of financing and the loan/grant/bond mix is determined by such factors as the financial feasibility of the project, applicant's credit strength, the ability to assess specially benefited property owners, applicant's ability to afford annual loan payments, and future beneficiaries of the project.

Maximum SPWF loan per project is $10 million, if funded from SPWF revenue bond proceeds. Projects financed directly from the SPWF may receive up to $1 million. Interest rates are no less than 6.5 percent and are set quarterly by the Department; loan terms cannot exceed 25 years. The maximum SPWF grant is $500,000 for a construction project and is not to exceed 85 percent of the total project cost. Grants are made only when loans are not feasible.

For additional information on the OCDBG and other OECDD programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/spwf.htm.

Water/Wastewater Financing Program

The Water/Wastewater Financing Program was designed for communities that must meet Federal and State mandates to provide safe drinking water and adequate treatment and disposal of wastewater. The legislation was intended to assist local governments meet the Safe Drinking Water Act and the Clean Water Act. The Oregon State Legislature capitalizes the funding for this program through a biennial appropriation from the Oregon Lottery Economic Development Fund. The program is administered by OECDD, Community Development Programs Section. Program eligibility is limited to projects necessary to ensure compliance with the applicable State regulatory agency standards or rules.

While loans and grants may be awarded, grant funding must be accompanied by loans from the Community Development Program. Loans are based on a municipality's ability to repay. Grant funding is available only if a loan is not feasible. OECDD will structure a financing package that may include direct loans, bond loans, and/or grants and may include funds from other Community Development programs for which the project is eligible. The mix of loan/grant/bond financing will depend on the financial feasibility of the project and will consider utility rates, per capita income, existing debt, and other factors. The current interest rate on loans is 4.72 percent. Yachats would be eligible for a $500,000 grant based on affordability guidelines. Financing limits are as follows in Table 8.1.2:

TABLE 8.1.2
PROJECT FINANCING LIMITATIONS

Project Financing	Maximum	
	Loan	Grant
With Bond Funds	$10 million	$500,000
With SPWF Funds	$500,000	$500,000
Technical Assistance [a]	$20,000	$10,000

[a] For eligible applicants under 5,000 population.

Interested applicants should contact OECDD prior to submitting an application. Applications are accepted year-round. For additional information on this and other OECDD programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/wtrww.htm.

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

The SRF Program is administered by the DEQ and was developed to replace the EPA Construction Grants Program. The SRF is a loan program that provides low interest rate loans, instead of grants, for the planning, design, and construction of water pollution control facilities.

Interest rates on all design and/or construction loans are two-thirds of the current municipal bond rate during the quarter that the loan agreement is signed. Estimated loan rates are currently 3.06 percent. In addition, a servicing fee (0.5 percent of the outstanding balance) is also assessed to cover program administration by DEQ. Loans can be in the form of general obligation bonds or other rated debt obligations, revenue secured loan, or a discretionary loan. Loans are for a 20-year period, with the repayment date set based on substantial completion of construction.

SRF funds are allocated based on a prioritization process. Based on the preliminary applications, projects are assigned points and ranked in priority order based on 1) severity of water quality/health hazard problem; 2) receiving water body sensitivity; and 3) population served by the project.

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 allocated funds are placed on the Funded List. Unfunded projects are 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 environmental assessment of the project, a sewer ordinance prohibiting inflow connections and toxic discharges to the wastewater system, a non-residential sewer use survey, a land use compatibility statement from the county planning official, and a department approved user charge system.

For additional information on this and other DEQ programs, call 1-800-452-4011 or visit the DEQ website at http://waterquality.deq.state.or.us.

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 1-503-378-4040 or visit the Office of Energy website at http://www.energy.state.or.us.

Oregon Department of Energy, Business Energy Tax Credit

The Business Energy Tax Credit was revamped in 2001 to allow public entities to participate. The State of Oregon Department of Energy offers a tax credit of 35% of project costs, taken over a five-year period, for qualifying capital improvements that reduce energy use. Requirements for projects are similar to that of the SELP program. Public entities do not pay taxes and so are not eligible for a direct tax credit, but may sell their credit to private businesses at a discounted rate, usually about 28%. Lighting retrofits, VFDs, efficient motors, and controls are typical projects that qualify for funding.

Cooperative Programs: U.S. Forest Service Funding

Cooperative Programs are available through the U.S. Forest Service and offer various Economic Action Programs to the public. Communities, tribal governments, counties, municipalities, and non-profit organizations with an economic development mission in areas dependent of forests and natural resources may apply. The community must be located within 100 miles of the official boundary of a National Forest, have a population under 10,000, and have a workforce whose income is over 15% wood and forest product industry related.

Some of the Economic Action Programs offered through this system include:

- **Rural Community Assistance**: Grants are provided to eligible communities, counties, and tribes for the development of strategic action plans and for funding projects contained in those plans.

- **The Northwest Forest Plan/Northwest Economic Adjustment Initiative**: The Cooperative Programs staff work with the state Community Economic Revitalization Teams in Oregon to technically and financially assist communities impacted by declining timber harvests on federal lands within the range of the northern spotted owl.

- **Rural Community Assistant**: This program is directed towards communities that have become economically dependent or disadvantaged due to public land management decisions.

Various community and economic development proposals may be funded through the Economic Action Programs. The requests for funding may range from requests for support to community action plan development and other technical assistance, to the implementation of an existing action plan. For more information regarding Economic Action Programs and grant funding available from the USFS call Ron Saranich, Rural Community Assistance Program Manager at 503-808-2348 or visit the Cooperative Programs website at http://fs.fed.us/r6/coop.

8.2 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 fund raising 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 fare 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 to 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 was 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 5% of the municipality's registered voters may cause the issue to be referred to an election.

Improvement Bonds

Improvement (Bancroft) bonds can be issued under an Oregon law called the Bancroft Act. These bonds are an intermediate form of financing that is less than full-fledged general obligation or revenue bonds. This type of bond is quite useful, especially for smaller issuers or for limited purposes.

An improvement bond is payable only from the receipts of special benefit assessments, not from general tax revenues. Such bonds are issued only where certain properties are recipients of special benefits not accruing to other properties. For a specific improvement, all property within the improvement area is assessed on an equal basis, regardless of whether it is developed or undeveloped. The assessment is designed to apportion the cost of improvements, approximately in proportion to the afforded direct or indirect benefits, among the benefited property owners. This assessment becomes a direct lien against the property, and owners have the option of either paying the assessment in cash or applying for improvement bonds. If the improvement bond option is taken, the City sells Bancroft improvement bonds to finance the construction, and the assessment is paid over 20 years in 40 semi-annual installments with interest. Cities and special districts are limited to improvement bonds not exceeding 3% of true cash value.

With improvement bond financing, an improvement district is formed, the boundaries are established, and the benefited properties and property owners are determined. The engineer usually determines an approximate assessment, either on a square foot or a front-foot basis. Property owners are then given an opportunity to object to the project assessments. The assessments against the properties are usually not levied until the actual cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of making monthly payments to the contractor. Therefore, some method of interim financing must be arranged, or a preassessment program, based on the estimated total costs, must be adopted. Commonly, warrants are issued to cover debts, with the warrants to be paid when the project is complete.

The primary disadvantage to this source of revenue is that the property to be assessed must have a true cash value at least equal to 50% of the total assessments to be levied. As a result, owners of undeveloped property usually require a substantial cash payment. In addition, the development of an assessment district is very cumbersome and expensive when facilities for an entire community are contemplated. In comparison, general obligation bonds can be issued in lieu of improvement bonds, and are usually more favorable.

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.

Connection Fees

Most cities charge connection fees to cover the cost of connecting new development to water and wastewater systems. Based on recent legislation, connection fees can no longer be programmed to cover a portion of capital improvement costs.

System Development Charges

A system development charge (SDC) is essentially a fee collected as each piece of property is developed, and which 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.

Local Improvement District (LID)

Improvement bonds issued for local improvement districts (LIDs) are used to administer special assessments for financing local improvements in cities, counties, and some special districts. Common improvements financed through a LID include storm and sanitary sewers, street paving, curbs, sidewalls, water mains, recreational facilities, street lighting, and off-street parking. The basic principle of special assessment is that it is a charge imposed upon property owners who receive special benefits from an improvement beyond the general benefits received by all citizens in the community. A public agency should consider three "principles of benefit" when deciding to use special assessment: 1) direct service, 2) obligation to others, and 3) equal sharing/basis. Cities are limited to improvement bonds not exceeding three percent of true cash value.

The Oregon Legislature has provided cities with a procedure for special assessment financing (ORS 223.387-399), which applies when city charter or ordinance provisions do not specify otherwise. To establish a LID, an improvement district is formed, the boundaries are established, and the benefited properties and property owners are determined. An approximate assessment to each property is determined based on the above three principles of benefit and is documented in a written report. Property owners are then given an opportunity to object to the project assessments. The assessments against the properties are usually not levied until the actual cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of making monthly payments to the contractor. Therefore, some method of interim financing must be arranged based on the estimated total costs.

The primary disadvantage to this source of revenue is that the property to be assessed must have a true cash value at least equal to 50 percent of the total assessments to be levied. As a result, owners of undeveloped property usually require a substantial cash payment. In addition, the development of an assessment district is very cumbersome and expensive.

Ad Valorem Taxes

Ad valorem property taxes are often used as 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 Fee

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.

8.3 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

A total of $5.9 million in recommended capital improvement project costs were identified in Section 7.5. The identified projects expand, replace, or repair existing equipment and facilities and are expected to increase the annual operations and maintenance costs to the City by approximately $15,885 (assuming that the $8,400 listed for grease removal is already budgeted).

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. 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.

Most of the grant programs require that the project address a DEQ issued violation or order before the project is eligible for funding. Rural Development will issue grants for projects without this requirement, but for a reduced amount and the project must pass strict scrutiny. The City signed an MAO on June 13, 2004 and currently operates the wastewater system under this agreement.

It is recommended that the City undertake efforts to secure funding in the form of grants and loans. Rural Development looks closely at sewer user rates and expects local rates to be at or above that of similar communities before the project becomes eligible for grants. Typical sewer user rates for communities the size of Yachats are in the range of $43 per month. Sewer rates currently average $37.27 for user fees and $2.65 for the sewer construction bond (paid through property taxes) for a total monthly average residential sewer cost of $39.92 per residential unit. The actual cost to provide sewer service, based on the operating and capital reserve budget for 2004, is $23.46 per EDU per month for all users, with EDUs calculated based on average water consumption records. The discrepancy between residential rates and average service cost requires an analysis that is outside of the scope of this study. Rural Development uses the average service cost for the system when allocating grant funds. See Appendix C for the calculation of EDUs and sewer service costs. Each project was reviewed against the criteria for various funding agencies, with a summary of the potential funding sources summarized in Table 8.3.1.

TABLE 8.3.1
POTENTIAL PROJECT FUNDING SOURCES

Phase	Project #	Project Description	Cost	Funding Source
1	2	Grease Prevention	$6,670	City Funds
	7	Pontiac PS Safety Improvements	$3,350	City Funds
	14	Manure Spreader	$3,500	City Funds
	10	Supernatant Decanting	$10,000	City Funds
	11	Automatic Sampling Stations	$19,000	City Funds
	13	Biosolids Irrigation Sprayer	$4,700	City Funds
	15	Additional Biosolids Disposal Sites*	$0	City Funds
		Subtotal	**$47,220**	
2	12	WWTP Expansion	**$4,850,480**	SRF – Water/Wastewater
	4	Main Pump Station Replacement	$430,000	SRF – Water/Wastewater
	5	Ocean View Pump Station Replacement	$336,000	SRF – Water/Wastewater
	6	Riverside Pump Station Replacement	$107,000	SRF – Water/Wastewater
	1	Ocean View Drive	$39,000	SRF – Water/Wastewater
	9	New Effluent Meter	$23,000	SRF – Water/Wastewater
	8	Upgrade WWTP Laboratory	$50,000	SRF – Water/Wastewater
		Subtotal	**$5,835,480**	
Total			**$5,882,700**	

* These projects are not considered capital improvements and funding is anticipated as part of the City's O&M budget.

The City signed a Mutual Agreement and Order (MAO) with DEQ to provide temporary operating limits and to settle current violations. While the MAO makes the City eligible for grant funding from addressing a current violation standpoint, the current low cost of sewer services per average EDU makes it unlikely to receive Rural Development grants. The City would be eligible for a $500,000 OECDD grant based on affordability.

If the funding level in Table 8.3.3 is achieved, then the anticipated monthly sewer rate increase is $24.32 per EDU per month. Information on loan costs is summarized in Tables 8.3.3 and 8.3.4. The total anticipated sewer rate per EDU is $47.48 based on current actual sewer costs of $23.46 plus the increase for debt service on the new loan. Residential rates would be $61.59 if the increase were distributed equally among all EDUs and added to the current rates. This sewer cost is high compared to rates in similar communities.

TABLE 8.3.3
FUNDING ALTERNATIVES

	Grant	Cost	Loan Amount	Years	Interest Rate	Annual Loan Payment
Rural Utility Services (RUS)	$0	$5,882,700	$5,882,700	40	4.50%	($319,684)
CBDG Grant - W/W Loan	$500,000	$5,382,700	$5,382,700	25	4.72%	($371,269)
RUS 20% Grant - RUS Loan	$1,294,194	$4,588,506	$4,588,506	40	4.50%	($249,354)
SRF (Includes 0.5% annual loan fee)	$0	$5,882,700	$5,882,700	20	3.06%	($368,193)
Private Funding	$0	$5,882,700	$6,470,970	20	5.00%	($519,247)

Amount based on current dollars
Interest rate for SRF funding is based on 3.06% annual interest (Oct - Dec, 2004), 0.5% servicing fee.

TABLE 8.3.4
ESTIMATED SEWER USE COST AFTER PROJECT

	Loan Amount	Loan Cost/EDU per Month	Monthly Sewer Bill 2,200 gal.
Rural Utility Services (RUS) Loan	$ 5,882,700	$ (21.12)	$ 58.39
CBDG Grant - W/W Loan	$ 5,382,700	$ (24.53)	$ 61.80
RUS 20% Grant - RUS Loan	$ 4,588,506	$ (16.47)	$ 53.74
SRF (Includes 0.5% annual loan fee)	$ 5,882,700	$ (24.32)	$ 61.59
Private Funding (10% Reserve)	$ 6,470,970	$ (34.30)	$ 71.57

Amount based on 1,261 average EDUs based on system water use

Local Cost Share

The existing WWTP is operating with flows over the design capacity. There are several items that are a priority for improving the operating efficiency of the existing system with a view toward operating within the permit limits until the plant is expanded. The short time schedule for these projects and the lower initial cost, make them candidates for financing directly by City funds. The City share for Phase I measures is estimated at $47,220.

Projects that increase system capacity are eligible to be considered for SDCs. The line size increase for Ocean View Road will increase capacity to allow for future connections. The pump station replacements and WWTP expansion are required due to capacity issues. An estimated $5,551,600 of the construction costs for these projects would be eligible for financing using SDC funds.

System User Costs

If the worse case was considered and the City was not successful in obtaining grant funds and all of the projects were completed one at a time, there would have to be an increase in user fees. Based on 1,261 EDUs, for a loan, as detailed above, monthly individual user fee increase would be between $16.50 and $24.50 per month.

Once the City has determined what funding may be available, the current rate structure should be reviewed and analyzed to determine the actual impact to ratepayers. Flows at the WWTP are over design capacity, necessitating a major expansion. Since a project of this nature will likely result in higher sewer rates, all grants, loans, existing debts and reserves, and surpluses should be taken into account when calculating the final impact to rate payers.

Glossary

Glossary

The terms used in this study are defined below.

Average Dry Weather Flow (ADWF) - the average flow measured during a dry weather season, usually May 1 to October 31, and during low groundwater levels that occur on a daily basis. During periods of little or no precipitation, wastewater flow is composed primarily of sanitary sewage and commercial and/or industrial wastes. Base infiltration may be present.

Average Wet Weather Flow (AWWF) – the average flow measured during the wet season, usually November 1st to April 30th. This value may be utilized as a basis for higher winter mass load limits.

Base Infiltration - water that enters the sewage system from the surrounding soil during periods of low groundwater levels.

Biochemical Oxygen Demand (BOD) - a measure of wastewater strength in terms of the quantity of oxygen required for biological oxidation of the organic matter contained in wastewater. The BOD loading imposed on a treatment plant influences both the type and degree of treatment, which must be provided to produce the required effluent quality. All references to BOD in this report are with respect to five-day BOD and 20° Celsius.

DEQ - the Oregon State Department of Environmental Quality.

Discharge Monitoring Report (DMR) – the standard form required by the Oregon Department of Environmental Quality (DEQ) for the recording and reporting of influent and effluent volumes and characteristics along with other data pertaining to the wastewater system.

Excessive Infiltration and Inflow (I/I) - portion of infiltration and/or inflow which can be removed from the sewage system through rehabilitation at less cost than continuing to transport or treat that portion of I/I.

Industrial Wastes - waterborne wastes produced as the result of manufacturing or processing operations.

Infiltration - water that enters the sewage system from the surrounding soil. Common points of entry include broken pipe and defective joints in pipe and manhole walls. Although generally limited to sewers laid below the normal groundwater level, infiltration also occurs as a result of rain or irrigation water soaking into the ground and entering mains, manholes, and even shallow house sewer laterals with defective joints or other faults.

Inflow - water that enters the sewage system from surface runoff. Inflow may enter the sewer system through manhole covers, exposed broken pipes and defective pipe joints, cross connections between storm sewers and sanitary sewers, and illegal connections of roof and area drains.

Maximum Monthly Dry Weather Flow (MMDWF) - the monthly average flow that has only twenty-percent probability of being experienced during May to October in any given year. In other words, this flow represents the wettest dry weather season monthly average flow that is anticipated to have a five-year recurrence interval. For western Oregon, May is usually the month, which has the highest dry weather flow.

Maximum Monthly Wet Weather Flow (MMWWF) - the monthly average flow that has only twenty-percent probability of being experienced during November to April in any given year. This flow represents the wettest wet season monthly average flow that is anticipated to have a five-year recurrence interval. For western Oregon, January is usually the month that has the highest wet weather flow.

"mg/l" - means milligrams per liter.

Peak Instantaneous Flow (PIF) - the highest hourly flow measured during wet weather. The addition of increased I/I during periods of high groundwater levels and rainfall may produce flows several times greater than the ADWF. This value determines the hydraulic capacity of major process units, sewers, channels, and pumps.

Rain Induced Infiltration - portion of infiltration due to leakage of percolating rainwater into collection system defects that lie near the ground surface.

Residual - the amount of chlorine in mg/l left in treated effluent at discharge.

Sanitary Sewage - waterborne wastes principally derived from the sanitary conveniences of residences, business establishments, and institutions.

Total Suspended Solids (TSS) - a measure of the quantity of suspended material contained in the wastewater. The quantity of TSS removed during treatment influences the sizing of sludge handling and disposal processes, as well as the effectiveness of disinfection with chlorine.

Wastewater - total fluid flow in a sewerage system. Wastewater may include sanitary sewage, industrial wastes, and infiltration and inflow (I/I).

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Appendices

Permits & DEQ

Appendix

A

AUG 2 8 1991

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

August 21, 1991

City of Yachats
P. O. Box 67
Yachats, OR 97498

Permit Action Letter

Re: Waste Disposal Permit
File Number 99260
EPA Reference Number OR-002029-0
Lincoln County

Schedule B, Condition 1.c. of the National Pollutant Discharge Elimination System (NPDES) Permit issued on August 9, 1991, requires composite samples from each digester withdrawal line to consist of at least 4 aliquots of equal volume collected over a 8-hour period and combined.

Since sludge is not removed from the digester frequently, samples will be taken from the digester not the digester withdrawal line. It is also important to have the aerators running prior to sample collection. To reflect the above changes, the permit for this facility is hereby modified. Sludge samples shall be collected from the digester and not the digester withdrawal line, and note 1 on page 4 now reads as follows:

"Composite samples from the aerobic digester shall consist of at least 4 aliquots of equal volume, taken from evenly spaced locations and combined. Digester aerators shall operate a minimum of 2 hours prior to sample collection. Composite samples from the drying beds shall consist of blending equal fractions of grab samples taken from the center of 9 or more like-sized units resulting from an imaginary grid of each section of the drying beds being harvested. The grab samples taken from the center of each grid shall include the entire depth of sludge in the area sampled. Samples shall be composited and mixed in equal portions. The sampling locations should be spaced to get samples from all parts of the drying beds. The composited samples from the sludge drying beds and the aerobic digester can be combined prior to analysis of the sludge".

If you should have any further questions, please contact our Salem Office.

Sincerely,

Lydia R. Taylor

Lydia R. Taylor
Administrator
Water Quality Division

LRT:RK:crw
MW\WC8\WC8852
cc: Willamette Valley Region, DEQ
U. S. Environmental Protection Agency

811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, OR 97204
Telephone: (503) 229-5696

Issued pursuant to ORS 468.740 and The Federal Clean Water Act

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ISSUED TO:

City of Yachats
P. O. Box 67
Yachats, OR 97498

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Domestic Sewage	001	Pacific Ocean

PLANT TYPE AND LOCATION:

Activated Sludge Plant
500 W. 7th Street
Yachats, Oregon 97498
Treatment System Class: II
Collection System Class: II

RECEIVING SYSTEM INFORMATION:

Basin: Mid-Coast
Sub-Basin: None
Stream: Pacific Ocean
Hydro Code: 10-*PACI 214.5 D
County: Lincoln

EPA REFERENCE NO: OR-002029-0

Issued in response to Application No. 998827 received November 17, 1988.

This permit is issued based on the land use findings in the permit record.

Lydia R. Taylor
Lydia R. Taylor, Administrator

AUG 09 1991
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:

Each other direct and indirect discharge to public waters is prohibited.

This permit does not relieve the permittee from responsibility for compliance with any other applicable federal, state, or local law, rule, standard, ordinance, order, judgment, or decree.

SCHEDULE A

1. **Waste Discharge Limitations not to be Exceeded After Permit Issuance.**

a. Outfall Number 001 (Sewage Treatment Plant Discharge)

(1) May 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Average Effluent Concentrations Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
a. BOD-5	20 mg/l	30 mg/l	25	37.5	50
b. TSS	20 mg/l	30 mg/l	25	37.5	50
c. FC/100ml	200	400			

(2) November 1 - April 30:

Parameter	Average Effluent Concentrations Monthly	Average Effluent Concentrations Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
a. BOD-5	30 mg/l	45 mg/l	37.5	56	75
b. TSS	30 mg/l	45 mg/l	37.5	56	75
c. FC/100ml	200	400			

*Based on average dry weather design flow to the facility equaling 0.15 MGD.

(3) Other parameters

a. pH (year-round)	Shall be within the range 6.0 - 9.0
b. BOD and TSS Removal Efficiency	Shall not be less than 85% monthly average

(4) Not withstanding the effluent limitations established by this permit, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-41-245 except in the defined mixing zone:

That portion of the Pacific Ocean within a 100 foot radius of the point of discharge.

SCHEDULE B

1. Minimum Monitoring and Reporting Requirements,
(unless otherwise approved in writing by the Department)

a. Influent

Item or Parameter	Minimum Frequency First Year	Minimum Frequency After First Year	Type of Sample
Total Flow (MGD)	Daily	Daily	Estimate
BOD-5	2/month	Weekly	Composite
TSS	2/month	Weekly	Composite
pH	2/week	2/Week	Grab

b. Outfall Number 001 (discharge from the sewage treatment plant)

Item or Parameter	Minimum Frequency First Year	Minimum Frequency After First Year	Type of Sample
Total Flow (MGD)	Daily	Daily	Measurement
Flow Meter Calibration	Yearly	Yearly	Verification
BOD-5	2/month	Weekly	24-hour Composite
TSS	2/month	Weekly	24-hour Composite
pH	2/week	2/Week	Grab
Fecal Coliform	2/month	Weekly	Grab
Quantity Chlorine Used	Daily	Daily	Measurement
Chlorine Residual	Daily	Daily	Grab
Average Percent Removed (BOD and TSS)	Monthly	Monthly	Calculation

c. Sludge Management

Item or Parameter	Minimum Frequency	Type of Sample
Sludge analysis including: Total solids (% dry wt.) Volatile solids (% dry wt.) Sludge nitrogen NH_3-N; NO_3-N; & TKN (% dry wt.) Sludge metals content for Pb; Zn; Cu; Ni; & Cd (mg/kg) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units)	Annually	Composite sample to be representative of the product to be land applied from each digester withdrawal line and sludge drying beds (See Note 1/)

Quantity and type of lime product used to stabilize sludge	Each occurrence	Pounds/gallons of sludge land applied
Record of locations where sludge is applied on land (Site location map to be maintained at treatment facility for review upon request by DEQ)	Each Occurrence	Date, volume & locations where sludge is applied recorded on site location map.

Notes:

1/ Composite samples from each digester withdrawal line shall consist of at least 4 aliquots of equal volume collected over a 8 hour period and combined. Composite samples from the drying beds shall consist of blending equal fractions of grab samples taken from the center of 9 or more like-sized units resulting from an imaginary grid of each section of the drying beds being harvested. The grab samples taken from the center of each grid shall include the entire depth of sludge in the area sampled. Samples shall be composited and mixed in equal portions. The sampling locations should be spaced to get samples from all parts of the drying beds. The composited samples from the sludge drying beds and the digester withdrawal line can be combined prior to analysis of the sludge.

Monitoring reports (DMRs) shall include a record of the location, quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.

2. <u>Reporting Procedures</u>

Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the Department by the 15th day of the following month.

All monitoring reports shall indicate the wastewater system classification as shown on page one of this permit and include the name of each principal operator designated by the permittee as responsible for supervising the system during the reporting period, and their certificate classification and grade level.

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SCHEDULE C

Compliance Schedules and Conditions

1. The permittee shall a continuing program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by January 15 of each year which details sewer collection maintenance activities that have been done in the previous year and outlines those activities planned for the following year.

2. As soon as practicable but no later than six (6) months after permit issuance date, the permittee shall submit a plan and schedule to upgrade lime stabilization facilities or propose other means to meet federal Process to Significantly Reduce Pathogens (PSRP) regulations. The permittee shall implement the above plan within six (6) months of Department approval.

3. 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. All sludge shall be managed in accordance with a sludge management plan approved by the Department of Environmental Quality. No substantial changes shall be made in sludge management activities which significantly differ from operations specified under the approved plan without the prior written approval of the Department.

2. The Department has classified the permittee's wastewater system as a Collection System Class II and a Treatment System Class II. The permittee shall comply with Oregon Administrative Rule (OAR) Chapter 340, Division 49, "Regulations Pertaining to Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater treatment system supervised by one or more operators who hold valid certificates issued under OAR 340-49-035 that corresponds in classification and grade level equal to or greater than the class of the system to be supervised as shown above.

      Note: Supervisors are responsible for the technical operation of the system which may affect performance and/or the quality of the effluent produced and the person to whom the permittee designates authority for establishing and executing specific practices and procedures in accordance with the policies of the permittee and the requirements of the waste discharge permit.

   b. When in operation, no system shall be without supervision as required in paragraph "a" above for more than thirty (30) days. During this period, when the supervisor is off-site and physically unavailable, such as vacation or sick leave, the permittee shall make available an alternate, or in case of shift operation, a shift supervisor. The alternate or shift supervisor, shall hold a valid certificate issued under OAR 340-49-035 that corresponds in classification no less than one grade lower than the class of the system to be supervised.

   c. Supervisors or alternates shall be available to the permittee and to any other operator. It shall be the responsibility of the permittee to ensure that supervisors and alternates are properly certified and available.

   d. In addition to the reporting requirements specified in Schedule B, the permittee shall notify the Department in writing within thirty (30) days of replacement or re-designation of certified operators identified by the permittee as responsible for supervising the operation of its system (including shifts). The notice shall be filed with the Water Quality Division, Operator Certification Program.

3. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in-plant control and quick and proper action in the event of a spill or accident.

4. The permittee shall notify the DEQ Salem Office (phone: 378-8240) of any malfunction so that corrective action can be coordinated between the permittee and the Department.

P99260W (CRW) (7-26-91)

NPDES GENERAL CONDITIONS

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) 468.720 and is grounds for enforcement action; for permit termination; suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Violations of Permit Conditions

Oregon Law (ORS 468.990) classifies a willful or negligent violation of the terms of a permit or failure to get a permit as a misdemeanor and a person convicted thereof shall be punishable by a fine of no more than $25,000 or by imprisonment for not more than one year, or by both. Each day of violation constitutes a separate offense.

In addition to the criminal penalties specified above, Oregon Law (ORS 468.140) also allows the Director to impose civil penalties up to $10,000 per day for violation of the terms or conditions of a permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or 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 should 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, or terminated for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit, rule, or statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant 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 privileges, nor does it authorize anyinjury to private property or any invasion of personal rights, nor any violation of federal, state or local laws or regulations.

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 includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

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. <u>Bypass of Treatment Facilities</u>

a. Definitions

(1) "Bypass" means diversion of waste streams from any portion of the conveyance system or treatment facility.

(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 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 and the Director may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable 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 pumping, conveyance, or treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment 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 paragraph c of this section.

(2) The Director may approve an anticipated bypass, after considering its adverse effects, when the Director determines that it will meet the three conditions listed above in paragraph b(1) of this section.

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 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 Section D, Paragraph D-5 (24-hour notice).

d. Bypass not exceeding limitations.

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.

4. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure 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 $\pm$ 10% 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 6 months per violation, or by 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 postmarked by the 14th 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 DMR. Such increased frequency shall also be indicated.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for coliform and fecal coliform bacteria which shall be averaged based on a geometric or log mean.

8. Retention of Records

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, or report of application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility which will result in a change in the character of pollutants to be discharged or which will result in a new or increased discharge of pollutants.

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 from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. 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; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

The following shall be included as information which must be reported within 24 hours:

a. Any unanticipated bypass which exceeds any effluent limitation in the permit.

b. Any upset which exceeds any effluent limitation in the permit.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Section D, Paragraphs D-4 and D-5, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D-5.

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 Reports

State law provides that 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 shall, upon conviction be punished by a fine of not more than $1,000 per violation, or by imprisonment for not more than six months per violation, or by both.

SECTION E. DEFINITIONS AND ACRONYMS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids (non-filterable residue).

3. mg/l means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

4. MGD means million gallons per day.

5. Composite sample means a combination of samples collected, generally at equal intervals over a 24-hour period, and apportioned according to the volume of the flow at the time of the sampling.

6. FC means fecal coliform bacteria.

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION

OF THE STATE OF OREGON

IN THE MATTER OF:	)	MUTUAL AGREEMENT
	)	AND ORDER
City of Yachats,	)	NO. WQ WQ/M-WR-02-205
Permittee	)	Lincoln County
	)	

WHEREAS:

1. On August 9, 1991, the Department of Environmental Quality (Department or DEQ) issued National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number 100812, (Permit) to the City of Yachats (Permittee). The Permit authorizes the Permittee to construct, install, modify or operate wastewater treatment control and disposal facilities (facilities) and discharge adequately treated wastewater into the Pacific Ocean, waters of the state, in conformance with the requirements, limitations and conditions set forth in the Permit. The Permit has remained in effect since issuance. Permittee made timely application for renewal prior to the June 30, 1996 expiration date and remains in effect. A permit renewal is being issued concurrently with the signing of the MAO.

2. Schedule A, Condition 1, of the Permit does not allow Permittee to exceed the following waste discharge limitations after the Permit issuance date:

Outfall Number 001:

May 1 to October 31:

	AVERAGE EFFLUENT CONCENTRATIONS		EFFLUENT LOADINGS		
Parameter	Monthly	Weekly	Monthly Average Lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
BOD	20 mg/l	30 mg/l	25	37.5	50
TSS	20 mg/l	30 mg/l	25	37.5	50
Fecal coliform	200	400			

November 1 to April 30:

Parameter	AVERAGE EFFLUENT CONCENTRATIONS Monthly	Weekly	EFFLUENT LOADINGS Monthly Average Lbs/day	Weekly Average lbs/day	Daily Maximum Lbs
BOD	30 mg/l	45 mg/l	37.5	56	75
TSS	30 mg/l	45 mg/l	37.5	56	75
Fecal coliform	200	400			

Year Round:

Parameter	Average Effluent Concentration
Total Residual Chlorine	Shall not exceed 0.65 mg/l daily maximum and 0.25 mg/l monthly average.

3. During the time period the previous permit was in effect, Permittee has not been able to consistently meet the above effluent limitations. The Department sent Notices of Noncompliance (NON) to Permittee for violations of the NPDES effluent limitations on the following dates: April 2, 2001, for BOD and fecal exceedances in December 1999 and June 2000; July 26, 2001, for pH violations in May 2001; August 15, 2002, for fecal exceedances on June 2002; and August 27, 2002, for BOD exceedances in July 2002. The Department and the Permittee agree that most of these violations relate to the treatment plant no longer having adequate capacity to consistently treat the wastewater flows in accordance with the Permit discharge limitations.

4. The permittee uses chlorine as a disinfecting agent for killing pathogenic organisms living in the wastewater effluent. Condition 1 of Schedule A of the new Permit does not allow Permittee to exceed the waste discharge limitations for total residual chlorine at Outfall 001 after the Permit issuance date. The limitations are 0.25 mg/L monthly average and 0.6 mg/L daily maximum.

5. DEQ and the Permittee recognize that until new or modified facilities are constructed and put into full operation, Permittee will continue to violate the permit effluent limitations for BOD, total chlorine residual and fecal coliform bacteria at times.

6. Permittee presently is capable of treating its effluent so as to meet the following interim

effluent limitations, measured as specified in the Permit:

	AVERAGE EFFLUENT CONCENTRATIONS		EFFLUENT LOADINGS		
Parameter	Monthly	Weekly	Monthly Average lbs/day	Weekly Average lbs/day	Daily Maximum lbs
BOD	35 mg/l	45 mg/l	37.5	56	No limit
TSS	35 mg/l	45 mg/l	37.5	56	No limit
Fecal Bacteria	200 colonies				
Total Residual Chlorine	Shall not exceed 2.2 mg/l daily maximum and 1.8 mg/l monthly average.				

7. The Department and Permittee recognize that the Environmental Quality Commission has the power to impose a civil penalty and to issue an abatement order for violations of conditions of the Permit. Therefore, pursuant to ORS 183.415(5), the Department and Permittee wish to settle those past violations referred to in Paragraph 3 and to limit and resolve the future violations referred to in Paragraph 4 in advance by this Mutual Agreement and Order (MAO).

8. This MAO is not intended to settle any violation of any interim effluent limitations set forth in Paragraph 6 above. Furthermore, this MAO is not intended to limit in any way, the Department's right to proceed against Permittee in any forum for any past or future violations not expressly settled herein.

NOW THEREFORE, it is stipulated and agreed that:

9. The Environmental Quality Commission shall issue a final order:

A. Requiring Permittee to comply with the following schedule for sewage collection system and treatment plant upgrades:

(1) By no later than 60 days after the effective date of this MAO, Permittee shall submit Inflow/Infiltration (I&I) Rehabilitation plans and schedules to the Department for approval. Upon Department approval of the plans, Permittee will implement plans in accordance with the approved schedules.

(2) By no later than six months after the effective date of this MAO, Permittee shall submit to the Department, an Operation Optimization Study. The study shall include

interim operational and/or mechanical improvements that can feasibly be made to the wastewater treatment facility, an implementation schedule for same, and an estimate of the additional capacity that might be achieved by these improvements.

(3) By no later than 18 months after the effective date of this MAO, the Permittee shall submit to the Department a completed final Facilities Plan for approval.

(4) By no later than one year after Departmental approval of the Facilities Plan, Permittee shall secure funding for the project.

(5) By no later than 18 months after Department approval of the Final Facilities Plan, Permittee shall submit to the Department for approval Plans and Specifications for construction of the wastewater treatment facility upgrades.

(6) By no later than three months after Department approval of the final plans and specifications, the construction bids shall be awarded.

(7) By no later than 18 months after Department approval of the Plans and Specifications, the, Permittee shall complete construction of the wastewater treatment plant upgrades.

B. Requiring Permittee to meet the interim effluent limitations set forth in Paragraph 6 above until achieving compliance with Paragraph 9.A. above.

C. Prohibiting Permittee from allowing any new connections, based upon Equivalent Dwelling Units (EDUs), to the Permittee' sewage collection system after the effective date of this MAO, unless otherwise authorized in writing by the Department. Exceptions to this prohibition may be authorized in writing by the Department provided Permittee achieves and maintains the corrective schedules outlined in Paragraph 9.A. above in accordance with the following items:

(1) Permittee may allow connection of up to 10 EDUs upon the effective date of this MAO.

(2) Permittee may allow connection of additional EDUs upon completion of the Inflow/Infiltration Reduction Plan corrections. Additional EDUs may not exceed the estimated reduction in flow and may not exceed 10 EDUs in total..

(3) Permittee may allow connection of up to 10 EDUs upon submittal of a completed Facilities Plan.

(4) Permittee may allow connection of up to 10 EDUs upon submission of documentation demonstrating that funding arrangements have been completed as required in Paragraph 9.A. (4) above.

(5) Permittee may allow connection of up to 10 EDUs upon submission of Plans and Specifications for construction of the wastewater treatment facility upgrades.

(6) Permittee may also submit for Department approval a plan for interim capacity improvements. Upon Department approval of the plan, and completion of the improvements, Permittee may request authorization for additional EDU connections.

(7) In the event Permittee fails to comply with the corrective schedule in Paragraph 9.A. above, the Department may rescind authorization for any EDU connections not yet completed until the Permittee complies with the schedule in Paragraph 9.A. For the purposes of this MAO, an EDU is defined as equivalent to a single-family residence. For EDUs of other types of establishments, the flow shall be calculated as specified in OAR Chapter 340 Division 71 Table 2 Column 1, and divided by 250 gallons per day. Permittee shall submit quarterly reports on the number of EDUs connected in the previous quarter. Reports shall be submitted no later than 15th of the month following the quarter.

D. Requiring Permittee, upon receipt of a written Penalty Demand Notice from the Department, to pay the following stipulated civil penalties:

(1) $250 for each day of each violation of the compliance schedule set forth in Paragraph 9.A.

(2) $100 for each violation of each weekly average waste discharge limitation set forth in Paragraph 6.

(3) $500 for each violation of each monthly average waste discharge limitation set forth in Paragraph 6.

(4) $10,000 for any EDU connection not authorized by the Department pursuant to the terms and conditions of this MAO.

10. If any event occurs that is beyond Permittee's reasonable control and that causes or may cause a delay or deviation in performance of the requirements of this MAO, Permittee shall immediately notify the Department verbally of the cause of delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Permittee proposes to carry out such measures. Permittee shall confirm in writing this information within five (5) working days of the onset of the event. It is Permittee's responsibility in the written notification to demonstrate to the Department's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the control and despite due diligence of Permittee. If Permittee so demonstrates, the Department shall extend times of performance of related activities under this MAO as appropriate. Circumstances or events beyond Permittee's control include, but are not limited to, acts of nature, unforeseen strikes, work stoppages, fires, explosion, riot, sabotage, or war. Increased cost of performance or consultant's failure to provide timely reports may not be considered circumstances beyond Permittee's control.

11. Regarding the violations set forth in Paragraphs 4 and 5 above, which are expressly settled herein without penalty, Permittee and the Department hereby waive any and all of their rights to any and all notices, hearing, and judicial review, and to service of a copy of the final order herein. The Department reserves the right to enforce this MAO through appropriate administrative and judicial proceedings.

12. Permittee acknowledges that Permittee is responsible for complying with the schedule set forth in Paragraph 9.A. above regardless of the availability of any federal or state grant monies.

13. The terms of this MAO may be amended by the mutual agreement of the Department and Permittee.

14. The Department may amend the compliance schedule and conditions in this MAO upon finding that such modification is necessary because of changed circumstances or to protect public

health and the environment. The Department shall provide Permittee a minimum of thirty (30) days written notice prior to issuing an Amended Order modifying any compliance schedules or conditions. If Permittee contests the Amended Order, the applicable procedures for conduct of contested cases in such matters shall apply.

15. This MAO shall be binding on the parties and their respective successors, agents, and assigns. The undersigned representative of each party certifies that he or she is fully authorized to execute and bind such party to this MAO. No change in ownership or corporate or partnership status relating to the facility shall in any way alter Permittee's obligations under this MAO, unless otherwise approved in writing by DEQ.

16. All reports, notices and other communications required under or relating to this MAO should be directed to Ruben Kretzschmar, DEQ Coos Bay Regional Office, 340 Front, Coos Bay, Oregon 97420, phone number (541) 269-2721, ext. 23. The contact person for Permittee shall be Mayor, City of Yachats, PO Box 345, Yachats, Oregon 97498, phone number (541) 547-3565.

17. Permittee acknowledges that it has actual notice of the contents and requirements of the MAO and that failure to fulfill any of the requirements hereof would constitute a violation of this MAO and subject Permittee to payment of stipulated civil penalties pursuant to Paragraph 9.E. above.

18. Any stipulated civil penalty imposed pursuant to Paragraph 9.D. shall be due upon written demand. Stipulated civil penalties shall be paid by check or money order made payable to the "Oregon State Treasurer" and sent to: Business Office, Department of Environmental Quality, 811 S.W. Sixth Avenue, Portland, Oregon 97204. Within 21 days of receipt of a "Demand for Payment of Stipulated Civil Penalty" Notice from the Department, Permittee may request a hearing to contest the Demand Notice. At any such hearing, the issue shall be limited to Permittee's compliance or non-compliance with this MAO. The amount of each stipulated civil penalty for each violation and/or day of violation is established in advance by this MAO and shall not be a contestable issue.

19. Providing Permittee has paid in full all stipulated civil penalties pursuant to Paragraph 18 above, this MAO shall terminate 60 days after Permittee demonstrates full compliance with the

requirements of the schedule set forth in Paragraph 9.A. and 9.B. above.

PERMITTEE

6/6/03

Date

Mayor, City of Yachats

DEPARTMENT OF ENVIRONMENTAL QUALITY

Date

Kerri L. Nelson, Administrator

FINAL ORDER

IT IS SO ORDERED:

ENVIRONMENTAL QUALITY COMMISSION

Date

Kerri L. Nelson, Administrator
Department of Environmental Quality
Pursuant to OAR 340-011-0136(1)

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

WILLAMETTE VALLEY REGION

750 FRONT ST. NE, SUITE 120, SALEM, OR 97310 PHONE (503) 378-8240

December 12, 1990

Rod Carrasco
P.O. Box 345
Yachats, OR 97498

'Dale 926-4404
Flescher 547-3656

Re: WQ-City of Yachats
Sludge Land Application
James Flescher
T14S; R11W; Sec.34

Dear Mr. Carrasco:

The Department received your request for authorization to land apply sludge from the City of Yachats at beneficial rates on the site referenced above. In addition, we received information characterizing soils, topography, sludge, crop, crop management; annual available nitrogen loading (agronomic loading rate) and site life, as well as signatures from the city and site operator. I evaluated the site on November 15, 1990. Based on my observations and data you provided, I am pleased to advise you that the site in question is approved for the application of lime stabilized sewage sludge from the City provided:

1. Sludge processing and handling will comply with rules and guidelines indicated under OAR 340-50-005 to OAR 340-50-080;

2. Based on your October 30, 1990, sludge chemical analysis, the proposed crop, topographic, and soil conditions, the rate of sludge application to the site is limited to 50 lbs. of available nitrogen/acre/year or approximately 85,000 gallons of liquid sludge per acre. Changes in sludge characteristics or cropping practices will necessitate appropriate changes in the application rate to maintain nitrogen loadings consistent with crop demands; In addition, a maximum of 15, 000 gallons of sludge per acre can be applied in a single application.

3. Based on the sludge analysis noted above, this site has an ultimate loading of 87 dry tons per acre with copper being the limiting parameter. Should future analyses show substantial changes in the characteristics of your sludge, estimated site life will change accordingly;

4. Application of sludge is not permitted on snow, frozen ground and during seasonal storms or prolonged wet weather.

5. If other sources of nitrogen will be applied to the site, the sludge application rate must be reduced so that commercial or animal manure nitrogen plus sludge nitrogen does not exceed the agronomic loading rate of this site;

6. A minimum setback of 50 feet shall be maintained from all public road frontages, surface waterways, and springs;

7. A minimum setback of 200 feet shall be maintained from all wells and other water sources including the Yachats River.

8. A 30-day fallow period shall follow the application of sludge prior to grazing livestock on the site or feeding of harvested crops to animals;

9. Sludge shall be applied evenly and thinly in a manner that will prevent ponding and runoff;

10. The permittee shall clean up any spillage of sludge. Spillages which cannot be completely cleaned up must be covered with dry lime and posted where appropriate;

11. The City shall maintain daily records for the sludge land application site which indicate (on a field map grid system) where, when, and how much (gallons) sludge was land applied to a particular site vicinity; and

12. The City shall provide DEQ a monthly summary of sludge processing and land application activities on DMR's required under the sewage treatment facility's NPDES permit.

If you have any questions regarding this approval or should problems arise with the sludge disposal, please feel free to call me at 378-8240, Salem.

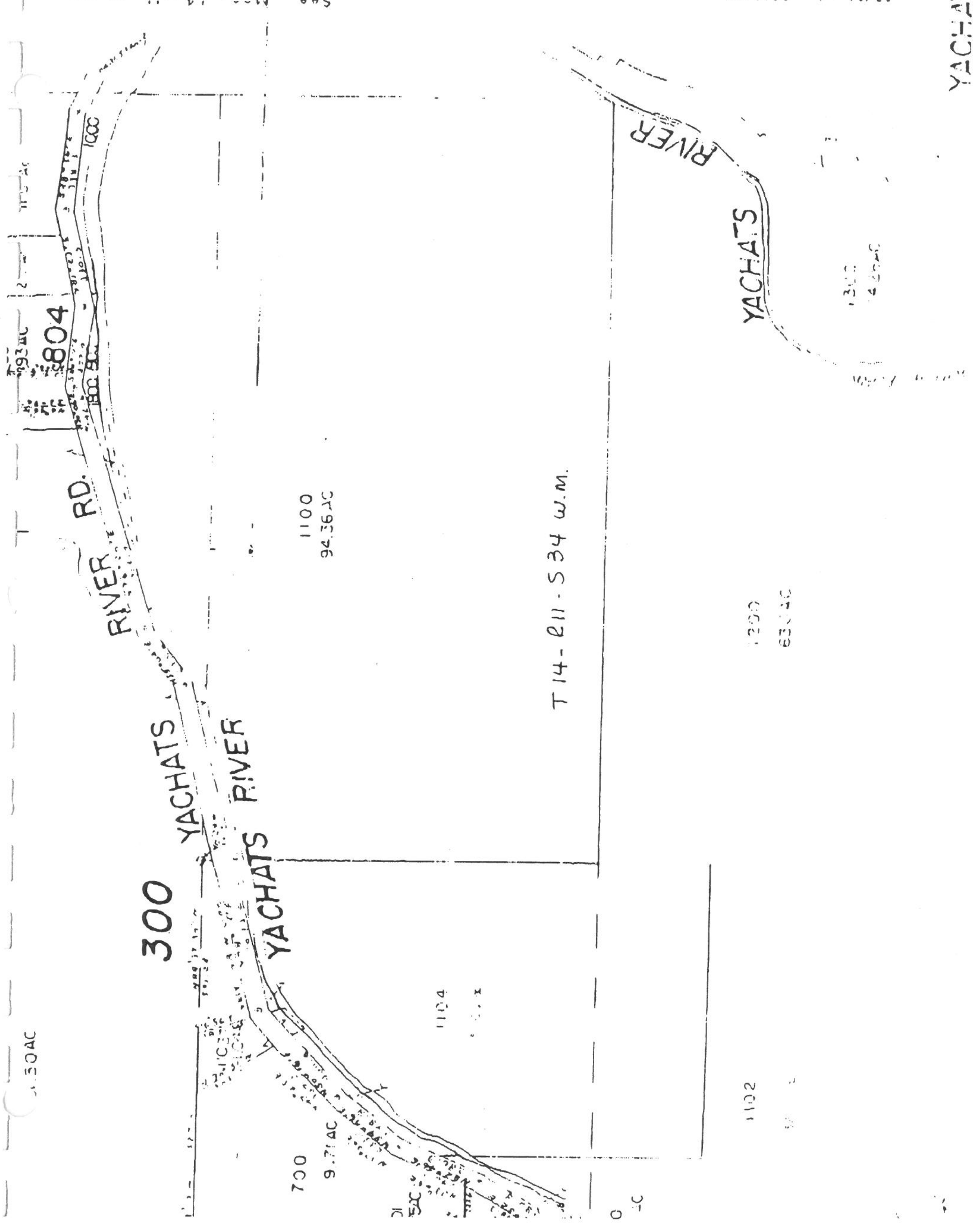
Sincerely,

Tom Fisher

Tom R. Fisher
Environmental Specialist

TRF/cm
YACHATS.LTR

cc: Water Quality
James Flesher, River Road Yachats 97498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VICTOR ATIYEH
GOVERNOR

Department of Environmental Quality
WILLAMETTE VALLEY REGION
895 SUMMER, N.E., SALEM, OR 97310 PHONE (503) 378-8240

April 11, 1986

Mr. John J. Mongelli
City of Yachats STP
P.O. Box 67
Yachats, OR 97448

RE: WQ-City of Yachats
NPDES 3845-J; Lincoln County
Hall Sludge Site
T14; R11; Sec.34; W.M.
Agricultural Application Site Approval

Dear John:

We have received your request for approval of the above referenced sludge disposal site along with related signatures and materials. I evaluated the site in January, 1986. The site is approved for application of digested sewage sludge with a Volatile Solids content of 60% or less or lime stabilized sludge. This approval is subject to the criteria detailed in OAR Chapter 340, Division 50, and the following conditions:

1. Based on your August, 1985, sludge chemical analysis, proposed crops and site soil types, the rate of application is limited to 100 lbs. of available nitrogen/acre/year or approximately 96,000 gallons of liquid sludge per acre over the 4 acre site. Changes in sludge characteristics or cropping practices will necessitate appropriate changes in the application rate to maintain nitrogen loadings consistent with crop demands.

2. Application of sludge is restricted during seasonal storms and prolonged wet weather.

3. If other sources of nitrogen are used, the sludge application rate must be reduced so that commercial nitrogen plus sludge nitrogen does not exceed the Agronomic Loading Rate of this site.

4. A minimum setback of 50 feet shall be maintained from all road frontages, surface waterways and springs.

5. A minimum setback of 200 feet shall be maintained from all wells and other water sources.

6. Sludge shall be applied evenly and thinly in a manner that will prevent ponding and runoff.

7. The permittee shall clean up any spillage of sludge. Spillages which cannot be completely cleaned up will be covered with dry lime and be appropriately posted.

8. The total quantity of sludge disposed of at this site shall be recorded on the attached Agricultural Application Site Log. This log is part of the Agricultural Application Site Authorization and must be available for Department inspection throughout the life of the site. (The total quantity of sludge disposed of at this site, on a monthly basis, should be added to sludge quantities disposed of at other sites and be reported on the Monthly Discharge Report required by the permittee's Discharge Permit.)

9. Twenty pounds of dry lime (calcium oxide) need to be added to each 1,000 gallons of liquid sludge.

10. A 30 day fallow period following the application of sludge is mandatory prior to grazing livestock on the site or feeding of harvested crops to animals.

If you have any questions regarding this approval or should problems arise with sludge disposal, please feel free to call me at 378-8240, Salem.

Sincerely,

Tom Fisher

Tom Fisher
Environmental Analyst

TRF/wr
Attachment: Agricultural Application Site Log.
cc: Water Quality Division
cc: Lester & Doris Hall, Rural Rd. 7662, Yachats 97498
cc: Lincoln County Health Department

VICTOR ATIYEH
GOVERNOR

Department of Environmental Quality

522 S.W. 5th AVENUE, BOX 1760, PORTLAND, OREGON 97207

North Coast Branch
3600 E. Third St.
Tillamook, OR 9714
Ph. (503) 842-6637

August 27, 1981

City of Yachats
P. O. Box 67
Yachats, OR 97498

ATTENTION: Mr. Rod Carrasco

RE: SW-Request for Sludge Spreading Site
City of Yachats
Lincoln County
North Coast Branch Office

Gentlemen,

Your request for a sludge spreading site at the Hall property is approved subject to the following conditions:

1. Annual rate of sludge application will not exceed 30,000 gallons per acre at the site.

2. The sludge should not be used on grass in public parks or other areas, where the public is likely to come in direct contact with it unless it has been treated or processed to remove all pathogenic organisms.

3. No sludge should be spread at the site closer than fifty feet to any ditch, channel, pond or waterway or within two hundred feet of a producing well.

4. Only treated or digested sewage sludge is authorized to be spread at this site.

5. Raw and/or non-digested sludge should not be disposed of on land surfaces. Prior to burial, containment or direct incorporation into the soil, authorization must first be obtained from the Department of Environmental Quality.

6. The sludge application rate is felt to be one at which the soil can assimilate it with a minimal possibility of runoff.

7. The application rate will provide about 30 percent or 45 pounds of the recommended 150 pounds of nitrogen per acre to achieve optimum pasture production.

8. Nuisance complaints can be minimized from nearby residences if the sludge is spread by truck no closer to them than 150 to 250 feet and 300 to 500 feet is spread by spray irrigation.

If you have any questions, please do not hesitate to contact me at 842-6637.

Sincerely,

James R. Close

James R. Close
Supervisor

JRC:rae
cc: Northwest Region Office, DEQ
Solid Waste Division, DEQ
Water Quality Division, DEQ

State of Oregon

Department of Environmental Quality Guidelines

Guidelines for Making Wet-Weather and Peak Flow Projections for Sewage Treatment in Western Oregon: MMDWF, MMWWF, PDAF, and PIF

1. Scope

These guidelines describe a rainfall method for calculating current or prevailing sewage flowrates. It is a shortcut method for using published rainfall statistics to determine peak monthly and daily flows which have specific recurrence intervals, or probabilities of occurrence. The method is only applicable where precipitation strongly impacts sewage flows, as in Western Oregon. Here a consistent storm effect generally prevails in areas where rainfall totals at least 20" to 25" per year.

The guidelines propose working definitions for various flowrates employed in wastewater design, until such time as flowrate definitions may be agreed to and standardized in the field of sanitary engineering. Our working definitions are:

$MMDWF_{10}$: The Maximum Monthly Average Dry-Weather Flow with a 10% Probability of Occurrence

$MMWWF_5$: The Maximum Monthly Average Wet-Weather Flows with a 20% Probability of Occurrence

$PDAF_5$: The Peak Daily Average Flow Associated with a 5-Year Storm

PIF_5: The Peak Instantaneous Flow Attained During a 5-Year PDAF

The guidelines also give examples of four graphs which help determine flowrates of various return frequencies:

Graph #1: Average Monthly Flowrate (MGD) versus Cumulative Monthly Rainfall (inches per month)

Graph #2 Flowrate (MGD) versus 24-hour Rainfall Intensity (inches per day)

Graph #3 Flowrate (MGD) versus Probability (%)

Graph #4 Flowrate (MGD) versus Total Suspended Solids (mg/l)

Our intent here is not to dictate or limit the approach used to estimate future design flows, but rather to establish a minimum baseline for comparison. In areas where there is enough rainfall to make a significant impact on sewage flowrates, the rainfall method described here should always be presented as part of the discussion on design flow projections, including Graphs # 1, 2, and 3. Graph # 4 can sometimes help to compensate for missing flow measurements when estimating $PDAF_5$ and PIF_5, and it should also be included if used.

Baseline flowrates, estimated using this rainfall method, should be considered the minimum estimate for current flows from which to project future flowrates. Flow projections to the design year (normally 20 years out) should then reflect anticipated growth as well as can be predicted.

2. Graph # 1 (Monthly Average Flowrate versus Monthly Cumulative Rainfall)

In Western Oregon, the main cause of extreme sewage flows is rain. To estimate a flowrate, the first step is to identify the exact relationship between peak storms and peak sewage flows. This will involve drawing a graph of flowrate versus rainfall, normally based on plant records. All low-groundwater months, when storms do not contribute a proportional amount to sewage flows, would interfere with the correlation and should be excluded.

As may be seen in the attached example of Graph #1, the correlation is conveniently presented in the form of monthly average daily flows (million gallons per day) versus total monthly rainfall accumulation (inches per month). A treatment plant's Daily Monitoring Reports (DMR's) will provide both types of data. Such a graph should reflect the current impact of rainfall on sewage flows under prevailing conditions, whenever groundwater levels are high. A table describing each data point (not shown here) should also be provided to document and help validate the graph.

Data must normally be limited to the period January-May, as the groundwater level in Western Oregon tends to sink in June and stay deep until December. Data should also be limited to the most recent year to avoid growth effects that may skew or mask the flow/rainfall correlation. A few selected points from the previous year may be warranted if a correlation is not clear-cut or if unreliable data make it advisable to exclude several outliers. Approximately 5 data points is enough if they are good ones.

This approach minimizes growth effects and does not involve a statistical analysis of several years of plant flow data. If the precipitation pattern is normal and the flow data are accurate, Graph #1 will illustrate whether a consistent flowrate-rainfall relationship prevails under peak monthly flow conditions.

3. Background and Basis for Design Flowrates

At one time, annual average flow was the main parameter used for sizing sewage treatment plants. Plants were designed and rated according to their annual average capacity. This convention still continues in regions where effluent limits remain constant year-round, regardless of the season.

In Western Oregon, however, an annual-average design basis had little applicability because of wide flow variations and seasonal effluent limits. Average summer flowrate replaced annual average flowrate as the basis for design, and average dry-weather flow became established as the basis for issuing NPDES permits.

Oregon NPDES permits still designate an "Average Dry-Weather Flow" (ADWF) for each treatment plant. The ADWF is the average of daily flows over the 6-month dry-weather period, roughly May through October. This is the flowrate on which dry-weather mass loads are based.*

However, from the standpoint of reliability, it is implicit in the concept of a seasonal or annual average that there is a 50% chance every year for possible overload and failure of the process. To base design on average capacity implied a potential failure or sewage overflow every other year, which presented an excessive risk to the environment. In 1991, we stopped using average flows as a design basis for sewage treatment in favor of the 5-year flow, which presents only 20% probability of a failure in any given year.

In 1996, we concluded that even a 20% probability of failure presented an excessive risk in the summer. The probability of a summertime failure or sewage overflow has now been reduced to 10%, which amounts to one failure every 10 years on average. This has the effect of further reducing the potential for poor treatment or raw sewage overflows during the period of May through October. An immediate consequence is to require somewhat larger and more reliable treatment facilities than previously.**

The regulations adopted in 1996, which require design capacities of $MMWWF_5$ and $MMDWF_{10}$, were published in OAR 34-41-120 (13) and (14). The anticipated compliance in the winter months with capacity at the $MMWWF_5$ would be 98% (59/60 = 0.983). Compliance in the summer months with capacity at the $MMDWF_{10}$ would be 99% (119/120 = 0.991). The use of these design flowrates assures compliance with the goals of EPA's water-quality regulations, which are designed to protect the environment if the regulations are met 95% of the time.

4. Estimating Current Maximum Monthly Design Flows

$MMDWF_{10}$

The Maximum Monthly Average Dry-Weather Flow would be the monthly average flow in the rainiest summer month of high groundwater. West of the Oregon Cascades, the MMDWF almost invariably occurs in May. On Graph # 1, the 10-Year MMDWF will be the anticipated monthly flow corresponding to the monthly rainfall accumulation during May with a 10% probability of occurrence in any given year.

The US Weather Bureau publishes statistical compilations for weather stations in Oregon by month. A convenient source is the Climatological Summary No. 20, Years 1951-1980 (see attached example). The 10-year May accumulation is indicated here as the 90% value. That is, the amount which exceeds 9 out of 10 totals which have been recorded in May.

With this approach to estimating $MMDWF_{10}$, note that is not necessary to have 10 years of plant flow data. Only about 4 to 8 good sets of Monthly Flow/Cumulative Rainfall data are needed to draw Graph # 1, showing $MMDWF_{10}$ at the 90% total for May. The statistics are developed through the rainfall data rather than through a database of plant flow records.

Another source of rainfall statistics is Johnson and Dart's Variability of Precipitation in the Pacific Northwest published in 1982 by the Portland State University Department of Geography. The Oregon State Meteorologist at OSU in Corvallis has extensive additional data and can advise on specific applications.

$MMWWF_5$

The Maximum Monthly Average Wet-Weather Flow represents the highest monthly average attained during the winter period of high groundwater. West of the Cascades, high groundwater is usually not attained until January, and the MMWWF (maximum monthly wet-weather flow) occurs in January. Sometimes the period of October-December produces significant storms, but the ground is still dry. Heavy storms generally do not begin to cause a reliable or consistent infiltration response until January.

Referring to the Climatological Summary, the 5-year January accumulation is listed as the 80% value. That is, the amount of rainfall that exceeds 4 out of 5 totals that have been recorded in January. On Graph #1, this 80% January rainfall will correspond to the current 5-year MMWWF.

5. Estimating Current Peak Daily Average Flow (5-Year PDAF)

In Western Oregon, $PDAF_5$ invariably corresponds to the 5-year storm: it is the flow that will result from a 5-year storm during a period of high groundwater. For convenience we recommend the 24-hour storm period for $PDAF_5$ analysis, as plant rainfall and flow records reflect the previous 24 hours. However, other time periods such as the 6-hour storm or 48-hour storm can be considered, where such data are available, and they may be more useful than 24-hour storm data in some cases.

$PDAF_5$ will not be directly available from plant records unless a 5-year storm was recently experienced during the high groundwater period of January-April. However, it can be determined by constructing a graph that shows the relationship between daily plant flow (MGD) and daily rainfall (inches per day). An example is attached as Graph # 2. Large storms going back several years should be used to define the graph, but one must use only records where the antecedent weather for each storm was wet and groundwater levels were high. Numerous large storms will not meet these conditions and should not be used.

On Graph # 2, $PDAF_5$ will correspond to the 5-year, 24-hour storm. This storm may be roughly estimated from isopluvial maps based on Weather Bureau records such as NOAA Atlas 2, Volume X, Figure 26. If a more refined 5-year, 24-hour storm intensity is desired, several decades of local rainfall data can be ranked and analyzed for probability of recurrence.

6. Estimating Current Peak Instantaneous Flow (PIF_5)

PIF_5 Estimate Using A Diurnal Peaking Factor

PIF_5 is the peak instantaneous or peak hourly flow associated with a 5-Year PDAF. That is, the peak flow resulting from a 5-year storm during high groundwater periods. The current PIF_5 may be reflected in plant records, or can be estimated by observing the diurnal peaking factors which characterize high-flow events at the facility. It is desirable to examine actual flow charts that were recorded during high-flow days to extract a suitable peaking factor (or peak-to-average ratio).

The peaking factor will be less during heavy flows than during normal flowrates. This reflects the relatively constant supply of infiltration which occurs only when the groundwater is high. Peaking factors developed from dry-weather periods do not reflect the diminished peaking caused by infiltration, and should not be applied to the PIF_5.

PIF_5 Estimate by Extrapolation (Graph # 3)

PIF5 may also be estimated by means of a probability graph, either using logarithmic probability paper or using a computation program to generate the graph. See attached example Graph # 3, where the PIF_5 was extrapolated from a known $PDAF_5$.

Sometimes this method seems to be the most rational way to estimate the PIF_5 which would be experienced if all bottlenecks were removed from the collection system to eliminate the peak-shaving effects of surcharging and overflows. The basis for this approach is annual probability of occurrence, and assuming that wet weather prevails.

It follows from this assumption that the year of interest will feature the $MMWWF_5$, and within it a $PDAF_5$ and PIF_5. The average annual flowrate will be the average of AWWF and ADWF, both of which are available from plant records. However, during dry years, the records should be adjusted for growth to a reasonably wet year (e.g. 1995-1996), consistent with our assumption of wet weather.

These assumptions yield the following probabilities of occurrence:

¶ The average annual flow, the mean of summer (ADWF) and winter (AWWF) flowrates, is likely to occur 6/12 of the time or 50% probability.

¶ A peak monthly flow, $MMWWF_5$, occurs 1/12 of the time or 8.3% probability.

¶ A peak weekly flow occurs 1/52 of the time or 1.9% probability

¶ The $PDAF_5$ occurs once in 365 days or 0.27% probability.

¶ The PIF_5 occurs once in 8,760 hours or 0.011% probability.

Graph # 3 should always be drawn as a check on estimated flowrates. Graph # 3 will show whether the various flowrates are theoretically coherent. A reasonable statistical consistency will be apparent if the estimates are realistic.

PIF and $PDAF_5$ Estimates by TSS Records (Graph # 4)

Too often upstream sewage overflows or undersized meters make peak daily flow records of PDAF and PIF unusable. Using the recorded storm intensity and plant laboratory tests for high-flow days, it may be possible to use influent solids dilution as a surrogate flow meter. This approach entails the realistic assumption of somewhat constant per-capita solids delivery from the collection system in winter and early spring, after the initial fall flush.

Provided that test documentation reflects 24-hour composite samples, and provided that low-groundwater events which would skew the curve are excluded, solids dilution can be a valid approach to determining the true peak flows which correspond to known rainfalls. The attached example Graph # 4 shows an estimated PDAF derived from a curve of dilute TSS as low as 19 mg/l. The influent sewer either choked or spilled all flows above 1.45 MGD., as shown, but the PDAF was estimated at 2.5 MGD based on TSS.

7. Projecting Current Flowrates to the Design Year

There is no standardized approach to projecting from current baseline flowrates to the future design year. The traditional method involves a mechanical application of peaking factors derived from plant records and past experience. It has the virtue of tending to overestimate future flows and to yield amply sized facilities.

This type of systematic error results from applying the same peaking factor to the stormwater contribution as to growth components, despite the fixed statistical basis of the stormwater portion. However, any error here tends to be conservative and beneficial to the environment. A more rational approach consists of summing up all anticipated loadings from all foreseeable sources, and adding them to the current baseline flowrates. This approach tends to result in less excess capacity being designed into the project.

Regardless of the approach taken, all calculations should be clearly documented and annotated, and projections should be based on current flowrates. Both methods will normally involve various adjustments in addition to growth. For example, former overflows and exfiltration from the collection system that may have to be captured in the project, less any inflow removal expected, less any infiltration removal that may be counted on, etc.

8. Documentation and Calculations

Any facility plan or engineering design report should indicate how $MMDWF_{10}$, $MMWWF_5$, $PDAF_5$, and PIF_5 were calculated. Backup data and tabulations that were used should either be included in the text, or be attached in an appendix. Graphs #1 and 2 should be included to show how the baseline flowrates were estimated. Graph # 3 should also be included to illustrate the statistical coherence of both baseline and design-year flowrates. All data points shown in the graphs should be tabulated and identified as to month, year, etc.

Lists of design criteria for sewage treatment works should always include all relevant current and future criteria projected to the design year. The list or tabulation should include as a minimum: ADWF, AWWF, $MMDWF_{10}$, $MMWWF_5$, $PDAF_5$, and PIF_5.

9. Other Flow Criteria for Design

The engineer must usually consider several additional flowrate criteria in establishing the basis of design. Standard manuals of practice list a number of these and their applications. For example: peak 8-hour flow, peak weekly flow, seasonal average flow, minimum daily and hourly flow, dry-weather and wet-weather maximum month BOD and SS loadings, etc. Also many additional flow parameters are needed for lagoon water balances and plant solids balances. Where used, all such criteria should be defined and distinguished to avoid confusion with $MMDWF_{10}$, $MMWWF_5$, $PDAF_5$, and PIF_5.

10. Inquiries

Inquiries about these guidelines should be directed to DEQ regional water-quality plan review engineers.

REFERENCES

Isopluvials of 5-year 24-hour Precipitation, NOAA ATLAS 2, Volume X, Figure 26 (Oregon).

Monthly Precipitation Probability for Oregon in Climatography of the United States No. 20, Climatic Summaries for Selected Sites, 1951-1980: Asheville, N.C., National Climatic Data Center, NOAA, US Department of Commerce.

Descriptive Statistics, Monthly Precipitation Data (1940-1979), in Johnson and Dart, Variability of Precipitation in the Pacific Northwest: Spatial and Temporal Characteristics: Portland, Department of

Geography, Portland State University, 1982.

ATTACHMENTS

Graph # 1 Example (Average Monthly Flowrate versus Total Monthly Rainfall)

Graph # 2 Example (Daily Flowrate versus Rainfall)

Graph # 3 Example (Flowrate versus Probability)

Graph # 4 Example (Flowrate versus TSS)

Isopluvial Chart Example (Western Oregon 5-year, 24-hour storm)

Rainfall Probability Table Example (Oregon City Gauge)

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Rev. IV.96

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WATER QUALITY CRITERIA SUMMARY

(Applicable to all Basins)[1]

The concentration for each compound listed in this chart is a criteria or guidance value* not to be exceeded in waters of the state for the protection of aquatic life and human health. Specific descriptions of each compound and an explanation of values are included in Quality Criteria for Water (1986). Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected, and what level of protection is necessary for aquatic life and human health.

Compound Name (or Class)	Priority Pollutant	Carcinogen	Concentration in Micrograms Per Liter for Protection of Aquatic Life				Concentration in Units Per Liter for Protection of Human Health		
			Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Consumption Only	Drinking Water M.C.L.
ACENAPTHENE	Y	N	*1,700.	*520.	*970.	*710.			
ACROLEIN	Y	N	*68.	*21.	*55.		320.ug	780.ug	
ACRYLONITRILE	Y	Y	*7,550.	*2,600.			0.058ug**	0.65ug**	
ALDRIN	Y	Y	3.0		1.3		0.074ng**	0.079ng**	
ALKALINITY	N	N		20,000					
AMMONIA	N	N	CRITERIA ARE pH AND TEMPERATURE DEPENDENT — SEE DOCUMENT USEPA JANUARY 1985 (Fresh Water) CRITERIA ARE pH AND TEMPERATURE DEPENDENT — SEE DOCUMENT USEPA APRIL 1989 (Marine Water)						
ANTIMONY	Y	N	*9,000.	*1,600.			146.ug	45,000.ug	
ARSENIC	Y	Y					2.2ng**	17.5ng**	0.05mg
ARSENIC (PENT)	Y	Y	*850.	*48.	*2,319.	*13.			
ARSENIC (TRI)	Y	Y	360.	190.	69.	36.			
ASBESTOS	Y	Y					30K f/L**		
BARIUM	N	N					1.mg		1.0mg
BENZENE	Y	Y	*5,300.		*5,100.	*700.	0.66ug**	40.ug**	
BENZIDINE	Y	Y	*2,500.				0.12ng	0.53ng**	
BERYLLIUM	Y	Y	*130.	*5.3			6.8ng**	117.ng**	
BHC	Y	N	*100.		*0.34				
CADMIUM	Y	N	3.9+	1.1+	43.	9.3	10.ug		0.010mg
CARBON TETRACHLORIDE	Y	Y	*35,200.		*50,000.		0.4ug**	6.94ug**	
CHLORDANE	Y	Y	2.4	0.0043	0.09	0.004	0.46ng**	0.48ng**	
CHLORIDE	N	N	860 mg/L	230 mg/L					
CHLORINATED BENZENES	Y	Y	*250	*50.	*160.	*129.	488.ug		
CHLORINATED NAPHTHALENES	Y	N	*1,600.		*7.5				
CHLORINE	N	N	19.	11.	13.	7.5			
CHLOROALKYL ETHERS	Y	N	*238,000.						
CHLOROETHYL ETHER (BIS-2)	Y	Y					0.03ug	1.36ug**	
CHLOROFORM	Y	Y	*28,900.	*1,240.			0.19ug**	15.7ug**	
CHLOROISOPROPYL ETHER (BIS-2)	Y	N					34.7ug	4.36mg	

TABLE 20

WATER QUALITY CRITERIA SUMMARY (Continued)

Compound Name (or Class)	Priority Pollutant	Carcinogen	Concentration in Micrograms Per Liter for Protection of Aquatic Life				Concentration in Units Per Liter for Protection of Human Health		
			Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Consumption Only	Drinking Water M.C.L.
CHLOROMETHYL ETHER (BIS)	N	Y					0.00000376ng**	0.00184ug**	
CHLOROPHENOL 2	Y	N	*4,380.	*2,000.					
CHLOROPHENOL 4	N	N			*29,700.				
CHLOROPHENOXY HERBICIDES (2,4,5,-TP)	N	N					10.ug		
CHLOROPHENOXY HERBICIDES (2,4-D)	N	N					100.ug		
CHLORPYRIFOS	N	N	0.083	0.041	0.011	0.0056			
CHLORO-4 METHYL-3 PHENOL	N	N	*30.						
CHROMIUM (HEX)	Y	N	16.	11.	1,100	50.	50.ug		0.05mg
CHROMIUM (TRI)	N	N	1,700.+	210.+	*10,300		170.mg	3,433.mg	0.05mg
COPPER	Y	N	18.+	12.+	2.9	2.9			
CYANIDE	Y	N	22.	5.2	1.	1.	200.ug		
DDT	Y	Y	1.1	0.001	0.13	0.001	0.024ng**	0.024ng**	
DDT METABOLITE (DDE)	Y	Y	*1,050.		*14.				
DDT METABOLITE (TDE)	Y	Y	*0.06		*3.6				
DEMETON	Y	N		0.1		0.1			
DIBUTYLPHTHALATE	Y	N					35.mg	154.mg	
DICHLOROBENZENES	Y	N	*1,120.	*763.	*1,970.		400.ug	2.6mg	
DICHLOROBENZIDINE	Y	Y					0.01ug**	0.020ug**	
DICHLOROETHANE 1,2	Y	Y	*118,000.	*20,000.	*113,000.		0.94ug**	243.ug**	
DICHLOROETHYLENES	Y	Y	*11,600.		*224.000.		0.033ug**	1.85ug**	
DICHLOROPHENOL 2,4	N	N	*2,020.	*365.			3.09mg		
DICHLOROPROPANE	Y	N	*23,000.	*5,700.	*10,300.	*3,040.			
DICHLOROPROPENE	Y	N	*6,060.	*244.	*790.		87.ug	14.1mg	
DIELDRIN	Y	Y	2.5	0.0019	0.71	.0019	0.071ng**	0.076ng**	
DIETHYLPHTHALATE	Y	N					350.mg	1.8g	
DIMETHYL PHENOL 2,4	Y	N	*2,120.						
DIMETHYL PHTHALATE	Y	N					313.mg	2.9g	
DINITROTOLUENE 2,4	N	Y					0.11ug**	9.1ug**	
DINITROTOLUENE	Y	N					70.ug	14.3mg	
DINITROTOLUENE	N	Y	*330.	*230.	*590.	*370.			
DINITRO-O-CRESOL 2,4	Y	N					13.4g	765.ug	
DIOXIN (2,3,7,8-TCDD)	Y	Y	*0.01	*38 pg/L			0.000013ng**	0.000014ng**	
DIPHENYLHYDRAZINE	Y	N					42.ng**	0.56ug**	

TABLE 20

WATER QUALITY CRITERIA SUMMARY (Continued)

Compound Name (or Class)	Priority Pollutant	Carcinogen	Concentration in Micrograms Per Liter for Protection of Aquatic Life				Concentration in Units Per Liter for Protection of Human Health		
			Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Consumption Only	Drinking Water M.C.L.
DIPHENYLHYDRAZINE 1,2	Y	N	*270.						
DI-2-ETHYLHEXYL PHTHALATE	Y	N					15.mg	50.mg	
ENDOSULFAN	Y	N	0.22	0.056	0.034	0.0087	74.ug	159.ug	
ENDRIN	Y	N	0.18	0.0023	0.037	0.0023	1.ug		0.0002mg
ETHYLBENZENE	Y	N	*32,000.		*430.		1.4mg	3.28mg	
FLUORANTHENE	Y	N	*3,980.		*40.	*16.	42.ug	54.ug	
GUTHION	N	N		0.01		0.01			
HALOETHERS	Y	N	*360.	*122.					
HALOMETHANES	Y	Y	*11,000.		*12,000.	*6,400.	0.19ug**	15.7ug**	
HEPTACHLOR	Y	Y	0.52	0.0038	0.053	0.0036	0.28ng**	0.29ng**	
HEXACHLOROETHANE	N	Y	*980.	*540.	*940.		1.9ug	8.74ug	
HEXACHLOROBENZENE	Y	N					0.72ng**	0.74ng**	
HEXACHLOROBUTADIENE	Y	Y	*90.	*9.3	*32.		0.45ug**	50.ug**	
HEXACHLOROCYCLOHEXANE (LINDANE)	Y	Y	2.0	0.08	0.16				0.004mg
HEXACHLOROCYCLOHEXANE-ALPHA	Y	Y					9.2ng**	31.ng**	
HEXACHLOROCYCLOHEXANE-BETA	Y	Y					16.3ng**	54.7ng**	
HEXACHLOROCYCLOHEXANE-GAMA	Y	Y					18.6ng**	62.5ng**	
HEXACHLOROCYCLOHEXANE-TECHNICAL	Y	Y					12.3ng**	41.4ng**	
HEXACHLOROCYCLOPENTADIENE	Y	N	*7.	*5.2	*7.		206.ug		
IRON	N	N		1,000.			0.3mg		
ISOPHORONE	Y	N	*117,000.		*12,900.		5.2mg	520.mg	
LEAD	Y	N	82.+	3.2+	140.	5.6	50.ug		0.05mg
MALATHION	N	N		0.1		0.1			
MANGANESE	N	N					50.ug	100.ug	
MERCURY	Y	N	2.4	0.012	2.1	0.025	144.ng	146.ng	0.002mg
METHOXYCHLOR	N	N		0.03		0.03	100.ug		0.1mg
MIREX	N	N		0.001		0.001			
MONOCHLOROBENZENE	Y	N					488.ug		
NAPHTHALENE	Y	N	*2,300.	*620.	*2,350.				
NICKEL	Y	N	1,400.+	160+	75	8.3	13.4ug	100.ug	
NITRATES	N	N					10.mg		10.mg
NITROBENZENE	Y	N	*27,000.		*6,680.		19.8mg		
NITROPHENOLS	Y	N	*230.	*150.	*4,850.				

TABLE 20

WATER QUALITY CRITERIA SUMMARY (Continued)

Compound Name (or Class)	Priority Pollutant	Carcinogen	Concentration in Micrograms Per Liter for Protection of Aquatic Life				Concentration in Units Per Liter for Protection of Human Health		
			Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Consumption Only	Drinking Water M.C.L.
NITROSAMINES	Y	Y	*5,850.		*3,300,000		0.8ng**	1,240.ng**	
NITROSODIBUTYLAMINE N	Y	Y					6.4ng**	587.ng**	
NITROSODIETHYLAMINE N	Y	Y					0.8ng**	1,240.ng**	
NITROSODIMETHYLAMINE N	Y	Y					1.4ng**	16,000.ng**	
NITROSODIPHENYLAMINE N	Y	Y					4,900.ng**	16,100.ng**	
NITROSOPYRROLIDINE N	Y	Y					16.ng**	91,900.ng**	
PARATHION	N	N	0.065	0.013					
PCB's	Y	Y	2.0	0.014	10.	0.03	0.079ng**	0.079ng**	
PENTACHLORINATED ETHANES	N	N	*7,240.	*1,100.	*390.	*281.			
PENTACHLOROBENZENE	N	N					74.ug	85.ug	
PENTACHLOROPHENOL	Y	N	***20.	***13.	13.	*7.9	1.01mg		
PHENOL	Y	N	*10,200.	*2,560.	*5,800.		3.5mg		
PHOSPHORUS ELEMENTAL	N	N				0.1			
PHTHALATE ESTERS	Y	N	*940.	*3.	*2,944.	*3.4			
POLYNUCLEAR AROMATIC HYDRO-CARBONS	Y	Y			*300.		2.8ng**	31.1ng**	
SELENIUM	Y	N	260.	35.	410.	54.	10.ug		0.01mg
SILVER	Y	N	4.1+	0.12	2.3		50.ug		0.05mg
SULFIDE-HYDROGEN SULFIDE	N	N		2.		2.			
TETRACHLORINATED ETHANES	Y	N	*9,320.						
TETRACHLOROBENZENE 1,2,4,5	Y	N					38.ug	48.ug	
TETRACHLOROETHANE 1,1,2,2	Y	Y		*2,400.	*9,020.		0.17ug**	10.7ug**	
TETRACHLOROETHANES	Y	N	*9,320.						
TETRACHLOROETHYLENE	Y	Y	*5,280.	*840.	*10,200.	*450.	0.8ug**	8.85ug**	
TETRACHLOROPHENOL 2,3,5,6	Y	N				*440.			
THALLIUM	Y	N	*1,400.	*40.	*2,130.		13.ug	48.ug	
TOLUENE	Y	N	*17,500.		*6,300.	*5,000.	14.3mg	424.mg	
TOXAPHENE	Y	Y	0.73	0.0002	0.21	0.0002	0.71ng**	0.73ng**	0.005mg
TRICHLORINATED EHANES	Y	Y	*18,000.						
TRICHLOROETHANE 1,1,1	Y	N			*31,2000.		18.4mg	1.03g	
TRICHLOROETHANE 1,1,2	Y	Y		*9,400.			0.6ug**	41.8ug**	
TRICHLOROETHYLENE	Y	Y	*45,000.	*21,900.	*2,000.		2.7ug**	80.7ug**	
TRICHLOROPHENOL 2,4,5	N	N					2,600.ug		
TRICHLOROPHENOL 2,4,6	Y	Y		*970.			1.2ug**	3.6ug**	

TABLE 20

WATER QUALITY CRITERIA SUMMARY (Continued)

Compound Name (or Class)	Priority Pollutant	Carcinogen	Concentration in Micrograms Per Liter for Protection of Aquatic Life				Concentration in Units Per Liter for Protection of Human Health		
			Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water and Fish Ingestion	Fish Consumption Only	Drinking Water M.C.L.
VINYL CHLORIDE	Y	Y					2.ug**	525.ug**	
ZINC	Y	N	120.+	110+	95	86			

MEANING OF SYMBOLS:

g = grams
mg = milligrams
ug = micrograms
ng = nanograms
pg = picograms
f = fibers
Y = Yes
N = No

M.C.L. = Maximum Contaminant Level

+ = Hardness Dependent Criteria (100 mg/L used).

* = Insufficient data to develop criteria; value presented is the L.O.E.L. — Lower Observed Effect Level.

** = Human health criteria for carcinogens reported for three risk levels. Value presented is the 10-6 risk level, which means the probability of one concern case per million people at the stated concentration.

*** = pH Dependent Criteria (7.8 pH used).

---

1 = Values in Table 20 are applicable to all basins as follows:

Basin	Rule	Basin	Rule
North Coast	340-41-205(p)	Umatilla	340-41-645(p)
Mid Coast	340-41-245(p)	Walla Walla	340-41-685(p)
Umpqua	340-41-285(p)	Grande Ronde	340-41-725(p)
South Coast	340-41-325(p)	Powder	340-41-765(p)
Rogue	340-41-365(p)	Malheur River	340-41-805(p)
Williamette	340-41-445(p)	Owyhee	340-41-845(p)
Sandy	340-41-485(p)	Malheur Lake	340-41-885(p)
Hood	340-41-525(p)	Goose & Summer Lakes	340-41-925(p)
Deschutes	340-41-565(p)	Klamath	340-41-965(p)
John Day	340-41-605(p)		

Water and Fish Ingestion

Values represent the maximum ambient water concentration for consumption of both contaminated water and fish or other aquatic organisms.

Fish Ingestion

Values represent the maximum ambient water concentration for consumption of fish or other aquatic organisms.

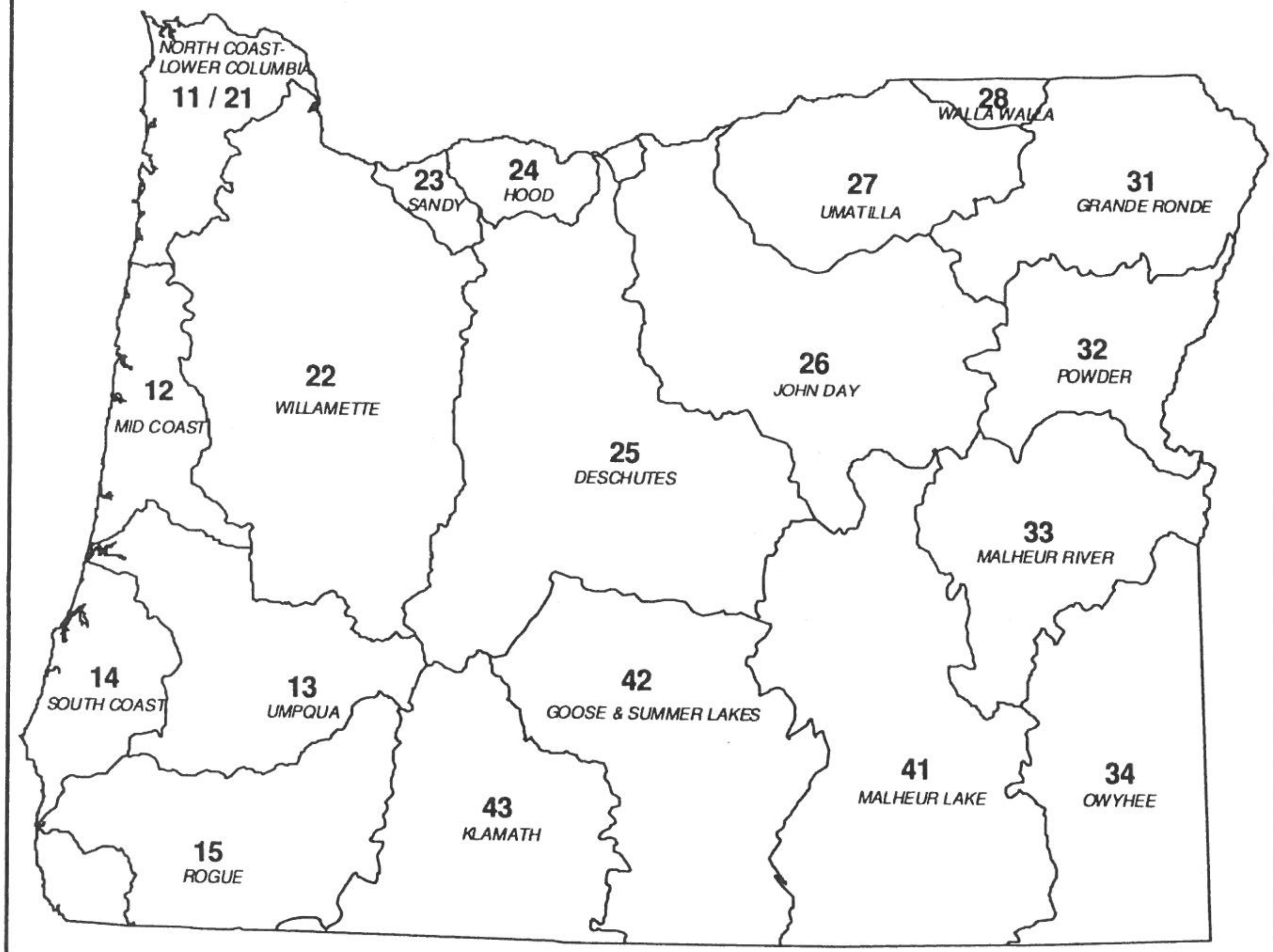
Basin-Specific Criteria
(Mid Coast Basin)

340-041-0220
Beneficial Uses to Be Protected in the Mid Coast Basin
(1) Water quality in the Mid Coast Basin (see Figure 1) may be managed to protect the designated beneficial uses shown in Table 220A (November 2003).
(2) Designated fish uses to be protected in the Mid Coast Basin are shown in Figures 220A and 220B (November 2003).
Stat. Auth.: ORS 468.020, ORS 468B.030, ORS 468B.035, ORS 468B.048
Stats. Implemented: ORS 468B.030, ORS 468B.035, ORS 468B.048

340-041-0224
Approved TMDLs in the Basin:
The following TMDLs have been approved by EPA, and appear on the Department's web site:
Clear Lake – Phosphorus – December 8, 1992
Stat. Auth.: ORS 468.020, ORS 468B.030, ORS 468B.035, ORS 468B.048
Stats. Implemented: ORS 468B.030, ORS 468B.035, ORS 468B.048

340-041-0225
Water Quality Standards and Policies for this Basin
(1) pH (hydrogen ion concentration). pH values may not fall outside the following ranges:
(a) Marine waters: 7.0 – 8.5;
(b) Estuarine and fresh waters: 6.5 – 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 340-041-0220: 100.0 mg/l.
(3) Nutrients in Clear Lake Watershed. In order to preserve the existing high quality water in Clear Lake north of Florence for use as a public water supply source requiring only minimal filtration, it is the policy of the Environmental Quality Commission to protect the Clear Lake watershed including both surface and groundwater, from existing and potential contamination sources with the following requirements:
(a) The total phosphorus maximum annual loading discharged into Clear Lake may not exceed 241 pounds per year from all sources.
(b) The total phosphorus maximum annual loading for the Clear Lake watershed may be deemed exceeded if the median concentration of total phosphorus from samples collected in the epilimnion between May 1 and September 30 exceed nine micrograms per liter during two consecutive years.
(c) Of the total phosphorus loading of 241 pounds per year specified in section (1) of this rule, 192 pounds per year will be considered current background and Department reserve and is not available to other sources.

Figure 1: Oregon Basin Index Map



Basin Name	Basin #	OAR #
DESCHUTES	25	340-41-0130
GOOSE & SUMMER LKS	42	340-41-0140
GRANDE RONDE	31	340-41-0151
HOOD	24	340-41-0160
JOHN DAY	26	340-41-0170
KLAMATH	43	340-41-0180
MALHEUR LAKE	41	340-41-0190
MALHEUR RIVER	33	340-41-0201
MID COAST	12	340-41-0220
NORTH CST-LWR COL	11-21	340-41-0230
OWYHEE	34	340-41-0250
POWDER	32	340-41-0260
ROGUE	15	340-41-0271
SANDY	23	340-41-0286
SOUTH COAST	14	340-41-0300
UMATILLA	27	340-41-0310
UMPQUA	13	340-41-0320
WALLA WALLA	28	340-41-0330
WILLAMETTE	22	340-41-0340

TABLE 21

DISSOLVED OXYGEN & INTERGRAVEL DISSOLVED OXYGEN CRITERIA

(Applicable to All Basins)

Class	Concentration and Period[1] (All Units Are mg/l)				Use/Level of Protection
	30-D	7-D	7-Mi	Min	
Salmonid Spawning		11.0[2,3]		9.0[3] 8.0[4] | 6.0[5]	Principal use of salmonid spawning and incubation of embryos until emergence from the gravels. Low risk of impairment to cold-water aquatic life, other native fish and invertebrates. The IGDO criteria represents an acute threshold for survival based on field studies.
Cold Water	8.0[6]		6.5	6.0	Principally cold-water aquatic life. Salmon, trout, cold-water invertebrates, and other native cold-water species exist throughout all or most of the year. Juvenile anadromous salmonids may rear throughout the year. No measurable risk level for these communities
Cool Water	6.5		5.0	4.0	Mixed native cool-water aquatic life, such as sculpins, smelt, and lampreys. Waterbodies includes estuaries. Salmonids and other cold-water biota may be present during part or all of the year but do not form a dominant component of the community structure. No measurable risk to cool-water species, slight risk to cold-water species present.
Warm Water	5.5			4.0	Waterbodies whose aquatic life beneficial uses are characterized by introduced, or native, warm-water species.
No Risk	No Change from Background				The only DO criterion that provides no additional risk is "no change from background". Waterbodies accorded this level of protection include marine waters and waters in Wilderness areas.

[1] 30-D = 30-day mean minimum as defined in OAR 340-41-006.
7-D = 7-day mean minimum as defined in OAR 340-41-006.
7-Mi = 7-day minimum mean as defined in OAR 340-41-006.
Min = Absolute minimums for surface samples when applying the averaging period, spatial median of IGDO.

[2] When Intergravel DO levels are 8.0 mg/L or greater, DO levels may be as low as 9.0 mg/L, without triggering a violation.

[3] If conditions of barometric pressure, altitude and temperature preclude achievement of the footnoted criteria, then 95 percent saturation applies.

[4] Intergravel DO action level, spatial median minimum.

[5] Intergravel DO criterion, spatial median minimum.

[6] If conditions of barometric pressure, altitude and temperature preclude achievement of 8.0 mg/L, then 90 percent saturation applies.

Note:

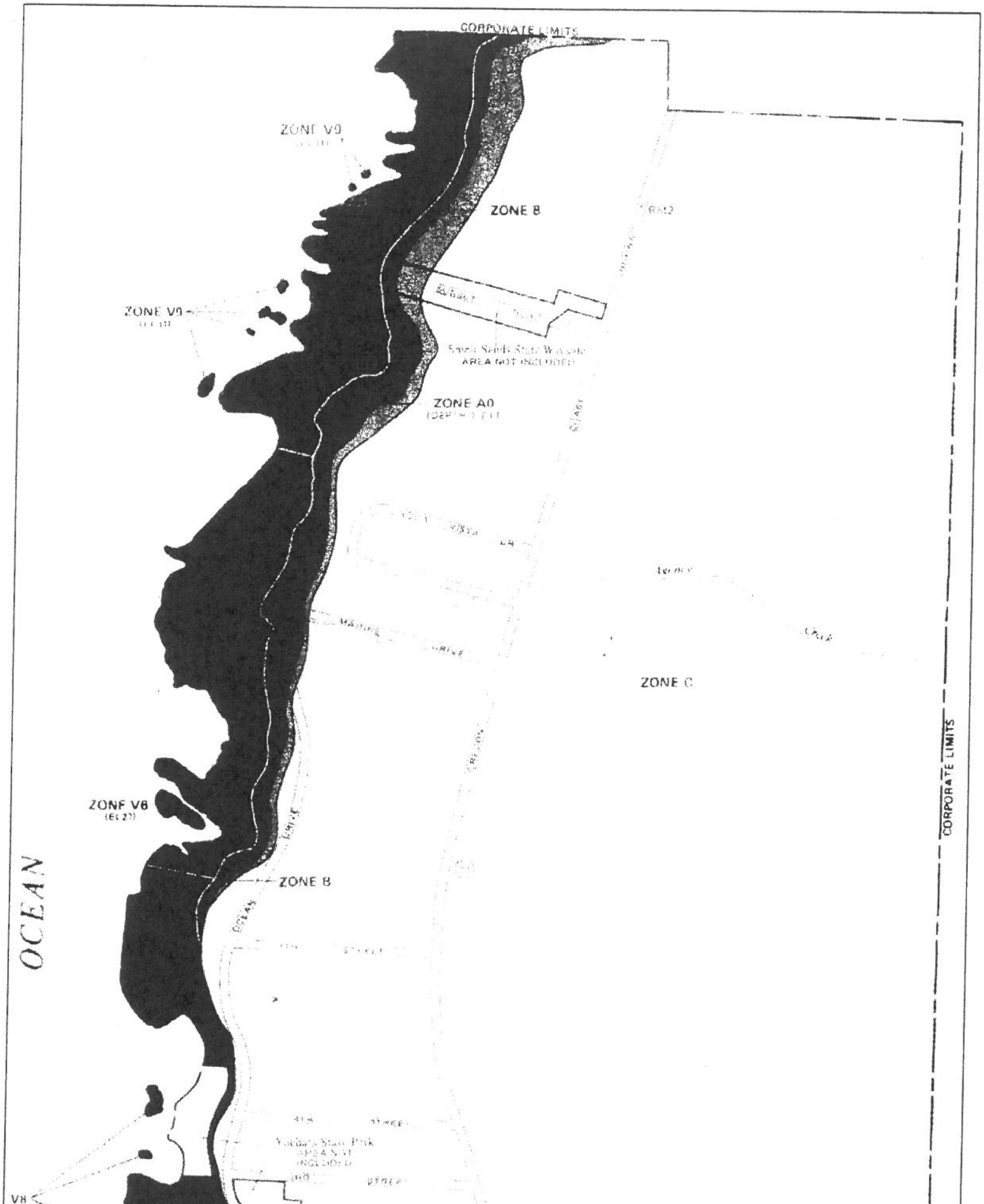
Shaded values present the absolute minimum criteria, unless the Department believes adequate data exists to apply the multiple criteria and associated periods.

SA\Table\WH6078

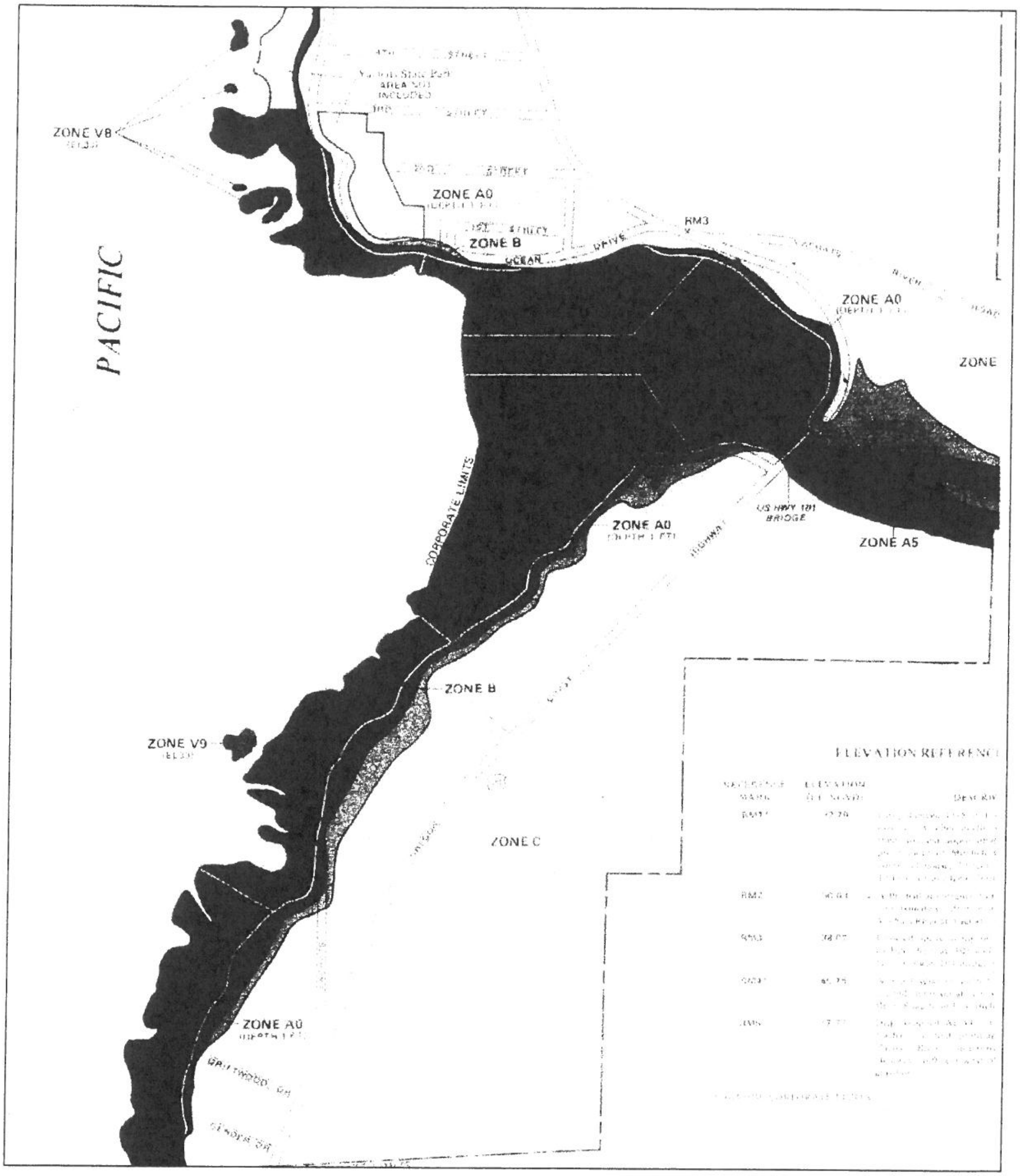
Figures and Maps

Appendix

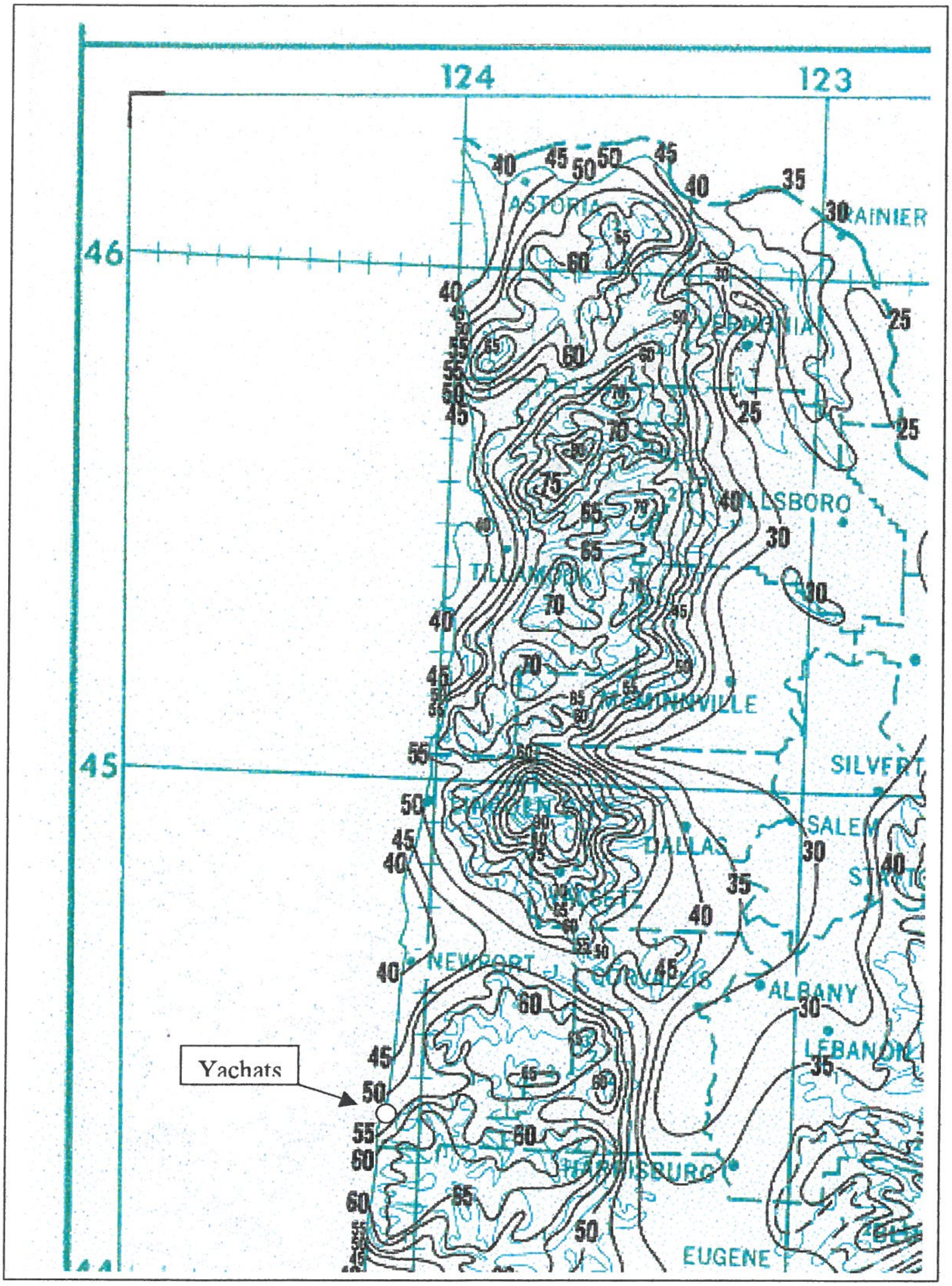
B



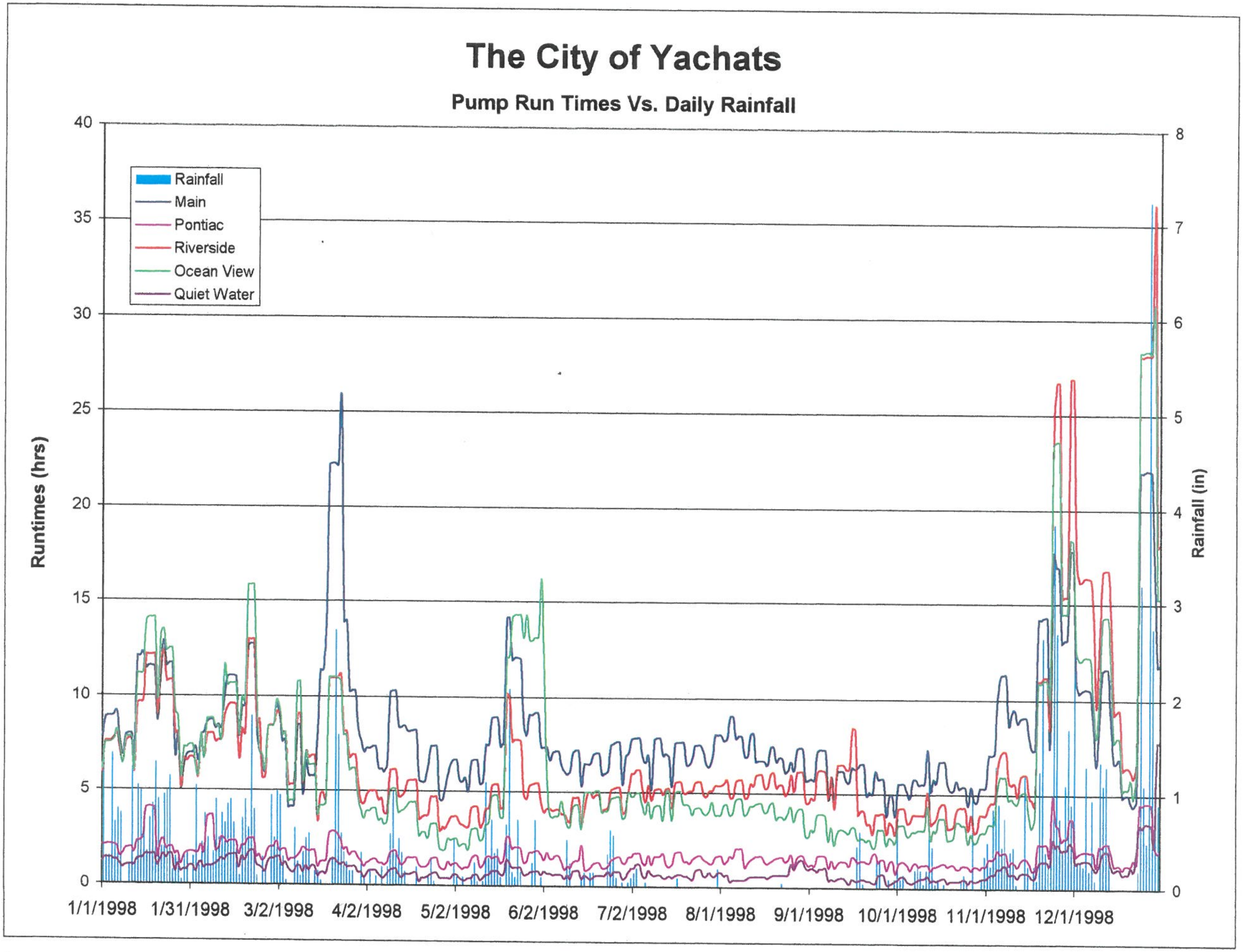
FLOOD MAP OF NORTH YACHATS
FROM FEMA FIRM 410135 0001A

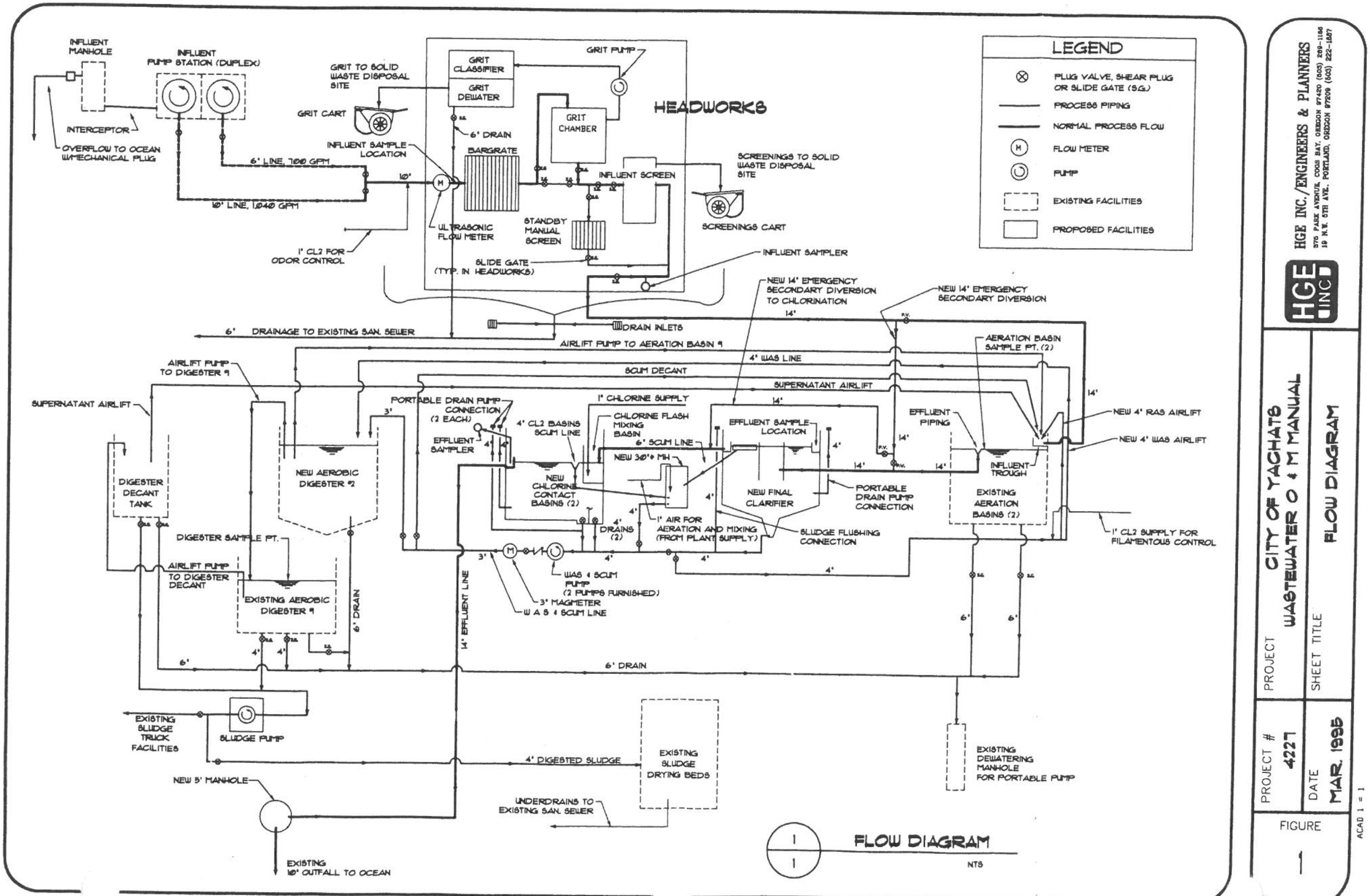


FLOOD MAP OF SOUTH YACHATS
FROM FEMA FIRM 410135 0001A



YACHATS 5-YEAR 24-HOUR STORM ISOPLUVIAL


The City of Yachats
Pump Run Times Vs. Daily Rainfall
Rainfall
Main
Pontiac
Riverside
Ocean View
Quiet Water
Runtimes (hrs)
Rainfall (in)
40
35
30
25
20
15
10
5
0
8
7
6
5
4
3
2
1
0
1/1/1998
1/31/1998
3/2/1998
4/2/1998
5/2/1998
6/2/1998
7/2/1998
8/1/1998
9/1/1998
10/1/1998
11/1/1998
12/1/1998



INFLUENT MANHOLE
INFLUENT PUMP STATION (DUPLEX)
INTERCEPTOR
OVERFLOW TO OCEAN W/MECHANICAL PLUG
6' LINE, 700 GPM
10' LINE, 1,040 GPM
1' CL2 FOR ODOR CONTROL
GRIT TO SOLID WASTE DISPOSAL SITE
GRIT CART
GRIT CLASSIFIER
GRIT DEWATER
GRIT PUMP
GRIT CHAMBER
HEADWORKS
6' DRAIN
INFLUENT SAMPLE LOCATION
BARGRATE
INFLUENT SCREEN
ULTRASONIC FLOW METER
STANDBY MANUAL SCREEN
SLIDE GATE (TYP. IN HEADWORKS)
SCREENINGS TO SOLID WASTE DISPOSAL SITE
SCREENINGS CART
INFLUENT SAMPLER
LEGEND
PLUG VALVE, SHEAR PLUG OR SLIDE GATE (SG)
PROCESS PIPING
NORMAL PROCESS FLOW
FLOW METER
PUMP
EXISTING FACILITIES
PROPOSED FACILITIES
NEW 14' EMERGENCY SECONDARY DIVERSION TO CHLORINATION
NEW 14' EMERGENCY SECONDARY DIVERSION
6' DRAINAGE TO EXISTING SAN. SEWER
DRAIN INLETS
AIRLIFT PUMP TO AERATION BASIN #
4' WAS LINE
SCUM DECANT
SUPERNATANT AIRLIFT
AERATION BASIN SAMPLE PT. (2)
AIRLIFT PUMP TO DIGESTER #
SUPERNATANT AIRLIFT
PORTABLE DRAIN PUMP CONNECTION (2 EACH)
1' CHLORINE SUPPLY
4' CL2 BASINS SCUM LINE
CHLORINE FLASH MIXING BASIN
EFFLUENT SAMPLE LOCATION
EFFLUENT PIPING
NEW 4' RAS AIRLIFT
NEW 4' WAS AIRLIFT
EFFLUENT SAMPLER
6' SCUM LINE
NEW 30'Ø MH
NEW CHLORINE CONTACT BASINS (2)
NEW FINAL CLARIFIER
PORTABLE DRAIN PUMP CONNECTION
INFLUENT TROUGH
EXISTING AERATION BASINS (2)
DIGESTER DECANT TANK
NEW AEROBIC DIGESTER #2
DRAINS (2)
1' AIR FOR AERATION AND MIXING (FROM PLANT SUPPLY)
SLUDGE FLUSHING CONNECTION
1' CL2 SUPPLY FOR FILAMENTOUS CONTROL
DIGESTER SAMPLE PT.
AIRLIFT PUMP TO DIGESTER DECANT
EXISTING AEROBIC DIGESTER #
6' DRAIN
14' EFFLUENT LINE
WAS & SCUM PUMP (2 PUMPS FURNISHED)
3' MAGMETER
W A S & SCUM LINE
6' DRAIN
EXISTING SLUDGE TRUCK FACILITIES
SLUDGE PUMP
4' DIGESTED SLUDGE
EXISTING SLUDGE DRYING BEDS
NEW 5' MANHOLE
UNDERDRAINS TO EXISTING SAN. SEWER
EXISTING 10' OUTFALL TO OCEAN
EXISTING DEWATERING MANHOLE FOR PORTABLE PUMP
1/1 FLOW DIAGRAM
NTS
HGE INC./ENGINEERS & PLANNERS
375 PARK AVENUE, COOS BAY, OREGON 97420 (503) 269-1166
19 N.W. 5TH AVE., PORTLAND, OREGON 97209 (503) 222-1687
HGE INC
PROJECT
CITY OF YACHATS
WASTEWATER O & M MANUAL
SHEET TITLE
FLOW DIAGRAM
PROJECT # 4227
DATE MAR. 1995
FIGURE 1
ACAD 1 = 1

DESIGN DATA

ITEM	VALUE DESIGN (YEAR 2013)
POPULATION	935
PLANT FLOW (MGD)	
AVERAGE DRY WEATHER DAILY FLOW	0.174
PEAK DRY WEATHER DAILY FLOW	0.303
5-YEAR MAXIMUM MONTHLY FLOW	0.288
5-YEAR MAXIMUM DAILY FLOW (NOMINAL PEAK)	0.773
5-YEAR PEAK HOURLY FLOW	1.909
PEAK INSTANTANEOUS FLOW	1.500
PLANT LOADINGS - BASED ON ACTUAL PLANT RESULTS	
BOD AVERAGE DAILY, PPD	206
BOD MAXIMUM DAILY, PPD	535
TSS AVERAGE DAILY, PPD	243
TSS MAXIMUM DAILY, PPD	681
SEPTAGE (EXCLUDED)	0
INFLUENT PUMP STATION (MAIN PUMP STATION)	
NON-CLOG CENTRIFUGAL PUMPS:	
TYPE - DRY PIT/CONSTANT SPEED, ON/OFF	
NUMBER OF PUMPS	2
CAPACITY WITH 6" PRESSURE MAIN, GPM, EACH	350
CAPACITY WITH 10" PRESSURE MAIN, GPM, EACH	520
HEAD, TDH	
6" PRESSURE MAIN	58
10" PRESSURE MAIN	47
ACTUAL PEAK FLOW (2 PUMPS)	1040 GPM
INFLUENT FLOW METER	
TYPE: ULTRASONIC	
SIZE, INCHES	6
CAPACITY, MGD	7.0
COARSE BAR RACK, HAND RAKED	
NUMBER	1
SPACING BETWEEN BARS, INCHES	1.75
CAPACITY, MGD	3.0
GRIT REMOVAL	
TYPE: MECHANICAL/CENTRIFUGAL INDUCED VORTEX	
NUMBER	1
CAPACITY, MGD	2.5
GRIT PUMPING	
TYPE: TURBO (VORTEX TYPE) PUMP W/INTERNAL VACUUM PRIMER	
DIAMETER, INCHES	4
FLOW RATE, GPM	100
GRIT WASHER	
TYPE: SCREW CLASSIFIER	
NUMBER	1
SCREW DIAMETER, INCHES	9
CAPACITY, POUNDS PER HOUR	1,100
INFLUENT SCREEN	
TYPE: ROTATING DRUM & RAKE	
NUMBER	1
CAPACITY, MGD	2.0
SCREEN SIZE OPENING, INCHES	0.1875
COMPACTION SCREW DIAMETER, INCHES	12
STANDBY MANUAL BAR SCREEN	
NUMBER	1
SPACING BETWEEN BARS, INCHES	2
CAPACITY, MGD	3.0

ITEM	VALUE DESIGN (YEAR 2013)
SECONDARY TREATMENT:	
AERATION BASINS :	
TYPE: COMPLETE MIX/PLUG FLOW/STEP FEED	
NUMBER	2
VOLUME PER BASIN, CF, GALLONS	5,414 ; 47,500
TOTAL VOLUME, CF, GALLONS	10,027; 75,000
DETENTION TIME, MMWMF, HRS.	9
DETENTION TIME, PWWIF, HRS.	1
F/M RATIO, LB. BOD /LB. MLSS	0.33
AVERAGE OXYGEN REQUIREMENT, LBS/DAY	334
AVERAGE SLUDGE YIELDS, LBS/DAY AT 0.5% SOLIDS	12,155
DIFFUSER TYPES	
AERATION - FINE BUBBLE FLEXIBLE MEMBRANE BOOT - FIXED	
DIGESTER - FINE BUBBLE FLEXIBLE MEMBRANE BOOT - FIXED	
BLOWERS, AERATION AND DIGESTION, EXISTING	
2 VARIABLE SPEED BELT DRIVES	
NUMBER, ON LINE	1
NUMBER, STANDBY	1
MOTOR HORSEPOWER (EACH)	25
AIR REQUIRED FOR MIXING	
AVERAGE DAY (SCFM)	378
MAXIMUM HOUR (SCFM)	456
BLOWER CAPACITY (SCFM)	600
SECONDARY CLARIFICATION	
TYPE: CONVENTIONAL SCRAPER	
NUMBER	1
DIAMETER	35
SIDEWATER DEPTH	16
OVERFLOW RATE	
AVERAGE DRY WEATHER FLOW, GPFSD	181
5-YR MAXIMUM DAILY FLOW, GPFSD	804
PEAK HOURLY FLOW (HYDRAULIC), GPFSD @ 1.5 MGD	1,560
WEIR TYPE: PERIPHERAL W/BAFFLES	
AEROBIC DIGESTER	
NUMBER	2
SLUDGE LOADING, LBS/DAY @ 0.5% SOLIDS	12,155
CAPACITY, CF	
UNIT #1, CF, GALS	5,000; 37,400
UNIT #2, CF, GALS	6,124; 45,808
TOTAL VOLUME, CF, GALS	11,071; 82,811
SIDE WATER DEPTH, FT	15
SOLIDS DETENTION TIME, DAYS @ 1.8% SOLIDS	60
AIR REQUIRED, SCFM	222
CHLORINE CONTACT BASIN	
NUMBER	2
SIDE WATER DEPTH, FT	14.4
VOLUME, CF, TOTAL	7,925
DETENTION TIME	
AVE. DAILY FLOW, MIN.	65
MAXIMUM DAILY FLOW, MIN.	14
LENGTH TO WIDTH RATIO	15 : 1
SLUDGE DISPOSAL SYSTEM	
AGRICULTURAL LAND APPLICATION	
TYPE: LIQUID @ 3% SOLIDS	
SOLID CAKE @ 10% SOLIDS	
TREATMENT EFFICIENCY	
BOD REMOVAL	90%+
SUSPENDED SOLIDS (TSS) REMOVAL	90%+

ITEM	VALUE DESIGN (YEAR 2013)
EFFLUENT DESIGN: BOD & TSS (MG/L)	
SUMMER MONTHLY AVERAGE	20 *
WINTER MONTHLY AVERAGE	30 *
* PERMIT MODIFICATION IS BEING REQUESTED FOR INCREASE IN ALLOWABLE MASS DISCHARGE TO PACIFIC OCEAN.	
CHLORINATORS	
NUMBER	2
CONTROLS - FLOW PROPORTIONAL (1) (VACUUM GAS)	
- MANUAL (1) (SOLUTION OR VACUUM GAS)	
CAPACITY, LBS/DAY EACH	100
OUTFALL	
LENGTH IN FEET	617
DIAMETER IN INCHES	10
TYPE: CONCRETE, D.I. INTO OCEAN	
DIFFUSER TYPE: NONE/OPEN 10" PIPE	
DEPTH IN FEET - MINUS 1 MSL	
GENERATOR	
TYPE: DIESEL	617
SIZE: 60 KW	
FUEL TANK CAPACITY - 200 GALLONS	
TRANSFER - AUTOMATIC	
RUNNING TIME PER TANK, HOURS	
SLUDGE DRYING BEDS	
NUMBER	3
SIZE, EACH 19.5' x 28.5'	
DEPTH, 8 TO 12 INCHES	
UNDERDRAIN TYPE: COARSE SAND & GRAVEL OVER CONCRETE TILE	
CLEANOUT - FRONT END LOADER	
CAPACITY, GALLONS/YR. EACH	33,260
LIQUID SLUDGE HAULING	
TRUCKS AVAILABLE	1
TRUCK SIZE - 3000 GALLONS	
LAND AVAILABLE FOR AGRICULTURAL APPLICATION	220 ACRES
R A S PUMPS 2 - 4" PUMPS	
NUMBER	2
TYPE: AIRLIFT	
CAPACITY, GPM	2 @ 100
AIR REQUIREMENTS, EACH (SCFM)	15
PORTABLE DRAIN PUMP	
NUMBER	1
TYPE: SELF PRIMING CENTRIFUGAL	
CAPACITY, GPM	800
FUEL - GASOLINE	
SCUM/W A S PUMP	
NUMBER	1 W/1 UNINSTALLED STANDBY
TYPE: IMMERSIBLE, SCREW CENTRIFUGAL	
HORSEPOWER	3
CAPACITY, GPM	125
CHLORINE INDUCTION UNIT	
NUMBER	1
TYPE: WATER CHAMP	
CHLORINE FEED RATE CAPACITY LBS./DAY	100
HORSEPOWER	2
MIXING CHAMBER VOLUME, CU. FT.	42.67
DIGESTED SLUDGE PUMP	
TYPE: BOTTOM SUCTION CENTRIFUGAL	
HORSEPOWER	2
CAPACITY, GPM	100
W A S FLOW METER	
TYPE: MAGNETIC	
SIZE, INCHES	3
INDICATOR RANGE, GPM	300

HGE INC./ENGINEERS & PLANNERS
375 PARK AVENUE, COOS BAY, OREGON 97420 (503) 269-1166
19 N.W. 5TH AVE., PORTLAND, OREGON 97209 (503) 222-1687
HGE INC

PROJECT: CITY OF YACHATS WASTEWATER O & M MANUAL

SHEET TITLE: DESIGN DATA

PROJECT # 4227

DATE: MAR. 1995

FIGURE 2

ACAD 1 = 1

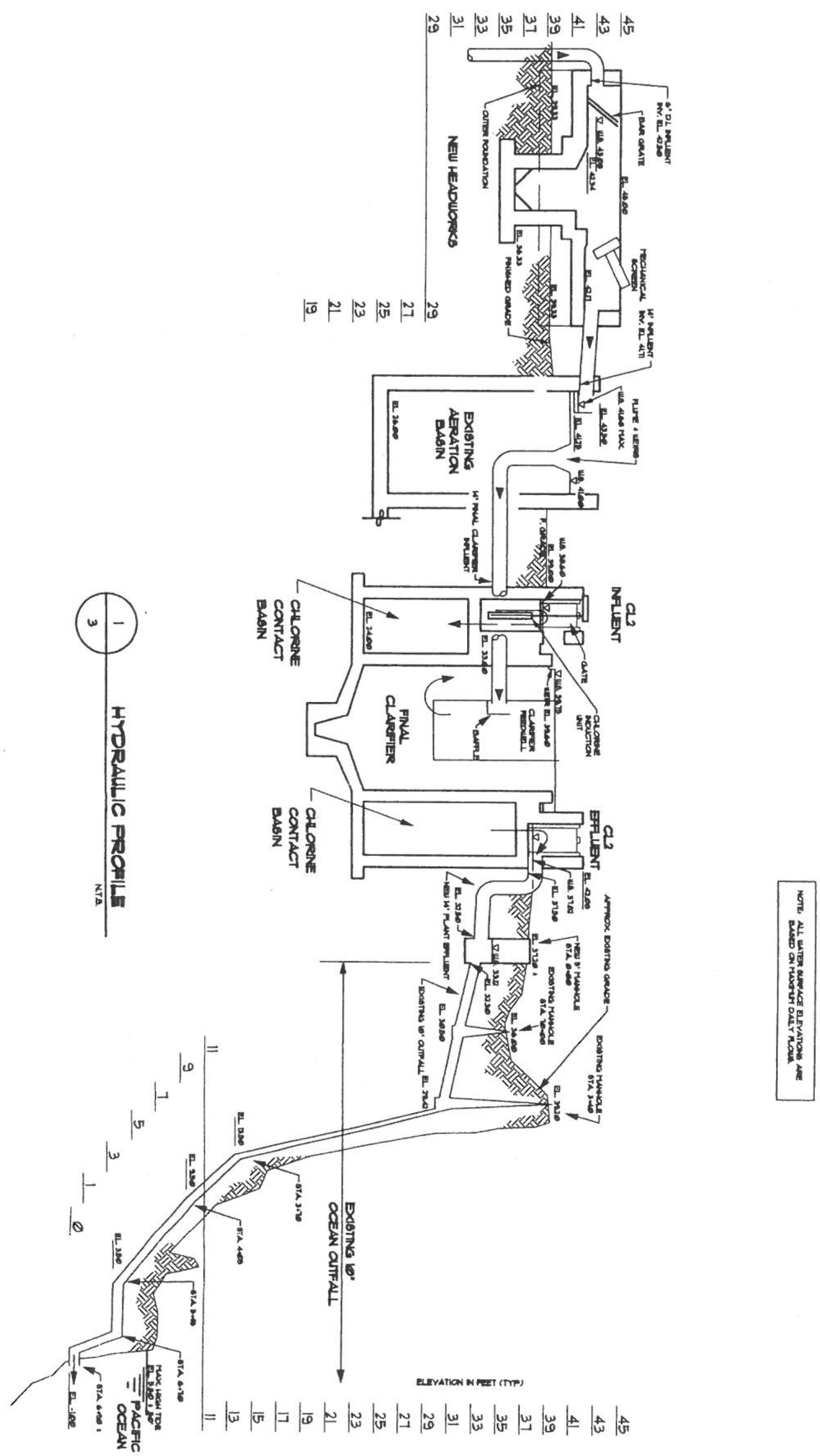
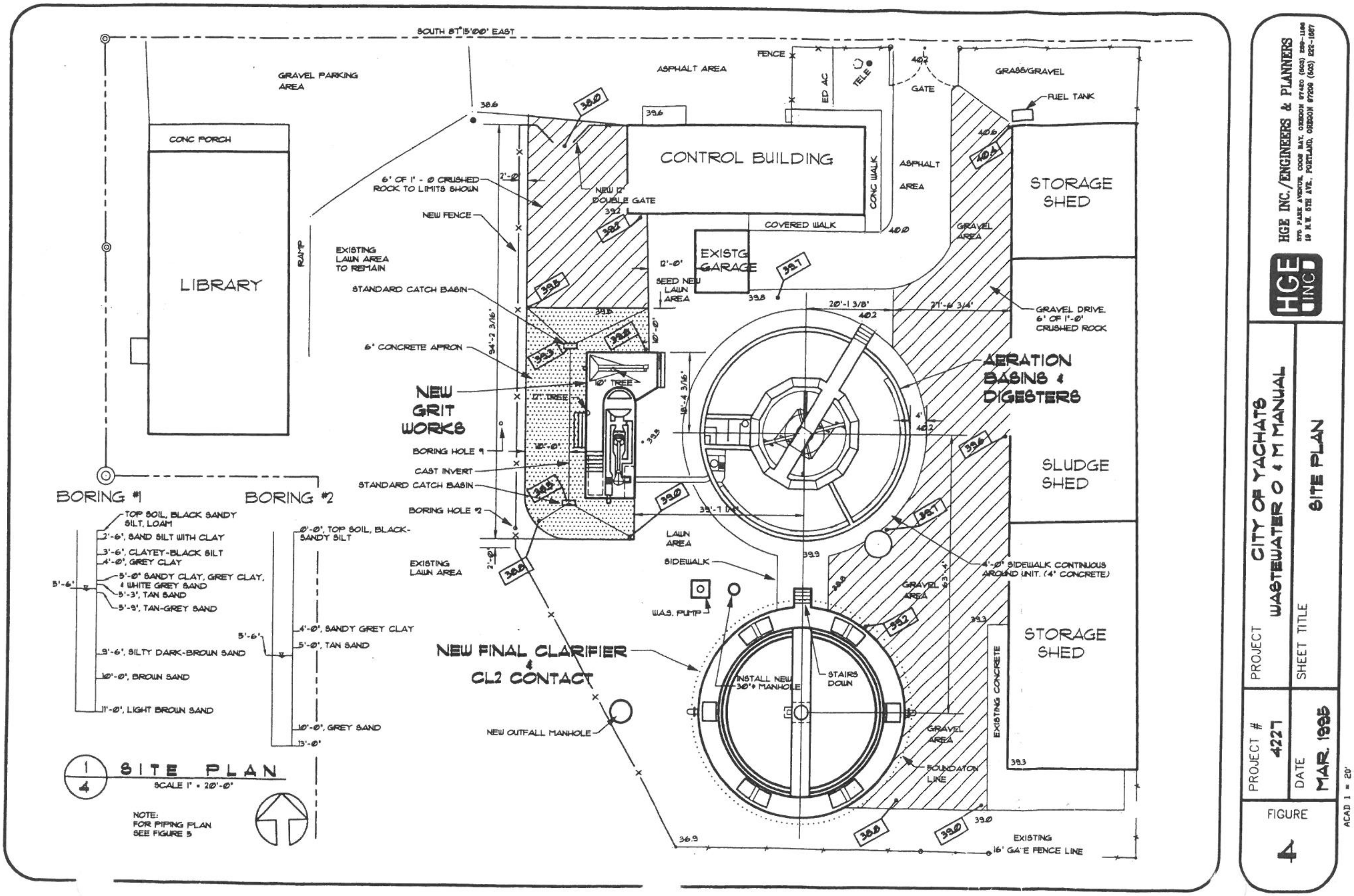
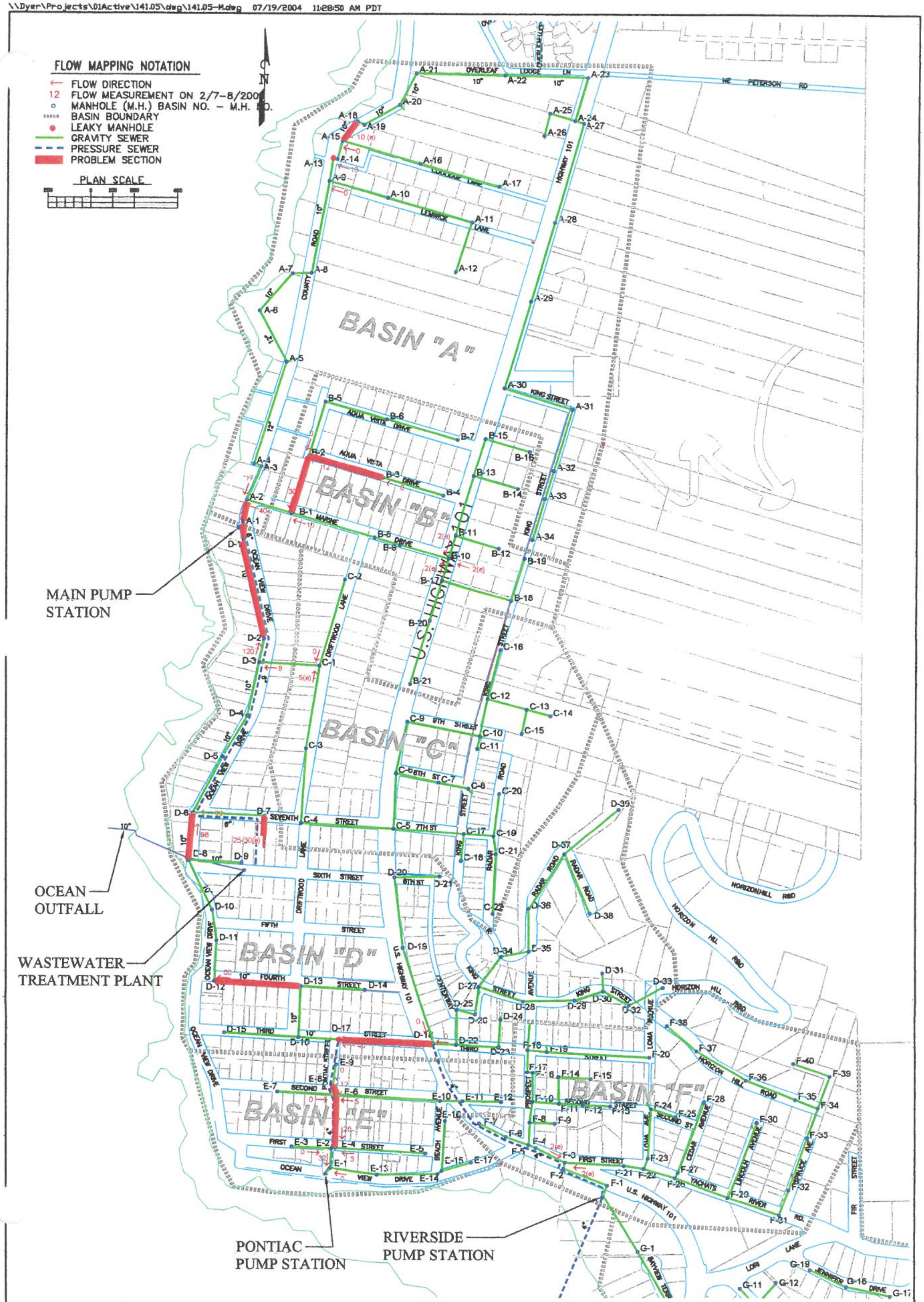


FIGURE 3	PROJECT # 4227	PROJECT CITY OF YACHATS WASTEWATER O & M MANUAL	HGE INC. HGE INC./ENGINEERS & PLANNERS 575 PARK AVENUE, COOS BAY, OREGON 97420 (503) 269-1166 19 N.W. 5TH AVE., PORTLAND, OREGON 97209 (503) 222-1687
	DATE MAR. 1995	SHEET TITLE HYDRAULIC PROFILE	

ACAD 1 = 1

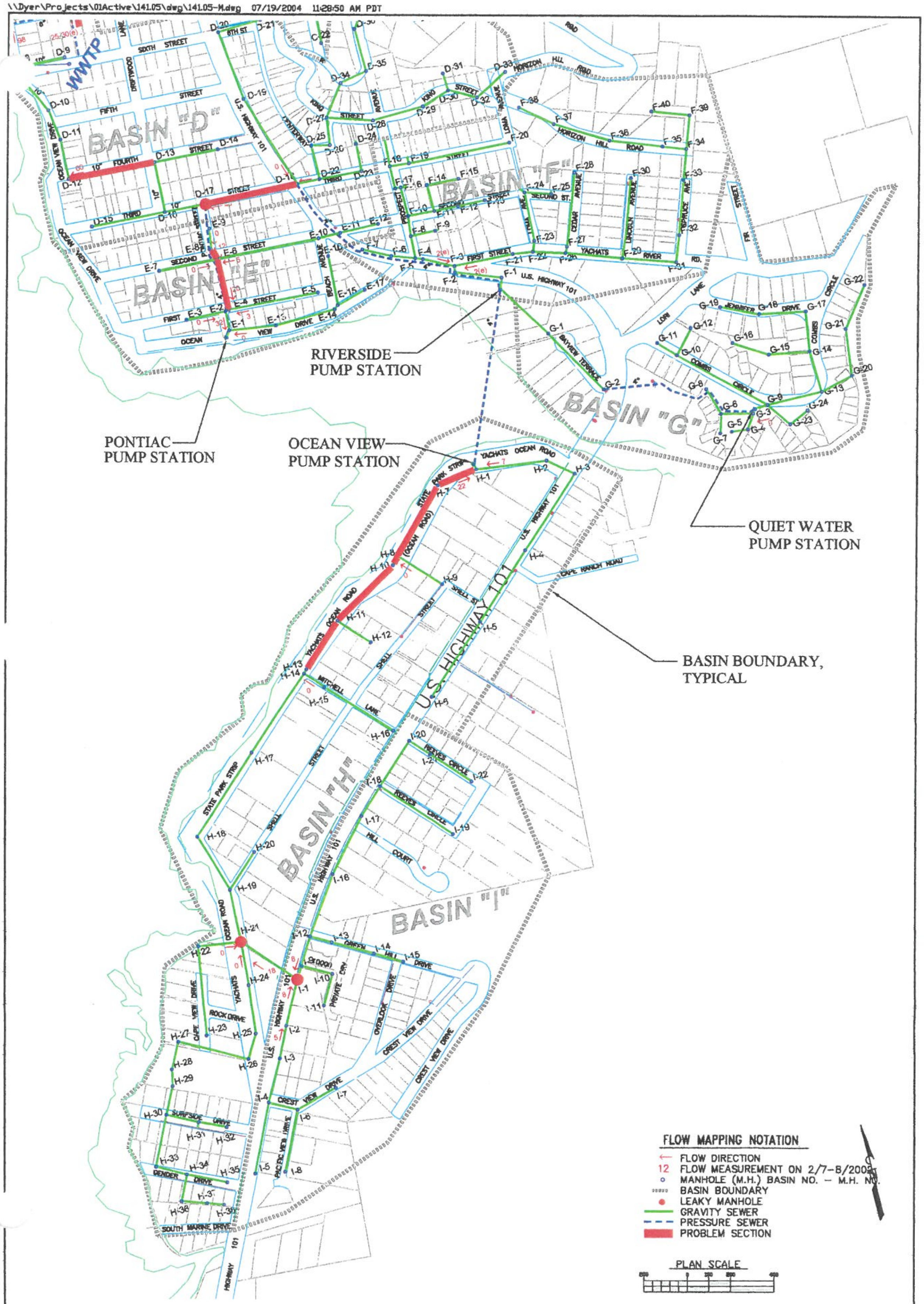

SOUTH 87°15'00" EAST
GRAVEL PARKING AREA
ASPHALT AREA
FENCE
ED AC
TELE
GATE
GRASS/GRAVEL
FUEL TANK
CONC PORCH
LIBRARY
RAMP
CONTROL BUILDING
CONC WALK
ASPHALT AREA
STORAGE SHED
6' OF 1" - Ø CRUSHED ROCK TO LIMITS SHOWN
NEW 12' DOUBLE GATE
NEW FENCE
COVERED WALK
GRAVEL AREA
EXISTING LAWN AREA TO REMAIN
EXISTG GARAGE
SEED NEW LAWN AREA
STANDARD CATCH BASIN
GRAVEL DRIVE, 6' OF 1"-Ø' CRUSHED ROCK
6" CONCRETE APRON
10' TREE
27' TREE
NEW GRIT WORKS
AERATION BASINS & DIGESTERS
BORING HOLE #1
CAST INVERT
STANDARD CATCH BASIN
SLUDGE SHED
BORING HOLE #2
LAWN AREA
4'-0" SIDEWALK CONTINUOUS AROUND UNIT. (4" CONCRETE)
EXISTING LAWN AREA
SIDEWALK
GRAVEL AREA
W.A.S. PUMP
STORAGE SHED
NEW FINAL CLARIFIER & CL2 CONTACT
INSTALL NEW 30" Ø MANHOLE
STAIRS DOWN
EXISTING CONCRETE
NEW OUTFALL MANHOLE
GRAVEL AREA
FOUNDATION LINE
EXISTING 16' GATE FENCE LINE
BORING #1
TOP SOIL, BLACK SANDY SILT, LOAM
2'-6", SAND SILT WITH CLAY
3'-6", CLAYEY-BLACK SILT
4'-0", GREY CLAY
5'-0" SANDY CLAY, GREY CLAY, & WHITE GREY SAND
5'-3", TAN SAND
5'-9", TAN-GREY SAND
9'-6", SILTY DARK-BROWN SAND
10'-0", BROWN SAND
11'-0", LIGHT BROWN SAND
BORING #2
0'-0", TOP SOIL, BLACK-SANDY SILT
4'-0", SANDY GREY CLAY
5'-0", TAN SAND
10'-0", GREY SAND
13'-0"
1/4 SITE PLAN
SCALE 1" = 20'-0"
NOTE: FOR PIPING PLAN SEE FIGURE 5
HGE INC./ENGINEERS & PLANNERS
HGE INC
PROJECT CITY OF YACHATS WASTEWATER O & M MANUAL
SHEET TITLE SITE PLAN
PROJECT # 4227
DATE MAR. 1995
FIGURE 4
ACAD 1 = 20'

\\Dyer\Projects\01Active\141.05\dwg\141.05-M.dwg 07/19/2004 11:28:50 AM PDT

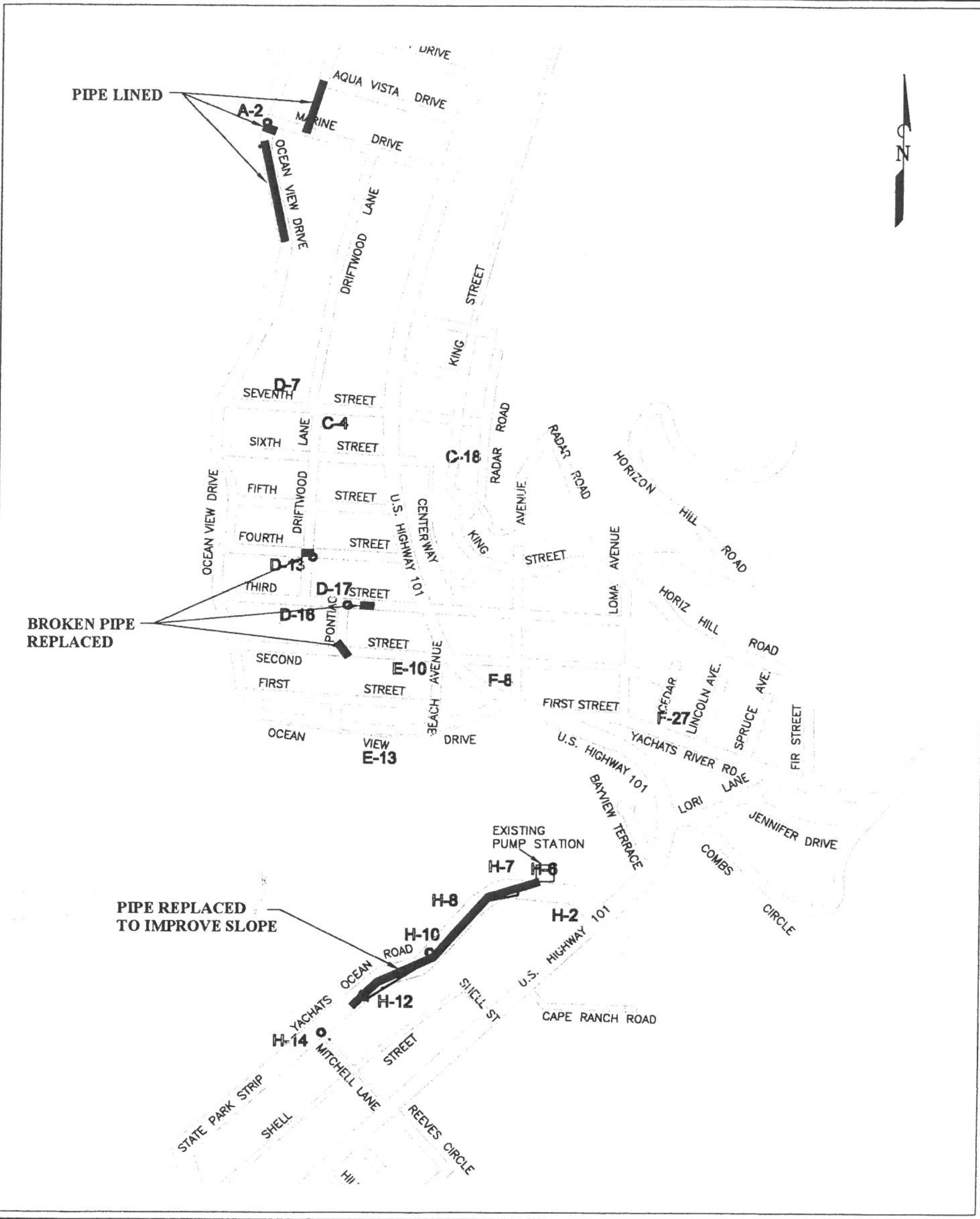


THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: SEPTEMBER, 2004	EXISTING SYSTEMS MAP - FEB. 2002 I / I FLOW MAPPING RESULTS	A

\\Dyer\Projects\01Active\141.05\dwg\141.05-M.dwg 07/19/2004 11:28:50 AM PDT



THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: SEPTEMBER, 2004	EXISTING SYSTEM MAP - MAY 2002 I/I FLOW MAPPING RESULTS	B



\\Dyer\Projects\01Active\141.05\dwg\FIG C.dwg 07/19/2004 01:30:08 PM PDT

THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	*CITY OF YACHATS 2003/2004*	**FIGURE NO.**
DATE: AUGUST, 2004 PROJECT NO.: 141.05	***I/I IMPROVEMENT PROJECTS COMPLETED***	**C**

Calculations

Appendix

C

City of Yachats

Population Estimates

Year	2000	2004	2005	2010	2015	2020	2025	2029
Residential Population(1)	617	673	689	770	860	961	1,075	1,175
Peak Part-Time Residential(2)	427	465	476	532	595	665	743	812
Off-Peak Part-Time Residential(3)	214	233	238	266	297	332	371	406
Peak Tourist Population(4)	825	901	929	1,076	1,248	1,447	1,677	1,888
Off-Peak Tourist Population(5)	413	451	464	538	624	723	839	944
Total Peak Population	1,869	2,040	2,093	2,378	2,703	3,073	3,494	3,874
Total Off-Peak Population	1,294	1,357	1,391	1,574	1,781	2,017	2,285	2,524

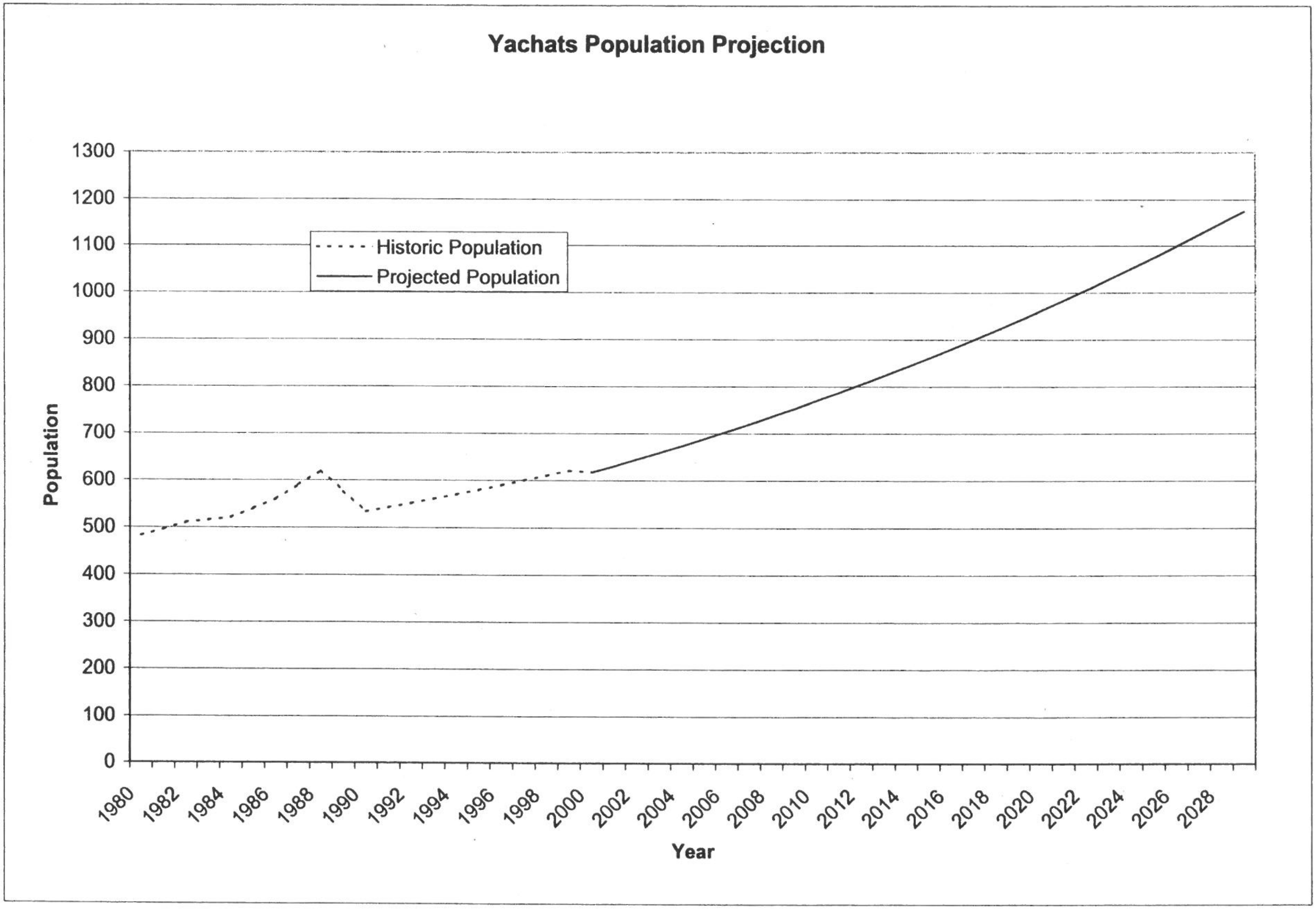
(1) With moderate 2.25% (+ -) growth per year.

(2) With moderate 2.25% (+ -) growth per year.

(3) 50% occupancy.

(4) Beginning with 268 motel rooms and 61 transient rentals w/ 2.5 ppr @ 3% (+ -) growth per year.

(5) 50% occupancy.



Yachats Population Projection
Population
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
Historic Population
Projected Population
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
Year

Lincoln County
OREGON
ESTABLISHED 1893

RECEIVED
MAY 21 2003

May 20, 2003

Janette Kerbo, P.E.
The Dyer Partnership
275 Market Avenue
Coos Bsy, OR 97420

RE: City of Yachats Population Projections

Dear Ms. Kerbo:

Our department has reviewed the proposed population projections prepared by the City of Yachats in accordance with the county's responsibility to ensure coordinated population estimates. The estimates proposed by the City of Yachats are based on a projected 2.25% average annual growth rate. These forecasts are generally consistent with other projections we have reviewed for other jurisdictions within the county, and within the parameters of the 1997 countywide projections provided by the Office of Economic Analysis.

The formal adoption of population projections for all of the county's jurisdictions has not been completed at this time, pending receipt of projections form all of the cities. However, as stated above, our review of the estimates provided by the City of Yachats indicates that they are acceptable for purposes of final coordinated countywide projections.

If you have any questions or need any additional information regarding zoning or land use issues, please contact our department.

Sincerely,

Matt Spangler
Director

Jan Kerbo

From: PERRY Dave [Dave.Perry@state.or.us]
Sent: Tuesday, July 15, 2003 9:23 AM
To: IPM Return requested (Receipt notification requested)
Cc: IPM Return requested (Receipt notification requested); WOOLLEY Laren (IPM Return requested) (Receipt notification requested)
Subject: Re: Yachats population figures

Jan,

We have reviewed the pop. numbers and concur with the County's projection for Yachats. Please let this e-mail serve as our acceptance of the projection at this point in time.

In the future, the county may prepare a comprehensive county-wide study and conduct an effort to coordinate populations projections among the cities of Lincoln County. The city of Yachats would be expected to participate in such an effort and the projection could be revised at that time. However, in lieu of a more comprehensive study, the projection endorsed by the county is the best available information at this time and is acceptable for the purpose of the current facility planning Dyer Partnership is is undertaking with the city.

Thank you for the opportunity to comment.

Dave Perry
Oregon Coastal Management Program
dave.perry@state.or.us

>>> jkerbo@dyerpart.com 07/15/03 07:43AM >>>
Hi Dave,

I was going through the Yachats file today to put together the changes that DEQ wanted and realized that I don't have documentation of DLCD acceptance of the 2.25% population growth figure for Yachats. I have Matt Spangler's letter from Lincoln County, but still need your approval in writing to satisfy DEQ. Have you had a chance to review the growth figures?

Jan Kerbo
The Dyer Partnership
(541) 269-0732
275 Market Avenue
Coos Bay OR 97420

Yachats Water Use 2001/2002

		July	August	September	October	November	December	January	February	March	April	May	June	Winter Avg
City Accounts		107523	31500	31400	*22000*	*44000*	*55000*	58500	40200	30700	38300	40100	55500	41,163
Residential		262593	269304	159053	194042	194755	129994	209856	135382	123024	158200	149015	234520	161,784
O/S City water only		7100	6300	3700	5100	5600	3700	4008	5100	4200	4793	4100	7000	4,575
Commercial		224300	280765	208725	166887	164914	85126	147730	141645	124360	171415	146825	201850	143,613
County/State/Federal		9800	1900	900	700	800	500	400	800	700	1000	700	800	700
Multi-Family		1600	3655	2655	2035	3720	2035	3340	3570	2250	3765	2960	4545	2,959
Community/Church/Fire		3000	1500	2900	1600	2300	900	2200	1400	1800	1100	2800	1000	1,763
Transient Rentals		45700	59316	24109	31030	21320	14660	22367	15965	17431	22920	18460	31750	20,519
Total CF		661616	654240	433442	423394	437409	291915	448401	344062	304465	401493	364960	536965	377,012
Total in City CF		654516	647940	429742	418294	431809	288215	444393	338962	300265	396700	360860	529965	372,437
Total Residential/MFH/Transient CF/Month		309893	332275	185817	227107	219795	146689	235563	154917	142705	184885	170435	270815	185,262
Total Housing Units per 2000 Census		619	619	619	619	619	619	619	619	619	619	619	619	619
H2O CF per EDU/Month		501	537	300	367	355	237	381	250	231	299	275	438	299
gpcd		67	71	40	49	47	32	51	33	31	40	37	58	40
City Total EDUs		1307	1207	1432	1140	1216	1216	1168	1354	1302	1328	1311	1211	1,254

	EDUs
Municipal	138
Residential	619
Other Government	2
Commercial	480
Community	6

Oct-Dec City use estimated from previous year

City of Yachats

Wastewater System Master Plan
5-Dec-00

Meter Connection Summary - August 2000

Connection Description	Number of Accounts
Residential	514
Outside Limits / Water Only	10
City Water Accounts	8
Commercial	57
Inside Limits / Water Only	27
Other Governmental Accounts	3
Multi Family	3
Community/Church/Fire	5
Transient / Rentals	57

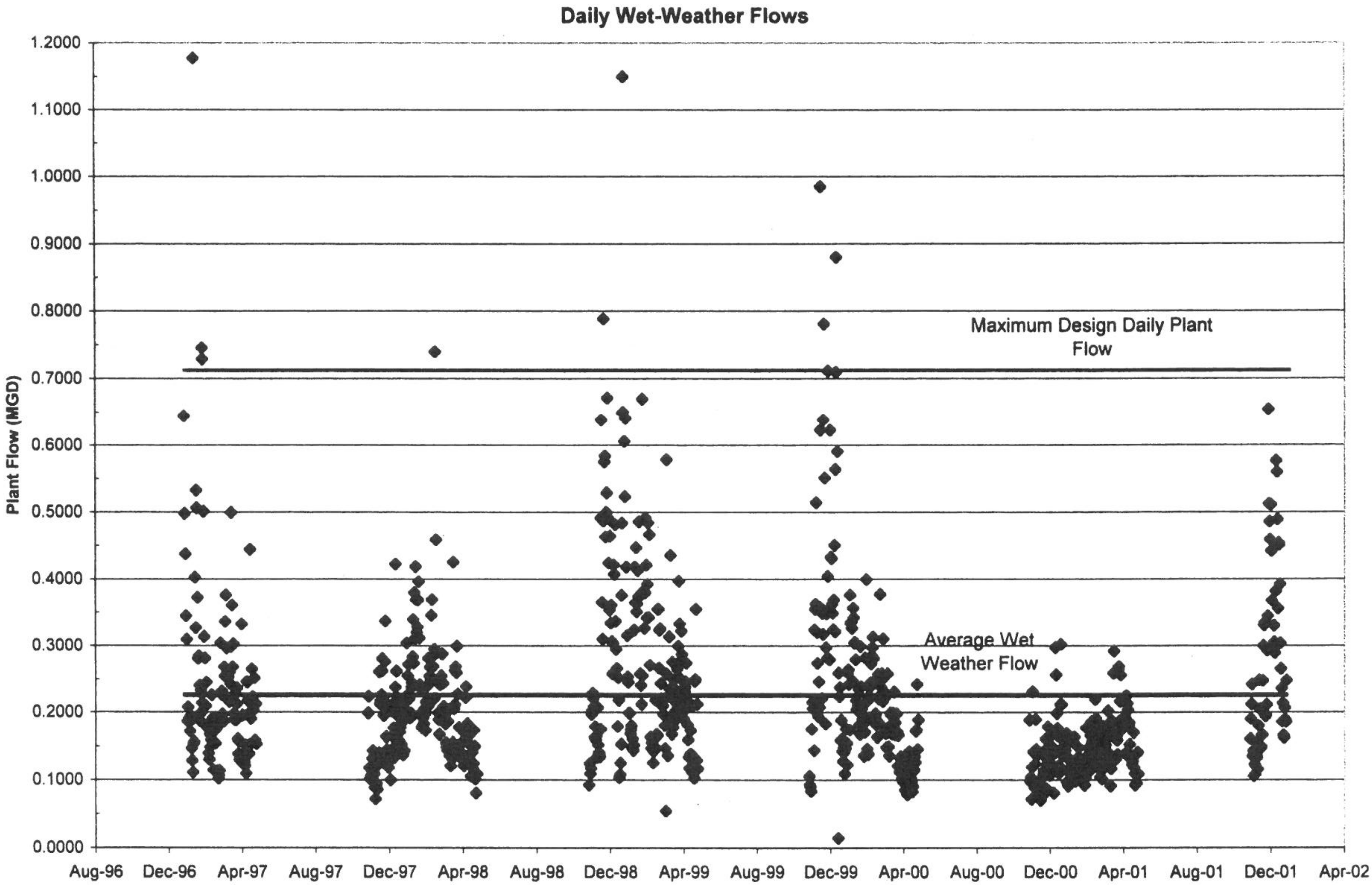
Total **684**

City of Yachats

Pump Station Drawdown Testing Results
October 24, 2000

Pump Station	Design Capacity	Tested Capacity	% Difference
Ocean View (Park Road) Pump Station	100 gpm	73 gpm	-27%
Pontiac Pump Station	150 gpm	140 gpm	-6.7%
Quiet Water Pump Station	150 gpm	125 gpm	-16.7%
Riverside Pump Station	150 gpm	146 gpm	-2.7%
Main Pump Station	540 gpm	530 gpm*	-1.9%

* Based on meter reading at WWTP



Daily Wet-Weather Flows
Plant Flow (MGD)
1.2000
1.1000
1.0000
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
Aug-96
Dec-96
Apr-97
Aug-97
Dec-97
Apr-98
Aug-98
Dec-98
Apr-99
Aug-99
Dec-99
Apr-00
Aug-00
Dec-00
Apr-01
Aug-01
Dec-01
Apr-02
Maximum Design Daily Plant Flow
Average Wet Weather Flow

System Storage and Detention Times

Station	Main	Ocean View	Riverside	Quiet Water	Pontiac
Wetwell active volume (gallons)	1057	734	734	440	734
gallons storage	25,868	9,909	3,712	2,496	3,178
1/2 pump capacity	175	50	75	62.5	75
time to overflow (minutes)	148	198	49	40	42
hours to overflow	2.5	3.3	0.8	0.7	0.7
Wetwell detention time (minutes)	6.0	14.7	9.8	7.0	18.3
FM Length	1850	790	1173	820	630
FM diameter	6	4	6	4	4
FM ft^3	363	69	230	72	55
Forcemain gallons	2716	515	1722	535	411
FM detention time	15.5	10.3	23.0	8.6	10.3

Alternate detention time, based on actual pump run times

Station	Main	Ocean View	Riverside	Quiet Water	Pontiac
Average daily run time (minutes)	510.6	443.4	469.2	64.2	105.6
Pump on time per cycle	3.0	7.3	4.9	3.5	4.9
Cycles per day	169	60	96	18	22
Minutes between cycles	9	24	15	79	67
Detention time	22	17	35	96	37

City of Yachats WWTP Basin Contact Times

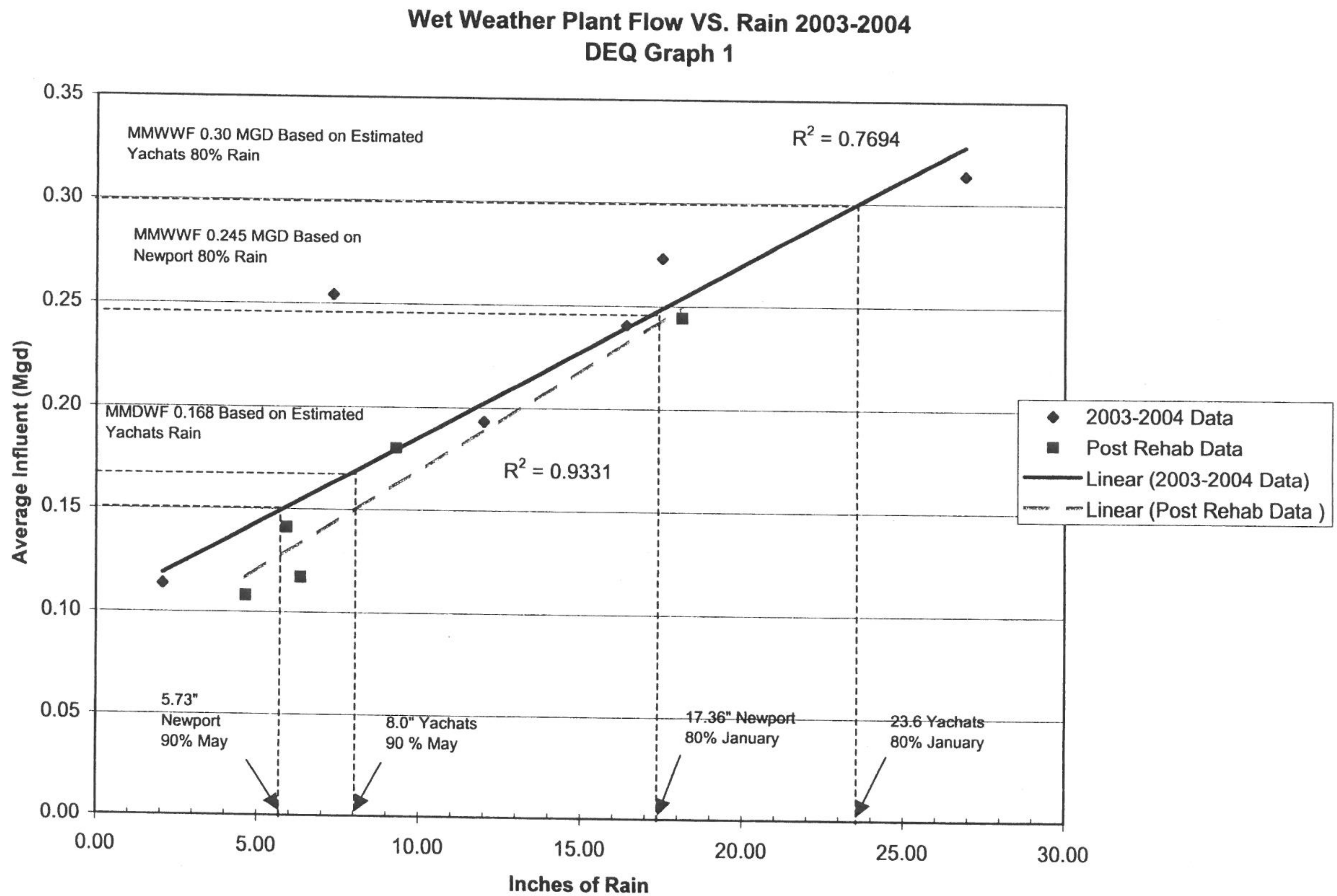
	Original Design	Current
ADWF	0.174 MGD	0.28 MGD
AWWF	MGD	0.38 MGD
Average Flow	MGD	0.33 MGD
MMWWF	0.29 MGD	0.41 MGD
Peak Day	0.77 MGD	1.88 MGD
PIF	1.91 MGD	3.66 MGD

Original Design

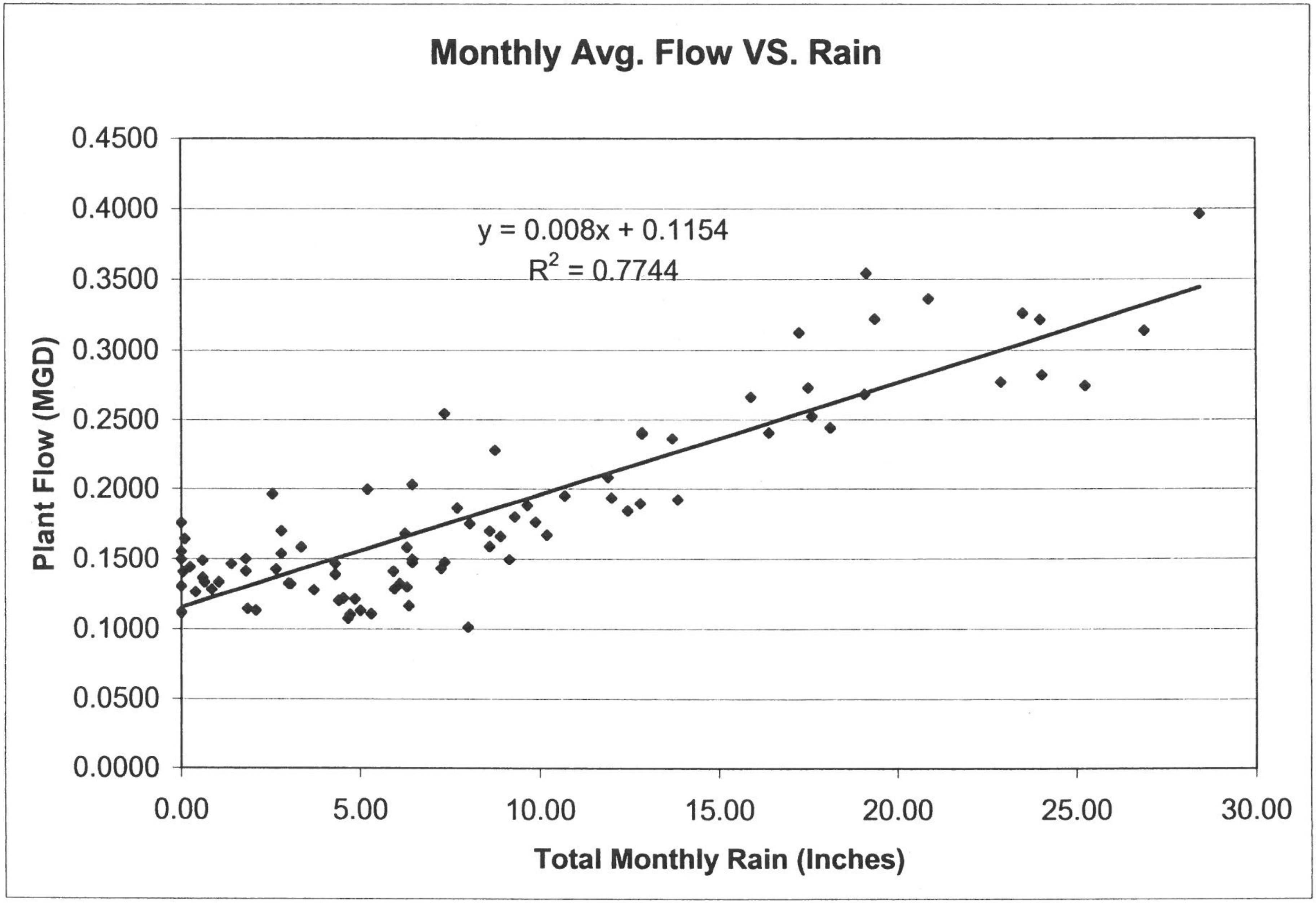
Basin contact times	Aeration Basin	Clarifier	Digester	Chlorine Contact
Working Volume ft^3	10,027	15,490	11,124	7,925
Hours at ADFW	10.35	15.98	11.48	8.18
Hours at MMWWF	6.21	9.59	6.89	4.91
Hours at Peak Day Flow	2.34	3.61	2.59	1.85
Hours at Peak Hourly Flow	0.94	1.46	1.05	0.74

Current

Basin contact times	Aeration Basin	Clarifier	Digester	Chlorine Contact
Working Volume ft^3	10,027	15,490	11,124	7,925
Hours at ADFW	6.43	9.93	7.13	5.08
Hours at AWWF	4.74	7.32	5.26	3.74
Hours at Average Flow	5.45	8.43	6.05	4.31
Hours at MMWWF	4.39	6.78	4.87	3.47
Hours at Peak Day Flow	0.96	1.48	1.06	0.76
Hours at Peak Hourly Flow	0.49	0.76	0.55	0.39

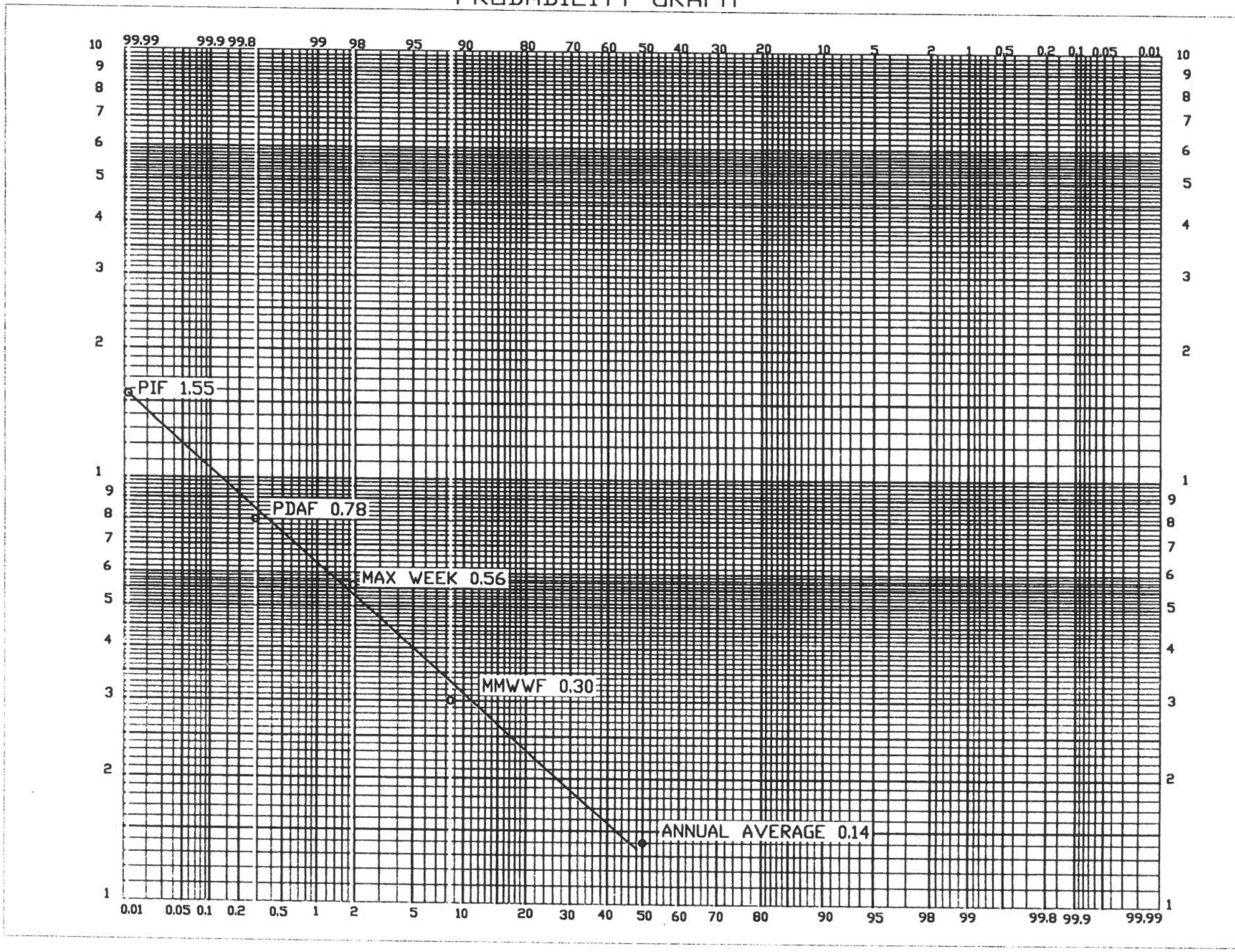


Wet Weather Plant Flow VS. Rain 2003-2004
DEQ Graph 1
MMWWF 0.30 MGD Based on Estimated Yachats 80% Rain
MMWWF 0.245 MGD Based on Newport 80% Rain
MMDWF 0.168 Based on Estimated Yachats Rain
$R^2 = 0.7694$
$R^2 = 0.9331$
5.73" Newport 90% May
8.0" Yachats 90 % May
17.36" Newport 80% January
23.6 Yachats 80% January
Average Influent (Mgd)
Inches of Rain
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
2003-2004 Data
Post Rehab Data
Linear (2003-2004 Data)
Linear (Post Rehab Data)



Monthly Avg. Flow VS. Rain
y = 0.008x + 0.1154
R^2 = 0.7744
Plant Flow (MGD)
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Total Monthly Rain (Inches)

YACHATS WASTEWATER EXISTING SYSTEM
PROBABILITY GRAPH



Peak Population=	2040	2004 Population Figures
Off-Peak Population=	1357	

DRY WEATHER OR PEAK POPULATION FLOWS:

Flow Component	gpcd	MGD	Comments
Base Sewage	68	0.14	Based on 1998 water records
EPA Flow Criteria	120	0.24	
Base Infiltration	13	0.03	ADWF-Base Sewage
ADWF	81	0.17	Based on 2003, July-August Records
MMDWF	82	0.17	Based on 2003-2004, Rainfall vs. Flow, 5 Year Rain Month

WET WEATHER OR OFF-PEAK POPULATION FLOWS:

Flow Component	gpcd	MGD	Comments
AWWF	159	0.22	Based on 1997-2004, Nov-April Plant Records
Peak Day	847	1.15	(12/28/1998)
PDAF	575	0.78	Based on 1997-2004 Storms greater than 2"
Peak Week	413	0.56	Average of 8 highest 7 day flows
Peak Average Monthly	236	0.32	Average of 9 highest monthly flows
MMWWF	221	0.30	Based on 2003-2004, Dec-April Plant Records
PIF	1142	1.55	
		0.19	

Yachats WWTP Peaking Factor Data

Existing Peaking Factors	ppd	Peak Factor
2002-2004 Data		
BOD		
Average Day	315	
Max day 12/31/02	1109	3.5
Max Week 3/23/03-3/29/03	690	2.2
Max Month 3/03	522	1.7
TSS		
Average Day	261	
Max day 3/22/03	959	3.7
Max Week 12/29/03-1/4/04	626	2.4
Max Month 7/03	490	1.9

Parameter	2004	2014	2029
Sewered Population (off peak)	1,357	1738	2524
Sewered Population (peak)	2,040	2634	3874
BOD			
Average Load ppcd (off-peak)	0.24	0.24	0.24
Average Load ppcd (peak)	0.15	0.15	0.15
Average Load ppd (off-peak)	322	413	600
Average Load ppd (peak)	307	396	582
TSS			
Average Load ppcd (off-peak)	0.20	0.20	0.20
Average Load ppcd (peak)	0.12	0.12	0.12
Average Load ppd (off-peak)	268	343	499
Average Load ppd (peak)	254	328	482

City of Yachats

Historic Infiltration and Inflow Analyis — Based on EPA Guidelines

1998-2004

Approximate Peak Population = 2040
Approximate Off-Peak Population = 1347
Official Census Population Estimate (2001) = 617

Dry Weather Flow

Date	Rainfall in/day	Plant Flow MGD	7-Day Avg. MGD	Per Capita Usage, gpcd
6/3/1998	0	0.1384		
6/4/1998	0	0.1396		
6/5/1998	0	0.1262		
6/6/1998	0	0.1536		
6/7/1998	0	0.1512		
6/8/1998	0	0.1032		
6/9/1998	0	0.1233	0.1336	66
7/9/1998	0	0.1308		
7/10/1998	0	0.1188		
7/11/1998	0	0.1522		
7/12/1998	0	0.1332		
7/13/1998	0	0.1397		
7/14/1998	0	0.1274		
7/15/1998	0	0.1308	0.1333	65
9/5/1998	0	0.1511		
9/6/1998	0	0.1570		
9/7/1998	0	0.1225		
9/8/1998	0	0.1371		
9/9/1998	0	0.0994		
9/10/1998	0	0.1050		
9/11/1998	0	0.0985	0.1244	61
8/15/1999	0	0.1979		
8/16/1999	0	0.1361		
8/17/1999	0	0.1258		
8/18/1999	0	0.1567		
8/19/1999	0	0.1867		
8/20/1999	0	0.1351		
8/21/1999	0	0.1624	0.1572	77
10/11/1999	0	0.1516		
10/12/1999	0	0.0707		
10/13/1999	0	0.0894		
10/14/1999	0	0.0916		
10/15/1999	0	0.0918		
10/16/1999	0	0.1151		
10/17/1999	0	0.1136	0.1034	51
5/18/2000	0	0.1158		
5/19/2000	0	0.1185		
5/20/2000	0	0.1361		
5/21/2000	0	0.1775		
5/22/2000	0	0.1073		
5/23/2000	0	0.1058		
5/24/2000	0	0.1000	0.1230	60
7/21/2000	0	0.1178		
7/22/2000	0	0.1441		
7/23/2000	0	0.1473		
7/24/2000	0	0.1197		
7/25/2000	0	0.1110		
7/26/2000	0	0.1098		
7/27/2000	0	0.1096	0.1228	60
8/12/2000	0	0.1303		
8/13/2000	0	0.1383		
8/14/2000	0	0.1512		
8/15/2000	0	0.1188		
8/16/2000	0	0.1272		
8/17/2000	0	0.1325		
8/18/2000	0	0.1435	0.1345	66
9/16/2000	0	0.2311		
9/17/2000	0	0.2307		
9/18/2000	0	0.1686		
9/19/2000	0	0.1902		
9/20/2000	0	0.1615		
9/21/2000	0	0.1590		
9/22/2000	0	0.1457	0.1838	90
5/20/2001	0	0.2149		
5/21/2001	0	0.1595		
5/22/2001	0	0.1781		
5/23/2001	0	0.1421		
5/24/2001	0	0.1362		
5/25/2001	0	0.1604		
5/26/2001	0	0.1821	0.1676	82
9/7/2001	0	0.1198		
9/8/2001	0	0.1723		
9/9/2001	0	0.1891		
9/10/2001	0	0.1189		
9/11/2001	0	0.1356		
9/12/2001	0	0.1206		
9/13/2001	0	0.0999	0.1366	67
8/13/2002	0	0.151		
8/14/2002	0	0.1784		
8/15/2002	0	0.1164		
8/16/2002	0	0.1751		
8/17/2002	0	0.2366		
8/18/2002	0	0.1992		
8/19/2002	0	0.1928	0.1785	88
8/1/2003	0	0.1896		
8/2/2003	0	0.1587		
8/3/2003	0	0.1945		
8/4/2003	0	0.1864		
8/5/2003	0	0.1947		
8/6/2003	0	0.1838		
8/7/2003	0	0.1541	0.1794	88
Base Sewage			Average	64

Infiltration, Before Improvements

Date	Rainfall in/day	Plant Flow MGD	7-Day Avg. MGD	Per Capita Usage, gpcd
1/25/1998	0.15	0.3116		
1/26/1998	0.3	0.2414		
1/27/1998	0.3	0.2363		
1/28/1998	0.05	0.1992		
1/29/1998	0.3	0.1771		
1/30/1998	0.33	0.1801		
1/31/1998	0	0.1924	0.2197	163
1/26/1998	0.3	0.2414		
1/27/1998	0.3	0.2363		
1/28/1998	0.05	0.1992		
1/29/1998	0.3	0.1771		
1/30/1998	0.33	0.1801		
1/31/1998	0	0.1924		
2/1/1998	0.3	0.1837	0.2015	150
1/2/1999	0	0.4182		
1/3/1999	0	0.3154		
1/4/1999	0	0.2536		
1/5/1999	0	0.2454		
1/6/1999	0	0.1993		
1/7/1999	0.5	0.1989		
1/8/1999	0	0.1682	0.2570	191
3/15/1999	0	0.2349		
3/16/1999	0	0.4357		
3/17/1999	0.15	0.1896		
3/18/1999	0.25	0.1680		
3/19/1999	0	0.2758		
3/20/1999	0	0.1779		
3/21/1999	0	0.2490	0.2473	184
4/12/1999	0	0.2174		
4/13/1999	0	0.1823		
4/14/1999	0	0.1600		
4/15/1999	0	0.1345		
4/16/1999	0	0.1176		
4/17/1999	0	0.1384		
4/18/1999	0	0.1731	0.1605	119
2/15/2000	0.3	0.3131		
2/16/2000	0	0.2811		
2/17/2000	0	0.2450		
2/18/2000	0	0.1936		
2/19/2000	0	0.1983		
2/20/2000	0	0.1826		
2/21/2000	0.2	0.1887	0.2289	170
3/5/2000	0	0.2307		
3/6/2000	0	0.1714		
3/7/2000	0	0.1692		
3/8/2000	0.5	0.1481		
3/9/2000	0	0.2254		
3/10/2000	0	0.2582		
3/11/2000	0.5	0.1708	0.1963	146
12/24/2000	0	0.2118		
12/25/2000	0	0.1605		
12/26/2000	0	0.1365		
12/27/2000	0	0.1503		
12/28/2000	0	0.1437		
12/29/2000	0	0.1616		
12/30/2000	0.6	0.1439	0.1583	118
3/20/2001	0	0.2590		
3/21/2001	0	0.2921		
3/22/2001	0	0.1667		
3/23/2001	0	0.1311		
3/24/2001	0	0.1620		
3/25/2001	0.5	0.1658		
3/26/2001	0.2	0.1591	0.1908	142
4/12/2001	0.2135	0.2135		
4/13/2001	0.204	0.2040		
4/14/2001	0.1819	0.1819		
4/15/2001	0.1855	0.1855		
4/16/2001	0.1531	0.1531		
4/17/2001	0.1352	0.1352		
4/18/2001	0.1322	0.1322	0.1722	128
12/21/2001	0	0.3041		
12/22/2001	0.2	0.2658		
12/23/2001	0	0.2360		
12/24/2001	0	0.1865		
12/25/2001	0	0.2139		
12/26/2001	0	0.1662		
12/27/2001	0	0.1628	0.2193	163
1/10/2002	0	0.427		
1/11/2002	0	0.3189		
1/12/2002	0.6	0.299		
1/13/2002	0	0.2585		
1/14/2002	0	0.2185		
1/15/2002	0	0.1959		
1/16/2002	0	0.1614	0.2685	199
2/7/2003	0	0.1958		
2/8/2003	0	0.2062		
2/9/2003	0	0.1759		
2/10/2003	0	0.1399		
2/11/2003	0	0.1313		
2/12/2003	0	0.1301		
2/13/2003	0	0.1454	0.1607	119
Average Before Improvements				153
EPA Criteria			*Infiltration*	120

Infiltration After Improvements

Date	Rainfall in/day	Plant Flow MGD	7-Day Avg. MGD	Per Capita Usage, gpcd
4/1/2004	0.1	0.2144		
4/2/2004	0	0.085		
4/3/2004	0	0.0981		
4/4/2004	0	0.1298		
4/5/2004	0	0.0916		
4/6/2004	0	0.0837		
4/7/2004	0	0.0846		
4/8/2004	0	0.0865		
4/9/2004	0	0.1057		
4/10/2004	0	0.1156		
4/11/2004	0	0.1020	0.1088	81
3/11/2004	0	0.1101		
3/12/2004	0	0.1136		
3/13/2004	0	0.1152		
3/14/2004	0	0.128		
3/15/2004	0	0.1317		
3/16/2004	0	0.1321		
3/17/2004	0	0.1334		
3/18/2004	0.05	0.1422	0.1258	93
Average Before Improvements				**153**
Average After I/I Improvements				**87**
EPA Criteria			***Infiltration***	***120***

Inflow

Date	Rainfall in/day	Plant Flow MGD	Per Capita Usage, gpcd
3/22/1998	2.7	0.4251	316
11/21/1998	2.65	0.4920	365
11/25/1998	3.85	0.4877	362
11/26/1998	2.7	0.7882	585
12/2/1998	2.9	0.6711	498
12/25/1998	3.2	0.3760	279
12/28/1998	7.25	0.6500	483
12/29/1998	2.75	1.1505	854
2/2/1999	2.2	0.3801	282
2/23/1999	2.75	0.3549	263
2/24/1999	2.55	0.3549	263
2/25/1999	2.1	0.2667	198
2/27/1999	2.2	0.3255	242
11/10/1999	2.5	0.3237	240
11/12/1999	2.2	0.3629	269
11/25/1999	4.28	0.6379	474
11/26/1999	5.04	0.7808	580
12/2/1999	2.5	0.4045	300
12/15/1999	3.5	0.5643	419
12/16/1999	3.2	0.7092	527
2/8/2000	2	0.2244	167
12/1/2001	2.5	0.6536	485
12/13/2001	2.2	0.3819	284
1/7/2002	2.4	0.3946	293
1/8/2002	2.2	0.7555	561
1/20/2002	2.25	0.3129	232
1/25/2002	3.45	0.4469	332
3/6/2002	2.4	0.1801	134
3/12/2002	2.7	0.3717	276
12/14/2002	2.7	0.3889	289
12/15/2002	2	0.6218	462
12/16/2002	3.8	0.6353	472
12/31/2002	2.9	0.6392	475
1/30/2003	3.5	0.4659	346
2/1/2003	2.75	0.9537	708
3/22/2003	3	0.7982	593
11/17/2003	2.25	0.2555	190
12/13/2003	2	0.4165	309
12/14/2003	2.5	0.6658	494
12/29/2003	4.75	0.5095	378
1/29/2004	2.5	0.4261	316
Average			**380**
Average after I/I Improvements			**316**
EPA Criteria		*Inflow*	275

Design Flows for Yachats

Summary of Existing Influent Flows at the Yachats WWTP

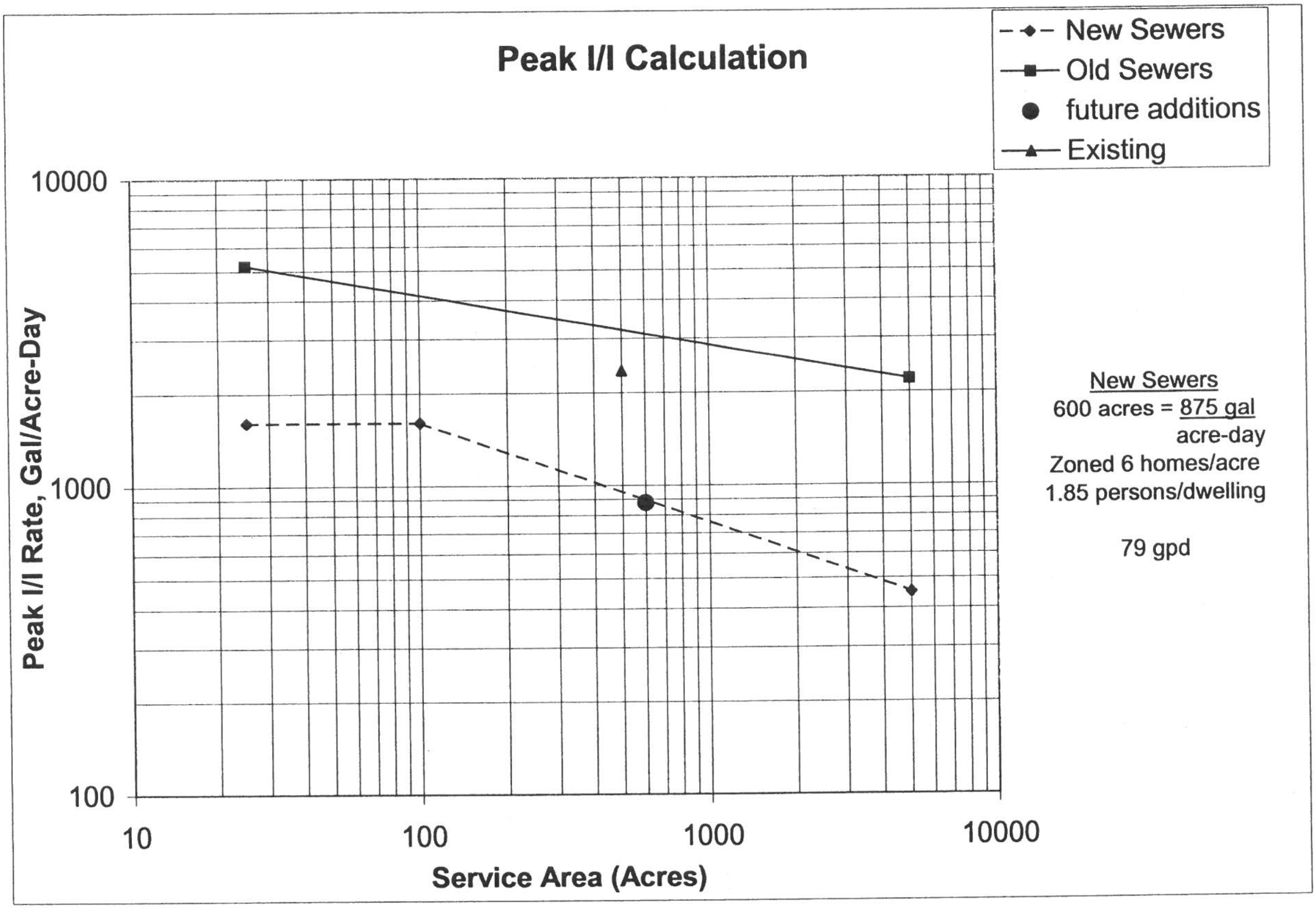
Flow Parameter	MGD	gpcd	Basis
Population - Dry Season		2040	2004 Equivalent Population
Population - Wet Season		1,357	2004 Equivalent Population
ADWF	0.17	81	1997-2004, May to Oct
Base Sewage	0.14	68	Based on review of Yachats Water Records
Base Infiltration	0.027	13	ADWF-Base Sewage
AWWF	0.22	159	1997-2004
MMDWF	0.17	82	2003-2004
MMWWF	0.30	221	2003-2004
Peak Month	0.32	236	Peak month = December 1998
Peak Week	0.56	413	Average of 7 day highs 1997-2004
Peak Day	1.15	847	Peak day: 12/29/98
PIF	1.55	1142	Estimated from probability plot
MMWW I/I	0.16	153	MMWWF - Base Sewage
PI I/I	1.41	1074	PIF - Base Sewage

Flow Projections for the years 2010 and 2029.

Year	2010	2029
Peak Population - Dry	2378	3,874
Off- Peak Population - Wet	1574	2524

Flow Parameter	MGD	MGD	Basis
Base Sewage - Dry	0.16	0.26	gpcd X new dry population
Base Infiltration - Dry	0.03	0.06	Base Infil. + (20 gpcd*pop. increase) - expansion
ADWF	0.20	0.33	Base sewage + base infiltration
Add. Dry I/I	0.00	0.00	Exist MMDWF - Exist. ADWF
MMDWF	0.20	0.33	Add. I/I + new ADWF
Base Sewage - Wet	0.16	0.26	gpcd X new wet population
Base Infiltration - Wet	0.04	0.12	Base Infil. + (79 gpcd*pop. increase) - expansion
Add. Ave. Wet I/I	0.05	0.05	Exist AWWF - Exist ADWF
AWWF	0.26	0.43	Add Ave. Wet I/I + Base Sewage (wet) + Base Infil (wet)
Add. MM Wet I/I	0.08	0.08	Exist MMWWF - Exist AWWF
MMWWF	0.34	0.51	Add MM Wet I/I + new AWWF
Peak Month	0.36	0.55	(Exist. Peak Month/Exist MMWWF) * New MMWWF
Peak Week	0.63	0.95	(Exist. Peak Week/Exist MMWWF) * New MMWWF
Peak Day	1.30	1.96	(Exist. Peak Day/Exist MMWWF) * New MMWWF
PIF	1.75	2.64	(Exist. PIF/Exist MMWWF) * New MMWWF
MMWW I/I	0.18	0.25	MMWWF - Base Sewage (wet)
PI I/I	1.59	2.39	PIF - Base Sewage (wet)

1,834 Dry population increase
1,167 Wet population increase


Peak I/I Calculation
New Sewers
Old Sewers
future additions
Existing
10000
1000
100
Peak I/I Rate, Gal/Acre-Day
10
100
1000
10000
Service Area (Acres)
New Sewers
600 acres = 875 gal
acre-day
Zoned 6 homes/acre
1.85 persons/dwelling
79 gpd

Calculation of Nitrogen Loading From Application of WWTP Sludge

City of Yachats Wastewater Facilities Plan

Summary of Analysis of Nitrogen in Dig. #2 Sludge WWTP Sludge Concentrations, % of dry weight

Pollutant	2003	8/28/2002	8/22/2001	8/21/2000	8/11/1999	Average
Ammonium Nitrogen	NA	1.31	0.22	1.8	0.8	0.94
Nitrate Nitrogen	NA	0	0.290	0.000	0.571	0.287
TKN	NA	7.41	7.58	9.3	6.55	7.81
Net Organic Nitrogen	NA	6.1	7.36	7.5	5.75	6.87
Volatile Solids	NA	70.2	72	76.9	71.1	73.3

Hall Site				
Year	2002	2002	2001	2000
Acres	16	16	16	not used
Ha	6.5	6.5	6.5	
Sludge Gallons	NA	318000	126,000	
% solids	2.0%	1.9%	2.1%	
Dry solids, lb/yr		50,655	21,963	
Crop	Rye Grass	Rye Grass	Rye Grass	
Agronomic Load Rate lb/acre/yr		100	100	
Agronomic Load Rate kg/ha/yr		112	112	
Application factor (surface)		0.5	0.5	
Aerobically digested sludge factor		0.3	0.3	
Total Organic Nitrogen, kg		1,405	735	
Ammonium Nitrogen, kg	NA	151	11	
Nitrate Nitrogen, kg	NA	0.0	29.0	
Organic Nitrogen Available, kg	NA	421	220	
Prior available organic Nitrogen, kg	185	41	0	
Total available nitrogen, kg		613	260	
Nitrogen available per kg/ha		95	40	
Average gallons of sludge per year this site can handle				**359,224**

Flescher Site				
Year	2002	2001	2000	1999
Acres	35	35	35	35
Ha	14.2	14.2	14.2	14.2
Sludge Gallons	NA	-	303,000	168000
% solids	2.0%	2.1%	1.8%	3.0%
Dry solids, lb/yr		-	44,223	41,753
Crop	Rye Grass	Rye Grass	Rye Grass	Rye Grass
Agronomic Load Rate lb/acre/yr	100	100	100	100
Agronomic Load Rate kg/ha/yr	112	112	112	112
Application factor (surface)	0.5	0.5	0.5	0.5
Aerobically digested sludge factor	0.3	0.3	0.3	0.3
Total Organic Nitrogen, kg		0	1,508	1,091
Ammonium Nitrogen, kg	NA	0	181	76
Nitrate Nitrogen, kg	NA	0.0	0.0	108.4
Organic Nitrogen Available, kg	NA	0	452	327
Prior available organic Nitrogen, kg	68	210	115	0
Total available nitrogen, kg		210	748	512
Nitrogen available per kg/ha		15	53	36
Average gallons of sludge per year this site can handle				**646,196**

Calculation of Pollutant Loading From Application of WWTP Sludge
City of Yachats Wastewater Facilities Plan

Yachats WWTP
Summary of Analysis of Pollutants in Digester #2 Sludge

Pollutant	Part 503.13 Concentration Limits, mg/kg dry Ceiling	Monthly Ave.	WWTP Sludge Concentrations, mg/kg dry 8/22/2002	8/22/2001	8/21/2000	8/11/1999	Average
Arsenic, As	75	41	5	5	5	5	<3.2
Cadmium, Cd	85	39	2	2.8	2.8	2.7	2.6
Copper, Cu	4,300	1,500	335	478	435	423	417.8
Lead, Pb	840	300	21.3	27.4	15.3	24.7	22.2
Mercury, Hg	57	17	0.5	0.5	0.6	0.6	0.6
Molybdenum, Mo	75	NA	5	6	6.2	4.9	<10.5
Nickel, Ni	420	420	10.7	13.2	13.6	15.8	13.3
Selenium, Se	100	100	5	5	5	5	5.0
Zinc, Zn	7,500	2,800	590	888	798	841	779.3

Hall Site								
Year	2002	2001	2000	1999	Cumulative	Avg.		
Acres	16	16	16	16	16	16.0		
ha	6.5	6.5	6.5	6.5	6.5	6.5		
Sludge Gallons	318000	126,000	-		444,000	222,000		
% solids	1.9%	2.1%	1.5%	1.5%		0.02000	EPA	
Dry solids, lb/yr	50,655	21,963	-	-	21,963	36,309	Limit	Site Life
Pollutant \ units	kg/ha/yr	kg/ha/yr	kg/ha/yr	kg/ha/yr	kg/ha	kg/ha/yr	kg/ha	Years
Arsenic, As	0.01778	0.00771	-	-	0.02549	0.01274	41	3,217
Cadmium, Cd	0.00711	0.00432	-	-	0.01143	0.00571	39	6,825
Copper, Cu	1.19125	0.73695	-	-	1.92820	0.96410	1500	1,556
Lead, Pb	0.07574	0.04224	-	-	0.11799	0.05899	300	5,085
Mercury, Hg	0.00178	0.00077	-	-	0.00255	0.00127	17	13,339
Molybdenum, Mo	0.01778	0.00925	-	-	0.02703	0.01352	NA	NA
Nickel, Ni	0.03805	0.02035	-	-	0.05840	0.02920	420	14,384
Selenium, Se	0.01778	0.00771	-	-	0.02549	0.01274	100	7,847
Zinc, Zn	2.09802	1.36907	-	-	3.46709	1.73354	2800	1,615

Flescher Site								
Year	2002	2001	2000	1999	Cumulative	Avg.		
Acres	35	35	35	35	35	35.0		
ha	14.2	14.2	14.2	14.2	14.2	14.2		
Sludge Gallons	0	126,000	303,000	168000	597,000	199,000		
% solids	1.9%	2.1%	1.8%	3.0%		0.02273	EPA	
Dry solids, lb/yr	-	21,963	44,223	41,753	107,939	35,980	Limit	Site Life
Pollutant \ units		kg/ha/yr	kg/ha/yr	kg/ha/yr	kg/ha	kg/ha/yr	kg/ha	Years
Arsenic, As	-	0.00352	0.00710	0.00670	0.01732	0.00577	41	7,102
Cadmium, Cd	-	0.00197	0.00397	0.00362	0.00956	0.00319	39	12,232
Copper, Cu	-	0.33689	0.61733	0.56678	1.52100	0.50700	1500	2,959
Lead, Pb	-	0.01931	0.02171	0.03310	0.07412	0.02471	300	12,142
Mercury, Hg	-	0.00035	0.00085	0.00080	0.00201	0.00067	17	25,401
Molybdenum, Mo	-	0.00423	0.00880	0.00657	0.01959	0.00653	NA	NA
Nickel, Ni	-	0.00930	0.01930	0.02117	0.04977	0.01659	420	25,314
Selenium, Se	-	0.00352	0.00710	0.00670	0.01732	0.00577	100	17,322
Zinc, Zn	-	0.62586	1.13248	1.12686	2.88520	0.96173	2800	2,911

Calculation of Required Digester Space
Yachats Wastewater Facilities Plan

Parameter	Current Operation		Basis
Year	2004	2029	20 year use period
AWWF, MGD	0.22	0.43	2001-2004 DMRs
ADWF, MGD	0.17	0.33	2001-2004 DMRs
Average Flow, MGD	0.195	0.38	Annual average of AWWF & ADWF
Ave. Month BOD Loading, ppd	322	600	From Section 5
Max. Month BOD Loading, ppd	522	995	Design BOD - max. month
Design Month BOD Loading, ppd	322	600	Peak Avg. month
Effluent BOD, mg/l	20	10	
Sludge Yield	0.75	0.75	Assumed yield
Amount of Sludge Produced, ppd	217.5	426.2	(Influent-effuent BOD) x sludge yield
Solids Fraction	0.005	0.005	Based on WAS %
Volume of Sludge Produced, gpd	5215	10221	
% Volatile Solids	75	75	Based on current average
Volatile Solids Loading	163.1	319.7	
Residence Time	60	60	
Temperature, oC	15	15	
% Volatile Solids Reduction	28	40	
Fraction of Solids Not Destroyed	0.79	0.70	
Influent SS, mg/l	5000	5000	
Thickened SS, mg/l	19000	19000	Avg. of land applied sludge thickness
SS in Supernatant	0	0	
Average SS in Digester	13300	13300	70% of thickened solids
Material Retained in Digester	0.21	0.18	
Material Leaving as Supernatant	0.79	0.82	
Required Tank Volume, MG	0.0929	0.1614	
Required Tank Volume, gallons	92,925	161,390	
Required Tank Volume, ft3	12423	21576	
Mass of Digester Sludge, lb/d	172	298	
Volume of Digester Sludge, gpd	1084	1883	
Separate Calculation of Required Tankage			
Thickened SS, mg/l	19000	19000	
Required Tank Volume, ft3	11008	21576	
Required Tank Volume, gallons	82,339	161,390	
Calculated Gallons/Yr sludge	395,707	687,252	
Actual gallons/Yr sludge	297,000		
Existing Tank Volume	82,811		
Required 6 months Storage Volume (gal)		343,626	half of annual volume

Cost Estimates

Appendix

D

Estimated Cost to Install Larger Pipe in Areas With Low Slopes

(Ocean View Road at Main Pump Station MH D-1 to A-1)

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 3,564	$ 3,564
2	Demolition & Site Preparation	LS	All	$ 2,376	$ 2,376
3	By-Pass Pumping	LS	All	$ 6,000	$ 6,000
4	AC Pavement	LF	80	$ 27	$ 2,160
5	Replace 10" w/ 14" sewerpipe	LF	80	$ 195	$ 15,600
			Construction Subtotal		**$ 29,700**
			Contingency		$ 2,970
			Engineering		$ 5,400
			Administration		$ 900
			Permit Fees		$ 350
			Project Total		**$ 39,320**

New Above Ground Main Pump Station

Construction Cost Estimate with Generator

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 33,100	$ 33,100
2	Demolition & Site Preparation	LS	All	$ 22,100	$ 22,100
3	Temporary controls & Pumping	LS	1	$ 16,000	$ 16,000
4	Decommission Old Pump Station & Wet-Well	EA	1	$ 11,000	$ 11,000
5	New Wet Well	EA	1	$ 16,000	$ 16,000
6	Fencing	EA	1	$ 11,000	$ 11,000
7	Extend adjacent gravity sewers	EA	1	$ 5,500	$ 5,500
8	10 HP submersible Pumps	EA	2	$ 16,200	$ 32,400
9	Piping & Valves	LS	1	$ 19,500	$ 19,500
10	Structure	SF	200	$ 110	$ 22,000
11	Electrical	LS	1	$ 13,000	$ 13,000
12	Controls & Telemetry	LS	1	$ 21,500	$ 21,500
13	Hoist & Rails	EA	2	$ 2,900	$ 5,800
14	Site Landscaping	LS	1	$ 2,700	$ 2,700
15	Generator	EA	1	$ 44,000	$ 44,000

Construction Subtotal	**$ 275,600**
Contingency	$41,400
Engineering	$55,200
Land Acquisition	$ 50,000
Administration	$ 8,000
Permit Fees	$ 1,000
Project Total	**$ 431,200**

New Above Ground Main Pump Station

Construction Cost Estimate with transfer switch & receptacle

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 25,000	$ 25,000
2	Demolition & Site Preparation	LS	All	$ 16,500	$ 16,500
3	Temporary controls & Pumping	LS	1	$ 16,000	$ 16,000
4	Decommission Old Pump Station & Wet-Well	EA	1	$ 11,000	$ 11,000
5	New Wet Well	EA	1	$ 16,000	$ 16,000
6	Fencing	EA	1	$ 11,000	$ 11,000
7	Extend adjacent gravity sewers	EA	1	$ 5,500	$ 5,500
8	10 HP submersible Pumps	EA	2	$ 16,000	$ 32,000
9	Piping & Valves	LS	1	$ 19,000	$ 19,000
10	Stucture	SF	200	$ 100	$ 20,000
11	Electrical	LS	1	$ 16,000	$ 16,000
12	Controls & Telemetry	LS	1	$ 21,500	$ 21,500
13	Hoist & Rails	EA	2	$ 2,700	$ 5,400
14	Site Landscaping	LS	1	$ 2,700	$ 2,700

Construction Subtotal	**$ 217,600**
Contingency	$ 31,000
Engineering	$ 38,000
Land Acquisition	$ 40,000
Administration	$ 6,210
Permit Fees	$ 1,000
Project Total	**$ 333,810**

New Ocean View Pump Station

Construction Cost Estimate Packaged Station with Generator

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 14,850	$ 14,850
2	Demolition & Site Preparation	LS	All	$ 9,900	$ 9,900
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	Generator	EA	1	$ 27,000	$ 27,000
5	Generator Pad & Enclosure	EA	1	$ 5,400	$ 5,400
6	Packaged Pump Station	EA	1	$ 43,000	$ 43,000
7	Remove Old Pump Station	LS	1	$ 1,600	$ 1,600
8	Piping & Connections	LS	1	$ 5,400	$ 5,400
9	Electrical	LS	1	$ 8,000	$ 8,000
10	Controls & Telemetry	LS	1	$ 2,100	$ 2,100
11	Site Landscaping	LS	1	$ 1,100	$ 1,100

Construction Subtotal	**$ 123,750**
Contingency	$ 12,400
Engineering	$ 24,800
Administration	$ 3,800
Permit Fees	$ 1,000
Project Total	**$ 165,750**
with crossing	$ 335,750

New Ocean View Pump Station

Construction Cost Estimate for Packaged Station Without Generator

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 9,615	$ 9,700
2	Demolition & Site Preparation	LS	All	$ 6,410	$ 6,410
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	Packaged Pump Station	EA	1	$ 43,000	$ 43,000
5	Remove Old Pump Station	LS	1	$ 1,600	$ 1,600
6	Piping & Connections	LS	1	$ 5,400	$ 5,400
7	Electrical	LS	1	$ 5,400	$ 5,400
8	Site Landscaping	LS	1	$ 1,100	$ 1,100
8	Controls & Telemetry	LS	1	$ 2,200	$ 2,200

Construction Subtotal	**$ 80,210**
Contingency	$ 8,100
Engineering	$ 16,100
Administration	$ 2,500
Permit Fees	$ 1,000
Project Total	**$ 107,910**

New River Crossing Force Main

6" line following Existing Route

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 32,565	$ 32,565
2	Demolition & Site Preparation	LS	All	$ 32,565	$ 32,565
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	Preconstuction Feasibility Exploration	LS	1	$ 22,000	$ 22,000
5	Tie to Existing Stations	EA	2	$ 2,700	$ 5,400
6	6" Force Main Under River	LF	790	$ 220	$ 173,800
7	Remove Old Force Main	LF	790	$ 10	$ 7,900
8	Site Landscaping	LS	1	$ 2,600	$ 2,600
			Construction Subtotal		**$ 282,230**
			Contingency		$ 42,400
			Engineering		$ 56,500
			Legal		$ 20,000
			Administration		$ 8,500
			Permit Fees		$ 2,000
			Project Total		**$ 411,630**

New River Crossing Force Main

6" line following Hwy 101, Crossing Bridge

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 14,700	$ 14,700
2	Demolition & Site Preparation	LS	All	$ 9,800	$ 9,800
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	Tie to Existing Stations	EA	2	$ 2,600	$ 5,200
5	Existing Manhole Drop & Rehab	EA	1	$ 2,700	$ 2,700
5	6" Force Main Under Bridge	LF	200	$ 220	$ 44,000
6	6" Force Main Direct Bury*	LF	600	$ 55	$ 33,000
7	Asphalt Repair	LF	100	$ 27	$ 2,700
8	Site Landscaping	LS	1	$ 5,000	$ 5,000
			Construction Subtotal		**$ 122,500**
			Contingency		$ 12,300
			Engineering		$ 24,500
			Legal		$ 5,000
			Administration		$ 3,700
			Permit Fees		$ 2,000
			Project Total		**$ 170,000**

* Assumes gravity flow from MH G-2 to Riverside PS.
Add 645 feet and $50,000 if Forcemain continues to Riverside PS.

New Riverside Packaged Pump Station

Construction Cost Estimate with transfer switch & receptacle

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 9,690	$ 9,690
2	Demolition & Site Preparation	LS	All	$ 6,460	$ 6,460
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	Remove Old Pump Station	LS	1	$ 1,600	$ 1,600
5	Packaged Pump Station	EA	1	$ 44,000	$ 44,000
6	Piping & Connections	LS	1	$ 5,400	$ 5,400
7	Electrical	LS	1	$ 4,400	$ 4,400
8	Controls & Telemetry	LS	1	$ 3,800	$ 3,800

Construction Subtotal	**$ 80,750**
Contingency	$ 8,075
Engineering	$ 14,535
Administration	$ 2,423
Permit Fees	$ 1,000
Project Total	**$ 106,783**

Refurbish & Upsize Riverside Packaged Pump Station

Construction Cost Estimate with transfer switch & receptacle

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 3,900	$ 3,900
2	Demolition & Site Preparation	LS	All	$ 2,600	$ 2,600
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	New Impellors	LS	1	$ 4,400	$ 4,400
5	New Motor	EA	1	$ 5,400	$ 5,400
6	Piping & Connections	LS	1	$ 5,400	$ 5,400
7	Electrical	LS	1	$ 5,400	$ 5,400

Construction Subtotal	**$ 32,500**
Contingency	$ 3,300
Engineering	$ 5,900
Administration	$ 1,000
Permit Fees	$ 1,000
Project Total	**$ 43,700**

9/4/2004

New Above Ground Packaged Pump Station

Construction Cost Estimate with transfer switch & receptacle

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 16,000	$ 16,000
2	Demolition & Site Preparation	LS	All	$ 9,500	$ 9,500
3	Temporary controls & Pumping	LS	1	$ 5,400	$ 5,400
4	New Wet Well	EA	1	$ 5,400	$ 5,400
5	10" sewerpipe (Class B, > 8')	LF	50	$ 105	$ 5,250
6	Manhole	EA	1	$ 3,800	$ 3,800
7	Packaged Pump Station	EA	1	$ 38,000	$ 38,000
8	Land Acquisition	EA	1	$ 22,000	$ 22,000
9	4" Pressure Main	EA	1,750	$ 35	$ 61,250
10	Piping & Connections	LS	1	$ 5,400	$ 5,400
11	Electrical	LS	1	$ 8,000	$ 8,000
12	Controls & Telemetry	LS	1	$ 5,400	$ 5,400
13	Site Landscaping	LS	1	$ 1,100	$ 1,100

Construction Subtotal	**$ 186,500**
Contingency	$ 28,000
Engineering	$ 35,000
Administration	$ 3,700
Permit Fees	$ 1,000
Project Total	**$ 254,200**

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Clean Wet wells	EA	2	$ 400	$ 800
2	Electricity	kWh	9000	$ 0.07	$ 630
3	Daily Inspection	HR	140	$ 25	$ 3,500
4	Repair	LS	1	$ 2,000	$ 2,000

Annual Project Total	**$ 6,930**
Interest Rate	6%
Project life years	25
Present O&M Cost	**$ 88,589**
Project Present Value	**$ 342,789**

Upgrade Existing Headworks

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 48,700	$ 48,700
2	Demolition & Site Preparation	LS	All	$ 32,500	$ 32,500
3	Bypass Pumping	LS	All	$ 3,800	$ 3,800
4	Mechanical Screen Upgrade	LS	All	$ 75,000	$ 75,000
5	Metal Work & Painting	LS	All	$ 16,000	$ 16,000
6	Structure	EA	1	$ 8,700	$ 8,700
7	Piping & Connections	LS	1	$ 10,900	$ 10,900
8	Electrical	LS	1	$ 8,200	$ 8,200
9	Headworks Pump Station	LS	1	$ 200,000	$ 200,000
10	Chute & Dumpster	LS	1	$ 1,600	$ 1,600

Construction Subtotal	**$ 405,400**
Contingency	$60,900
Engineering	$81,100
Administration	$12,200
Project Total	**$ 559,600**

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Clean Wet wells	EA	4	$ 400	$ 1,600
2	Electricity	kWh	60000	$ 0.07	$ 4,200
3	Daily Inspection	HR	182.5	$ 25	$ 4,563
4	Repair	LS	1	$ 3,500	$ 3,500

Annual Project Total	**$ 13,863**
Interest Rate	6%
Project life years	25
Present Value O&M Cost	**$ 177,209**
Project Present Value	**$ 736,809**

New Headworks

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 52,100	$ 52,100
2	Demolition & Site Preparation	LS	All	$ 34,700	$ 34,700
3	Bypass Pumping	LS	All	$ 2,200	$ 2,200
4	Mechanical Screen Upgrade	LS	All	$ 75,000	$ 75,000
5	New Grit Removal Equipment	LS	All	$ 50,000	$ 50,000
6	Structure	YD	250	$ 550	$ 137,500
7	Piping & Connections	LS	1	$ 27,000	$ 27,000
8	Electrical	LS	1	$ 11,000	$ 11,000
9	Roof, Metal Work & Railings	LS	1	$ 16,000	$ 16,000
10	Relocate & Extend Influent Force Main	LS	350	$ 80	$ 28,000
			Construction Subtotal		**$ 433,500**
			Contingency		$65,100
			Engineering		$86,700
			Administration		$8,700
			Project Total		**$ 594,000**

New Sampling Stations

In House, Using Local Electrician

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ -	$ -
2	Freight	EA	2	$ 125	$ 125
3	Whitney 6712FR Sampler	EA	2	$ 6,000	$ 12,000
4	24 1 Liter Bottle Assortment	EA	2	$ 300	$ 600
5	Suction Line & Strainer	EA	2	$ 95	$ 190
6	Bult Tubing	EA	2	$ 60	$ 120
7	GFI Electrical Outlets	LS	2	$ 250	$ 500

Construction Subtotal	**$ 13,535**
Contingency	$ 2,500
Engineering	$ 2,500
Administration	$ 500
Project Total	**$ 19,035**

New Effluent Meter

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 2,100	$ 2,100
2	Demolition & Site Preparation	LS	All	$ 1,400	$ 1,400
3	0-5 MGD Mag Meter	EA	1	$ 8,000	$ 8,000
4	Piping & Connections	LS	1	$ 2,500	$ 2,500
5	Electrical	LS	1	$ 2,000	$ 2,000
6	Wiring to control panel	LS	1	$ 1,500	$ 1,500

Construction Subtotal	**$ 17,500**
Contingency	$ 2,250
Engineering	$ 3,000
Administration	$ 500
Project Total	**$ 23,250**

Upgrade WWTP Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 371,000	$ 371,000
2	Demolition & Site Preparation	LS	All	$ 247,400	$ 247,400
3	New Headworks	LS	1	$ 324,200	$ 324,200
4	Temporary controls & Pumping	LS	1	$ 15,000	$ 15,000
5	UV disinfection	LS	1	$ 215,030	$ 215,030
6	Convert donut to digester	LS	1	$ 60,000	$ 60,000
7	New Filter Press	LS	1	$ 119,800	$ 119,800
8	Back up generator	LS	1	$ 95,000	$ 95,000
9	New 35' Clarifier	LS	1	$ 290,000	$ 290,000
10	New Aeration Basins	EA	2	$ 275,000	$ 550,000
11	Blowers for Aeration Basins	EA	3	$ 30,000	$ 90,000
12	Diffused air system for aeration basins	LS	1	$ 85,000	$ 85,000
13	Plant Piping and Valves	LS	1	$ 110,000	$ 110,000
14	Electrical	LS	1	$ 125,000	$ 125,000
15	Metalworks & railings	LF	500	$ 50	$ 25,000
16	Fencing	LF	520	$ 15	$ 7,800
17	Refurbish Exterior finishes & Paint	LS	1	$ 50,000	$ 50,000
18	Controls & Telemetry	LS	1	$ 75,000	$ 75,000
19	Landscaping & paving	LS	1	$ 20,000	$ 20,000
20	Demo Existing Shop	SF	1,650	$ 20	$ 33,000
21	New City Shop	SF	4,500	$ 75	$ 337,500
22	Blower and Control Building	LS	1	$ 150,000	$ 150,000
23	Nonpotable water system	LS	1	$ 20,000	$ 20,000

Construction Subtotal	**$ 3,415,730**
Contingency	$ 614,900
Engineering	$ 683,200
Administration	$ 102,500
DEQ Review Fees	$ 5,000
Project Total	**$ 4,821,330**

SBR Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 348,100	$ 348,100
2	Demolition & Site Preparation	LS	All	$ 232,100	$ 232,100
3	New Headworks	LS	1	$ 324,200	$ 324,200
4	Temporary controls & Pumping	LS	1	$ 15,000	$ 15,000
5	UV System	LS	1	$ 215,030	$ 215,030
6	Convert donut to digester	LS	1	$ 60,000	$ 60,000
7	New Filter Press	LS	1	$ 119,800	$ 119,800
8	Back up generator	LS	1	$ 95,000	$ 95,000
9	Concrete Structure	CY	1,190	$ 575	$ 684,250
10	Structural Backfill	CY	300	$ 50	$ 15,000
11	Native Backfill	CY	720	$ 30	$ 21,600
12	Excavation	CY	1,010	$ 30	$ 30,300
13	Equipment	LS	1	$ 312,500	$ 312,500
14	Piping & Valves	LS	1	$ 125,000	$ 125,000
15	Electrical	LS	1	$ 125,000	$ 125,000
16	Handrails	LF	600	$ 50	$ 30,000
17	Fencing	LF	520	$ 15	$ 7,800
18	Refurbish Exterior Surfaces & Paint	LS	1	$ 50,000	$ 50,000
19	Controls & Telemetry	LS	1	$ 75,000	$ 75,000
20	Site Landscaping	LS	1	$ 15,000	$ 15,000
21	Demo Existing Shop	SF	1,650	$ 20	$ 33,000
22	New City Shop	SF	4,500	$ 75	$ 337,500
23	Blower and Control Building	LS	1	$ 150,000	$ 150,000
24	Non-Potable Water System	LS	1	$ 40,000	$ 40,000

Construction Subtotal	**$ 3,461,180**
Engineering	$692,300
Contingency	$623,100
Administration	$69,300
Permit Fees	$ 4,600
Project Total	**$ 4,850,480**

Membrane Bioreactor Preliminary Cost Estimate

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 394,800	$ 394,800
2	Demolition & Site Preparation	LS	All	$ 276,400	$ 276,400
3	New Headworks	LS	1	$ 324,200	$ 324,200
4	Temporary controls & Pumping	LS	1	$ 15,000	$ 15,000
5	UV System	LS	1	$ 215,030	$ 215,030
6	Convert donut to digester	LS	1	$ 60,000	$ 60,000
7	New Filter Press	LS	1	$ 119,800	$ 119,800
8	Back up generator	LS	1	$ 95,000	$ 95,000
9	Concrete Structure	CY	400	$ 575	$ 230,000
10	Structural Backfill	CY	70	$ 50	$ 3,500
11	Native Backfill	CY	140	$ 30	$ 4,200
12	Excavation	CY	210	$ 30	$ 6,300
13	Membrane Bioreactor Equipment	LS	1	$ 2,042,400	$ 2,042,400
14	Piping & Valves	LS	1	$ 125,000	$ 125,000
15	Electrical	LS	1	$ 125,000	$ 125,000
16	Handrails and metal works	LF	275	$ 50	$ 13,750
17	Fencing	LF	520	$ 15	$ 7,800
18	Controls & Telemetry	LS	1	$ 75,000	$ 75,000
19	Site Landscaping	LS	1	$ 15,000	$ 15,000
20	Demo Existing Shop	SF	1,650	$ 20	$ 33,000
21	New City Shop	SF	4,500	$ 75	$ 337,500
22	Blower and Control Building	LS	1	$ 100,000	$ 100,000
23	Non-Potable Water System	LS	1	$ 40,000	$ 40,000

Construction Subtotal	**$ 4,658,680**
Engineering	$931,800
Contingency	$838,600
Administration	$93,200
Permit Fees	$ 4,600
Project Total	**$ 6,526,880**

UV Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 32,300	$ 32,300
2	Demolition & Site Preparation	LS	All	$ 21,600	$ 21,600
3	UV treatment equip & controls	EA	4	$ 35,000	$ 140,000
4	UV channel	EA	2	$ 11,000	$ 22,000
5	Excavation & Backfill	YD	30	$ 32	$ 960
6	Manhole	EA	1	$ 3,800	$ 3,800
7	Piping & Connections	LS	165	$ 150	$ 24,750
8	Fill Existing Chlorine Channel	YD	133	$ 40	$ 5,320
9	Electrical	LS	1	$ 15,000	$ 15,000
10	Water level control	LS	2	$ 1,600	$ 3,200

Construction Subtotal	**$ 268,930**
Contingency	$40,400.00
Engineering	$53,800.00
Administration	$8,100.00
Project Total	**$ 371,230**

UV O&M Costs

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Energy to Lamps	kWh	31,536	$ 0.07	$ 2,208
2	Weekly Lamp Cleaning	Hr	104	$ 30	$ 3,120
3	Lamp Replacement	EA	20	$ 45	$ 900
4	Ballast Replacement	EA	3	$ 150	$ 450
5	Crystal Replacement	EA	6	$ 35	$ 210
6	Monitoring & Operation	Hr	52	$ 30	$ 1,560
7	Semi Annual Basin Cleaning	Hr	8	$ 30	$ 240

	Operations & Maintenance	**$ 8,688**
	Interest Rate	6%
	Project life years	25
	Present Value O&M Cost	**$ 111,056**
25% of Construction Cost	Salvage Value	$ 92,808
Basis: 6% for 25 years; PWF = 0.2330	**PW Salvage Value**	**$ 21,624**

Present Worth of UV Disinfection	**$ 460,662**

Chlorine Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 14,900	$ 14,900
2	Demolition & Site Preparation	LS	All	$ 9,900	$ 9,900
3	Chrlorine Treatment Equipment	EA	1	$ 5,450	$ 5,450
4	Chlorine Contact Chamber	EA	1	$ 44,000	$ 44,000
5	Piping & Connections	FT	125	$ 120	$ 15,000
6	Chlorine Piping	FT	100	$ 27	$ 2,700
7	Manhole	LS	1	$ 3,800	$ 3,800
8	Electrical	LS	1	$ 2,150	$ 2,150
9	New Chlorine Room	SF	180	$ 160	$ 28,800
10	Excavation & Backfill	YD	75	$ 32	$ 2,400

Construction Subtotal	**$ 129,100**
Contingency	$19,400.00
Engineering	$23,300.00
Administration	$3,900.00
Project Total	**$ 175,700**

Chlorine O&M Costs

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Materials and energy costs	LS	1	$ 2,970	$ 2,970
2	Monitoring & Operation	LS	230	$ 30	$ 6,900

	Operations & Maintenance	**$ 9,870**
	Interest Rate	6%
	Project life years	25
	Present Value O&M Cost	**$ 126,172**
25% of Construction Cost	Salvage Value	$ 43,925
Basis: 6% for 25 years; PWF = 0.2330	**PW Salvage Value**	**$ 10,235**

Present Worth of Chlorine Disinfection	**$ 291,637**

Convert Clarifier to Biosolids Storage Tank

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 15,100	$ 15,100
2	Demolition & Site Preparation	LS	All	$ 10,100	$ 10,100
3	Saw Cut Concrete	LF	300	$ 2	$ 600
4	Remove & dispose of concrete	YD	100	$ 100	$ 10,000
5	Aeration diffusers	LS	1	$ 75,000	$ 75,000
6	Controls & Telemetry	LS	1	$ 5,000	$ 5,000
7	Site Piping	LS	1	$ 10,000	$ 10,000
8	Air lift Pumps	EA	2	$ 5,000	$ 10,000
9	Tank coating	SF	4,000	$ 10	$ 40,000
			Construction Subtotal		**$ 175,800**
			Engineering		$35,200
			Contingency		$31,700
			Administration		$ 8,000
			Project Total		**$ 250,700**

200,000 gal Concrete Biosolids Storage Tank

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 35,800	$ 35,800
2	Demolition & Site Preparation	LS	All	$ 23,900	$ 23,900
3	Concrete Structure	CY	220	$ 575	$ 126,500
4	Structural Backfill	CY	120	$ 50	$ 6,000
5	Backfill	CY	280	$ 30	$ 8,400
6	Excavation	CY	400	$ 30	$ 12,000
7	Piping & Valves	LS	1	$ 44,000	$ 44,000
8	Electrical	LS	1	$ 18,600	$ 18,600
9	Controls & Telemetry	LS	1	$ 20,000	$ 20,000
10	Site Landscaping	LS	1	$ 3,000	$ 3,000
11	Blowers and aerators	LS	1	$ 90,000	$ 90,000
12	Airlift Pumps	EA	2	$ 10,000	$ 20,000

Construction Subtotal	**$ 408,200**
Engineering	$81,700
Contingency	$73,500
Administration	$ 9,600
Project Total	**$ 573,000**

Biosolids Filter Press

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 17,970	$ 17,970
2	Demolition & Site Preparation	LS	All	$ 11,980	$ 11,980
3	Manure Spreader	EA	1	$ 3,800	$ 3,800
4	400 lbs/hr Belt Press	EA	1	$ 110,000	$ 110,000
5	Piping & Connections	LS	1	$ 5,400	$ 5,400
6	Electrical	LS	1	$ 2,700	$ 2,700
7	Mounting Slab in Sludge Beds	LS	1	$ 1,700	$ 1,700

Construction Subtotal	**$ 153,550**
Contingency	$18,500.00
Engineering	$30,800.00
Administration	$4,700.00
Project Total	**$ 207,550**

Used Biosolids Filter Press

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 4,960	$ 4,960
2	Demolition & Site Preparation	LS	All	$ 2,480	$ 2,480
3	Manure Spreader	EA	1	$ 3,800	$ 3,800
4	400 lbs/hr Belt Press	EA	1	$ 10,000	$ 10,000
5	Shipping & rehab of used press	EA	1	$ 5,000	$ 5,000
6	Piping & Connections	LS	1	$ 5,400	$ 5,400
7	Electrical	LS	1	$ 2,700	$ 2,700
8	Mounting Slab in Sludge Beds	LS	1	$ 1,700	$ 1,700

Construction Subtotal	**$ 36,040**
Contingency	$5,500.00
Engineering	$9,100.00
Administration	$1,100.00
Project Total	**$ 51,740**

Yachats Facilities Plan Operations and Maintenance Costs

Sampling Station

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Electricity @ 100 W	kWh	1752	0.07	$ 123
2	Sampling Labor @ 2x per week	Hr	26	22	$ 572
			Annual Project Total		**$ 695**
			Interest Rate		6%
			Project life		25
			Present Value O&M Cost		**$ 8,880**

Headworks Pump Station

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Clean Wet wells	EA	4	$ 400	$ 1,600
2	Electricity	kWh	60000	$ 0.07	$ 4,200
3	Daily Inspection	HR	182.5	$ 25	$ 4,563
4	Repair	LS	1	$ 3,500	$ 3,500
			Annual Project Total		**$ 13,863**
			Interest Rate		6%
			Project life		25
			Present Value O&M Cost		**$ 177,209**

New Packaged Pump Station

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Clean Wet wells	EA	2	$ 400	$ 800
2	Electricity	kWh	9000	$ 0.07	$ 630
3	Daily Inspection	HR	140	$ 25	$ 3,500
4	Repair	LS	1	$ 2,000	$ 2,000
			Annual Project Total		**$ 6,930**
			Interest Rate		6%
			Project life		25
			Present O&M Cost		**$ 88,589**

New SBR

Item	Operations & Maintenance Costs		Total Cost
1	SBR Ssytem		$ 40,000
2	UV System		$ 8,688
3	Repair		$ 103,835
		Annual Project Total	**$ 152,523**
		Interest Rate	6%
		Project life	25
		Present O&M Cost	**$ 1,949,755**

Yachats Facilities Plan Operations and Maintenance Costs

WWTP Expansion

Item	Operations & Maintenance Costs		Total Cost
1	Clarifier		$ 7,587
2	Aeration Basins		$ 19,282
3	UV System		$ 8,688
4	Repair & depreciation		$ 102,472
		Annual Project Total	**$ 138,028**
		Interest Rate	6%
		Project life	25
		Present O&M Cost	**$ 1,764,465**

Clarifier

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Energy to Run Drive	kW	3,257	$ 0.07	$ 228
2	Annual Cleaning	Hr	32	$ 25	$ 800
3	Annual Repair & Maintenance	LS	All	$ 2,000	$ 2,000
4	Monitoring & Operation	Hr	130	$ 25	$ 3,259
5	Sampling	LS	52	$ 25	$ 1,300
			Operations & Maintenance		**$ 7,587**

Aeration Basins

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Energy to Run Blowers	kWh	200,000	$ 0.07	$ 14,000
2	Annual Cleaning	Hr	32	$ 22	$ 704
3	Annual Repair & Maintenance	LS	All	$ 2,000	$ 2,000
4	Monitoring & Operation	Hr	65	$ 22	$ 1,434
5	Sampling	LS	52	$ 22	$ 1,144
			Operations & Maintenance		**$ 19,282**

UV Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Energy to Lamps	kWh	31,536	$ 0.07	$ 2,208
2	Weekly Lamp Cleaning	Hr	104	$ 30	$ 3,120
3	Lamp Replacement	EA	20	$ 45	$ 900
4	Ballast Replacement	EA	3	$ 150	$ 450
5	Crystal Replacement	EA	6	$ 35	$ 210
6	Monitoring & Operation	Hr	52	$ 30	$ 1,560
7	Semi Annual Basin Cleaning	Hr	8	$ 30	$ 240
			Operations & Maintenance		**$ 8,688**

Chlorine Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Materials and energy costs	LS	1	$ 2,970	$ 2,970
2	Monitoring & Operation	LS	230	$ 30	$ 6,900
			Operations & Maintenance		**$ 9,870**

Yachats Facilities Plan Operations and Maintenance Costs

New Membrane Plant

Item	Operations & Maintenance Costs	Unit	Quantity	Unit Cost	Total Cost
1	Operations & Maintenance Costs	Hour	1095	$ 25	$ 27,375
2	UV System				$ 8,688
3	Repair				$ 46,587
4	Membrane and blowers (Avg annual)				$ 18,143
			Annual Project Total		**$ 100,792**
			Interest Rate		6%
			Project life		25
			Present O&M Cost		**$ 1,288,464**

Filter Press Operating Costs		
Gallons of Sludge per year (future)		436,533
% solids		2%
Pounds of dry solids per year		69,845
Pounds of dry solids per week		1,343
Weeks of no disposal site		26
Equipment Capital Cost	$	100,000
Energy use (kW)		0.75
Feed rate (lb/hr)		400
Water use (gpm)		17
Annual Hours of Operation		131
Annual Energy Use (kWh)		98
Annual Labor Hours		262
Polymer cost @ $0.01/gallon	$	2,183
Energy Cost	$	7
Labor Cost	$	5,762
Sewer Cost*	$	351
Equipment Depreciation (20 year life)	$	5,000
Equipment Maintenance	$	2,000
Annual Cost	$	15,303
Cost per gallon	$	0.04

* Sewer costs are based on basic sewer rate for pressate returned to the headworks for treatment

City of Yachats Costs for Wastewater Plant Upgrade

New SBR with UV System, City Shops & Filter Press

Item	Cost
SBR Construction & Engineering Cost	$ 4,850,480
Current Construction Cost	$ 4,850,480
Annual O&M Cost	$ 167,595
Salvage Value in 2029	$ 1,212,620
Present Worth of Construction Cost	$ 4,850,480
Present Worth of O&M Cost	$ 2,142,424
Present Worth of Salvage Value	$ (282,540)
Present Worth Cost	$ 6,710,363

New Membrane Plant with UV System, City Shops & Filter Press

Item	Cost
Membrane Construction & Engineering Cost	$ 6,526,880
Current Construction Cost	$ 6,526,880
Annual O&M Cost	$ 115,864
Salvage Value in 2029	$ 1,631,720
Present Worth of Construction Cost	$ 6,526,880
Present Worth of O&M Cost	$ 1,481,133
Present Worth of Salvage Value	$ (380,191)
Present Worth Cost	$ 7,627,822

Plant Upgrade with UV System, City Shops & New Filter Press

Item	Cost
Aeration Basins, Clarifier, Headworks & UV	$ 4,821,330
New 200,000 gallon Biosolids Storage Tank	$ 573,000
Purchase and installation of New filter press	$ 207,550
Current Construction Cost	$ 5,601,880
Annual O&M Cost	$ 153,100
Salvage Value in 2029	$ 1,400,470
PW of Salvage Value	$ (326,310)
Present Worth Cost	$ 7,232,704

Analysis of Wet Weather Application VS. Dewatering Biosolids

Sludge Drying Bed Analysis				
Bed Area (SF)	1,400			
Depth of Flood (FT)	1.0			
Gallons per flood	10,472			
Days between floods	25			
Gallons per year	152,891			
Gallons of end product	19,111			
Yards of end Product	95			
Operations Cost	Material	Hours Labor	Labor Rate	Annual Cost
Pea Gravel at Drains	$ 35	6	$ 22	$ 167
Sand at Drains	$ 53	12	$ 22	$ 317
Flooding Labor		22	$ 22	$ 482
Cleaning Labor		88	$ 22	$ 1,927
Equipment Cost	$ 2,150			$ 2,150
Total				$ 5,043

Cost comparison for Farm Spreading Biosolids

Fixed Costs

Admin Time for DEQ Permits	$ 6,000
Sludge Testing	$ 1,000
Site Maintenance	$ 400
Total	$ 7,400

Source % Solids	Land Applied 2%	Drying Beds 16%	Filter Press 16%	Used Filter Press 16%	200,000 gallon Tank 2%
Original Sludge Gallons	300,000	150,000	150,000	150,000	300,000
Pessed Sludge Gallons		18,750	18,750	18,750	
Round Trip Miles	12	12	12	12	12
Cost Per Mile	3.13	3.13	3.13	3.13	3.13
Disposal Rate	$ -	$ -	$ -	$ -	$ -
Trip Hours	3.2	3.2	3.2	3.2	3.2
Sludge Dewatering Costs	$ -	$ 5,043	$ 3,290	$ 3,508	$ -
Annual Cost	$ 10,796	$ 10,441	$ 8,688	$ 8,906	$ 10,796
Total Cost/Orignal Gallon	$ 0.04	$ 0.07	$ 0.06	$ 0.06	$ 0.04
Cost to Land Apply Surplus	$ -	$ 5,398	$ 5,398	$ 5,398	$ -
Cost to Dispose of 300,000 Gallons	$ 10,796	$ 15,839	$ 14,086	$ 14,304	$ 10,796
Fixed Costs	$ 7,400	$ 7,400	$ 7,400	$ 7,400	$ 7,400
WWTP Total Annual Disposal Cost	$ 18,196	$ 23,239	$ 21,486	$ 21,704	$ 18,196
Capital Costs	$ 4,700	$ 3,500	$ 207,550	$ 52,000	$ 573,000
Present Worth Cost for Each Option	$ 213,407	$ 270,044	$ 453,988	$ 300,941	$ 781,707

Laboratory Equipment

Item	Brand Name	Model Number	Qty	Cost
BOD Equipment				
Incubator	VWR	35960-056	1	2000
Beam Balance	Ohaus 1600 series	1650	1	210
Stirring Hot Plate	Corning	PC-320	1	350
Stirring Bars	VWR	58948-025	6	25
Automatic Buret (25 ml)	VWR	17590-216	1	90
Buret Only (25 ml)	VWR	17590-200	1	80
BOD Bottles	Wheaton	227497	24	215
BOD Bottle Cap	Wheaton	227720	200	130
BOD Bottle Rack	Wheaton	227730	1	30
Erlenmeyer Flask	VWR	29140-067	6	180
Pipet Filler	VWR	53497-009	2	40
Disposable Pipets	Kimble	P6358-10	500	500
Thermometers	VWR	61016-194	4	60
Reagent Bottles	VWR	16267-087	6	800
Support Stand	VWR	17683-060	1	60
Buret Clamp	VWR	17683-258	1	35
Distilled Water Tank	VWR	16334-209	1	125
Disposable Weigh Boats	VWR	12577-051	500	75
Stainless Steel Scoops	VWR	57952-162	12	75
Fecal Coliform				
Water Bath	Blue M	MW-1120A-I	1	350
Autoclave	NapCO	704-9000D	1	2000
Autoclave Tape	3M	3/4"	1	100
Petri Dish	Numc	240045	500	75
Petri Dish Stand			1	50
Forceps	VWR	25729-117	1	20
Bags	Whirl-Pak	B1065 WA	1	50
Bag Holder	Whirl-Pak	B00750WA	1	25
Sample Bottles	High-Purity	B5123-4	24	50
Alcohol Burner	High-Purity	B9025	1	50
Filters	VWR	28148-733	100	75
pH				
pH Meter	Orion	230 W/AC Option		650
Starter Kit	Orion	OPBLSK	1	50
Beaker	Corning	1003-150	3	35
Miscellaneous				
DO Meter	YSI	54ARC	1	
DO Probe	YSI	5739	1	275
BOD Probe	YSI	5750	1	335
Cable	YSI	5740-10	1	175
Timer			1	40
Microscope	Swift	SM85B	1	1000
Slides			144	50
Training 3 days plus 1 day followup				2000

Lab Equipment Page 2/2

	Item	Brand Name	Model Number	Qty	Cost
Suspended Solids					
	Graduated Cylinders	Kimax	100 ml	12	225
	Graduated Cylinders	Kimax	250 ml	6	160
	Graduated cylinders	Kimax	1000 ml	4	225
	Griffin Beakers	Kimax	250 ml	12	45
	Griffin Beakers	Kimax	400 ml	12	55
	Griffin Beakers	Kimax	100 ml	12	50
	Rubber Stoppers	VWR	59582-585	2 lbs	80
	Oven	VWR	52200-501	1	465
	Desiccator	VWR	24983-331	1	250
	Desiccant Drierite	VWR	22891-040	5 lbs	40
	Analytical Balance	Mettler	AE 50	1	
	Vacuum Pump	VWR	54907-059	1	500
	Furnace	Thermolyne 1400	FB1415M	1	3000
	Filter Flask	VWR	29417-047	1	25
	Filter Funnel	VWR	28144-812	1	40
	Filter Paper	VWR	28496-886	2	120
	Vinyl Tubing	VWR	63013-040	100	45
	Tweezers	VWR	25943-212	4	40
	Wash Bottle	VWR	16651-223	4	65
	Crucibles	Coors	60148	4	40
	Gloves	High Purity	62700-2	1	100
Lab Fixtures					
	Shop Vacuum			1	150
	Refrigerator	18 cubic feet		1	800
	Dishwasher	SS interior		1	1000
	Disinfectant Dispensor			1	50
	Fume Hood	4'		1	20000
Equipment Total					$ 40,105

Biosolids Analysis

Appendix

E

Biosolid Management Plan
For
City of Yachats

Date: September 20, 2002

City of Yachats
500 W. 7th St.
Yachats OR 97478
Lincoln County
Treatment II
Collections II

EPA #: OR-002029-0
File Number: 99260
Permit Number:

I. Treatment Facility

Introduction:

City of Yachats (population approximately 935) owns and operates a municipal sewage collection and treatment system (built 1974) under National Discharge Elimination system (NPDES) permit number (100812). Wastewater processed by the sewage treatment works is principally of domestic origin. Septage is not accepted at this wastewater treatment facility. There are no industrial discharges to the City of Yachats Facility, which require regulation under a local pretreatment permit. Treated effluent from the treatment plant is discharge to the Pacific Ocean (10=*PACI 214.5 D).

A) Wastewater Processing:

City of Yachats operates activated sludge plant with aerobic digesters. Influent entering City of Yachats' 0.174 million gallons per day (MGD) design average dry weather flow sewage treatment facility passes through a headworks. The influent flows through a comminutor, then to one of two aeration basins. The influent flow from the comminutor is channel through a 6" flume where influent can be discharged at four points in each aeration basin. Each aeration basin is 37,500 gallons each. Normal operations or winter operation would necessitate use of one aeration basin, during summer or high loading period both aeration basins would be used.

After the aeration basin effluent flows through 6" transfer pipes to the center of the secondary clarifier. In the secondary clarifier is (22.7' diam. X 12.1'deep) solids are allowed to settle out before the effluent returns to the aeration basin. Clarifier effluent is directed to a chlorine contact chamber and then discharged to the Pacific Ocean. City of Yachats operates an aerobic digester (37,500 gallons).

B) Solids Processing:

Scum is pumped off the top of the clarifier and sludge is wasted from the bottom of the clarifier to the aerobic digester (37,500 gal.). The digester design retention time is 20 days at a concentration of 15,000 mg/L. From the aerobic digester the digested sludge is transferred to one of three drying beds.

At design flow, the operation and maintenance manual suggests pumping 1000 gal. of sludge at 2% (20,000 mg/L) solids to the drying beds. The drying beds are covered, have cement access ramps and are 1400 sq. ft. each. It is suggested that 8-inches of thicken sludge pumped to the drying bed is equivalent to 1-foot in the digester and the drying time for the 8" lift would be approximately 3 to 4 weeks in the drying bed.

There are three (3) potential end routes for biosolid from this facility and they are: 1) direct irrigation from the biosolid digester, 2) direct irrigation of biosolid after 24 hour alkaline stabilization process, and 3) biosolid from the air drying beds.

C) Solids Storage Structure:

There are three sludge storage-drying bed at this facility.

D) Septage Receiving Facility:

No septage (0 gallons per year) is received at City of Yachats' facility.

F) Pretreatment Program:

Not applicable.

II Solid Treatment Processes

The EPA's 40 CFR parts 503 and the DEQ's Oregon Administrative Rules (OAR) 340-50 allow permittees to use EPA approved alternatives to satisfy Class A and B biosolid pathogen or vector attraction reduction criteria. The permittee must notify the Department in writing and get approval prior to any process change that would utilize pathogen reduction or vector attraction reduction alternatives other than their primary reduction alternatives contained in this management plan. The permittee must also certify that the alternatives used are EPA approved and that sampling and monitoring conforms to the 40 CFR 503 and OAR 340-050 regulations.

Pathogen Reduction

To meet the 503 part regulatory requirements pathogen reduction must be met before vector attraction reduction or at the same time vector attraction reduction is achieved.

Class A Biosolid

With all Class A alternatives microbial monitoring for fecal coliforms or *Salmonella* sp. is required (see section A and B below). This management plan lists the primary alternative and options employed by the permittee to meet Class A and B biosolid criteria.

A) Monitoring for Fecal Coliform or *Salmonella* sp.

Monitoring for Fecal Coliform or *Salmonella* sp. is required to detect growth of bacterial pathogens. Because Class A biosolids may be used without site restrictions, all Class A material must be tested to show that the microbial requirements are met at the time when it is ready to be used or disposed. In addition to meeting process requirements, Class A biosolid must meet one of the following requirements:

- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight),
- *Or* the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).

Unlike Class B biosolid solid Class A requirements is not based on an average value. Sampling for Class A biosolid consists of at least 7 discrete samples taken over a 2-week period. Test results are required before Class A material can be release for use or disposal. The microbial requirement that a Class A biosolid must be meet is either:

- At the time of use or disposal, or
- At the time the biosolid are prepared for sale or given away in a bag or other container for land application, or
- At time the biosolid or material derived from the biosolid is prepared to meet the requirements in 503.10(b), 503.10 (c), 503.10 (e) or 503.10 (f).

B) Class A Pathogen Reduction Alternatives

Alt. 3) Sewage Sludge treated in Other Processes 503.32(a)(5)

This requirement relies on comprehensive monitoring of bacteria, enteric viruses and viable helmith ova to demonstrate adequate reduction of pathogens:

- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), *Or* the density of *Salmonella* sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).
- The density of enteric viruses in the sewage sludge after pathogen treatment must be less than 1 PFU per 4 grams of total solids (dry weight basis).
- The density of viable helmith ova in the sewage sludge after pathogen treatment must be less than 1 per 4 grams of total solids (dry weight basis).

Alt. 5) Use of Processes to Further Reduce Pathogens (PFRP) 503.32(a)(7)

This requirement relies the process to demonstrate adequate reduction of pathogens to meet Class A biosolid criteria:

- Sludge has been treated in one of the PFRPs listed in Appendix B of the 503 regulation, and
- Either the density of the fecal coliforms in the sewage sludge be less than 1,000 MPN per gram total solids (dry gram weight), *Or* the density of *Salmonella*

sp. Bacteria in the sewage be less than 3 MPN per 4 grams of total solids (dry weight basis).

Class B Biosolid

Class B biosolid can be met by using one of three alternatives, the two primary alternatives used by this facility are Alt. 1) Monitor sewage sludge for fecal coliform 503.32(b)(2), and Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32(b)(3).

Alt. 1) Monitor sewage sludge for fecal coliform 503.32(b)(2) requires that seven samples of treated sewage sludge (biosolid) be collected and that the geometric mean fecal coliform density of these samples be less than 2 million MPN per dry gram biosolid (dry weight basis).

Alt. 2) Use Process to Significantly Reduce Pathogen (PSRP) 503.32(b)(3) considers sludge treated in one of the PSRPs listed in appendix B of the Part 503 to meet Class B biosolid criteria for pathogen reduction.
For this facility the following PSRPs are primarily used:

- #1 aerobic digestion, sludge is treated in the presence of air for a specified residence time at a specified temperature. Values of the mean cell residence time and temperature shall be between 40 days at 20 (68C) and 60 days at 15C (59F), and
- #2 Air Drying, sludge air dried on beds for minimum of 3 months (ambient average temperature above 0C (32F)) 2 out of the 3 months.
- #5 sufficient alkaline stabilization agent is added to the sewage sludge to raise the pH of the sewage sludge to 12 for $ 2 hours of contact (mixed).

B) Vector Attraction

This facility primarily uses the following vector attraction reduction options:

Opt. 1) The % volatile solid reduction calculation to use for aerobic digester that is decanted and that does not have appreciable grit accumulation would be the Van Kleeck or Approximate Mass balance (AMB) equation depending upon the percent solids in the decantante (**attachment A**).

To meet the biosolid vector attraction reduction requirements an aerobic digester must provide a 15 day detention time at 35C (95F) in a completely mixed high rate digester in order to achieve a volatile solids reduction of 38 % or more. There are alternative volatile solid reduction methods that are deemed equivalent to the 38% volatile solid reduction criteria under the EPA's and the DEQ's regulations.

Opt.1) The mass of volatile solid in the sewage sludge shall be reduced by a minimum of 38 % or more (40CFR 503.33 (b)(1)), Opt. 3) When the 38% volatile solid reduction can not be met for an aerobically sewage sludge, vector attraction can be demonstrated by digesting a portion of the previously digested sludge that has 2% solid or less at 20C. When at the end of 30 days the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 15 percent vector attraction is achieved.

Opt. 7) 75% solid by drying prior to mixing with other materials. Sewage sludge treated in aerobic or anaerobic process (i.e. Sewage sludge that do not contain unstabilized solids generated in primary wastewater treatment).

III Biosolid Characteristics

City of Yachats' treatment works utilizes an activated sludge process. The treatment facility wastes actived sludge form the secondary clarifier to the anaerobic digester. The sludge under goes 3 to 4 months of digestion at ambient temperatures prior to removal and a performing a volatile solids reduction calculation. For the past five-(5) years the average volatile solids reduction criteria has not been checked by the City of Yachats wastewater treatment facility.

Annually, City of Yachats had generated approximately 10 dry tons of biosolids. For the year 1998 City of Yachats land applied 9 dry metric tons of Class B biosolid.

Monitoring

City of Yachats produces approximately 9 dry metric tons of biosolid each year. Under the 40 CFR Part 503, City of Yachats is required to sample biosolid once a year. Frequency of monitoring depends on the amount biosolid generated that is marketed to be sold or given away, land application and surface disposal. Frequency depends the amount on bulk biosolid applied to the land, or the amount of sewage sludge received by a person who prepares biosolid that is sold or given away in a bag or other container for application to the land (dry weight basis), or the amount of biosolid (excluding domestic septage) placed on a surface disposal site.

Sampling

1) Digester

Sample location: Sample port on discharge line of digester.

Number and type of sample taken per day: Composite of discrete samples collected throughout the sampling period.

Sample storage and transport: Samples are stored at 4 degrees C in ice chest or refrigerator. Samples are transported in ice chest to maintain temperature during delivery to laboratory. Pathogen samples are delivered to lab within 1 hour of sample collection.

Sample analysis method: EPA 9045; EPA 160.3;EPA 160.4; SM 4500-NH3B; EPA 353.2; EPA 365.3; EPA 351.3; SW-846 7060; SW-846 6010; SW-846; SW-

846 7481; SW-847 7471; SW-846 7740; SM 18th, 9221E.1; SM 18:9260D.1; ASTM D 4994-89; EPA 600/1-87/014; EPA 8240; EPA 1613; EPA 8270; EPA 1613B; EPA 1668(may include one or more of the referenced methods)

2) Air Drying Beds
Sample location: Center of 4 quadrants from each ADB in service.

Number and type of sample taken per batch: Four discrete samples from each ADB in service are mixed together to form a composite sample, a minimum of 6 times per year.

Sample storage and transport: Samples are stored at 4 degrees C in ice chest or refrigerator. Samples are transported in ice chest to maintain temperature during delivery to laboratory. Pathogen samples are delivered to lab within 1 hour of sample collection.

Sample analysis method: EPA 9045; EPA 160.3;EPA 160.4; SM 4500-NH3B; EPA 353.2; EPA 365.3; EPA 351.3; SW-846 7060; SW-846 6010; SW-846; SW-846 7481; SW-847 7471; SW-846 7740; SM 18th, 9221E.1; SM 18:9260D.1; ASTM D 4994-89; EPA 600/1-87/014; EPA 8240; EPA 1613; EPA 8270; EPA 1613B; EPA 1668 (may include one or more of the referenced methods)

Biosolid Analysis:

Biosolid Chemical Analysis:

Total solids	1.19%
Volatile solids	71.1
pH	6.5

From the City of Yachats' 1998 biosolids analysis the following is a representative sampling of the biosolid metal concentration.

Pounds	(#) Metal	#/acre-yr.	site life
lb.	Arsenic (As)	0.004	64228
lb.	Cadmium (Cd)	0.009	27153
lb.	Chromium (Cr)	0.05	132383
lb.	Copper (Cu)	1.74	5401
lb.	Lead (PB)	0.0134	140707
lb.	Mercury (Hg)	0.005	20969
lb.	Molybdenum (Mo)	0.0099	11416
lb.	Nickel (Ni)	0.0395	66593
lb.	Selenium (Se)	0.016	14098
lb.	Zinc (Zn)	3.668	4783

The site life would be limited to 4783 years based on the zinc loading (1998) biosolids analysis **(attachment B)**. From the analysis the City of Yachats needs approximately 2.3 acres to land apply on to handle their annual biosolid production.

Biosolid Nutrient Analysis:
These biosolids contain about 228-pound (lb.) total nitrogen (N) of which about 190 lb. is in an available form of nitrogen form ($NO3-NO2$, and $NH3$). Other nutrients include 500 lb., phosphorus (P), 15 lb., potassium (K), and has a pH of approximately 7.

IV Biosolid Beneficial Reuse Program

Transportation and Land Application:
Biosolids are off loaded into a city owned (gal.)-tanker truck near the treatment plant's headworks. The biosolid loading area is impounded in case of accidental spillage of biosolids during the truck loading process. This area has a drain that ties back into the headworks of the plant. During the summer months City of Yachats' biosolids are land applied on DEQ authorized sites (16 acres total). The biosolid land application sites are capable of assimilating 7 times City of Yachats 's annual total nitrogen production. The perennial agronomic biosolid land application rate for pastures and grass is 100 lb. available N per acre –yr.

Land application in the state of Oregon, City of Yachats land applies on farmlands to beneficially reuse their biosolids.

Biosolids Site management Information:

Site Number	Site Use	Total Available Nitrogen Loading (lb./ac/yr.)	Net acres for Biosolid Application	Available Nitrogen Site uptake
Hall	Pasture	(100-lb. N/acre)	16 acres	1600 lb./yr.

Long term biosolid application rates and site restrictions are contained in the biosolid site authorization letter. References to the OAR 34-50, The EPA 40 CFR Part 503, site setbacks, site agronomic loading rates, land application restrictions and site restrictions are also detailed out in the site authorization letter.

V Contingency Options

In event biosolids are spilled between the treatment facility and the land application site City of Yacht's sewage treatment works shall contain the spill, lime, absorb (via sand) and remove spilled sludge solids spills with a front end loader or shoves and dispose of the spillage at a DEQ authorized application or disposal site. All spills into waters of the state or spills on the ground surface that are like to enter waters of the state shall be reported to immediately to Oregon Emergency Response System (OERS) at 1-800-452-0311 and your regional biosolids coordinator at (541) 440-3338. All spills of 25 gallons or more on the ground surface shall be report to the regional biosolids coordinator at (541) 440-3338.

VI Reporting

Daily Reporting and Recordkeeping:

Each year prior to land application of biosolid the source operators shall check to see if contiguous property owners have changed. The operators shall keep a record of contact (date, and/or written log of phone call w/ name and number, and/or xerox of postcard w/ name and address, etc.,) with contiguous property owners, which notifies them of the biosolid land application practice. Operator shall provide this documentation in the annual biosolid report.

Annual Reporting

The Annual Biosolid Report is due February 19, of each year for the previous years land applied biosolid. Part of this report is the submittal of the daily site logs, which have the date, time, and quantity gal-lb. N/acre land applied for each day-tank-batch land applied. Site logs shall have a scaled map showing the site and the land application location that coincides with the daily site loading methods (truck spreader bar, irrigation cannon). Daily records should clearly show the location of daily biosolid loading site log.

<u>Annual Report shall have a signed copy of the certification statements for pathogen reduction, vector attraction reduction and biosolid has been land applied at approved agronomic loading</u>. Person signing statements should be the operator of record at the treatment plant. <u>The operator shall shown how the vector attraction reduction was met</u> i.e., volatile solids reduction was achieved by time and temperature, the Van Kleeck equation filled out with digester records (MCRT), bench scale test, sour test or any other EPA approved alternative method appropriated for biosolid generated at your facility. Certification of pathogen reduction is required and is satisfied by submittal of test results in the Annual Biosolid Report. <u>All</u> the previous year's biosolid sampling and analysis that is required by the permit shall be included in City of Yachats' Annual Biosolid Report **(in each year's annual report appendix).**

<u>VII Certification Statement</u>

City of Yachats' facility is capable of meeting their primary alternatives for achieving Class A or B biosolid pathogen and vector attraction reduction criteria. Signed Class A and/or B biosolid and vector attraction certification statements shall accompany all biosolids that are land applied **(attachment C).** For Class A or B biosolid annual biosolid analysis must be provided upon request. Certification statements must also show conformance with nutrient and land application loading rates where applicable.

Attachment A:

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 the solids existing each digester withdrawal line. Composite samples of the influent shall consist of at least four samples; each collected at approximately even intervals over an eight- (8) hour period.

Typically in the past we've used the Van Kleeck equation for digesters. The assumption that there is no grit accumulation in the digester. This volatile solids equation assumes the fixed solids input equals the fixed solids output. The Van Kleeck equation is appropriate if the digester decatante is low in total solids. The Van Kleeck equation can be used to calculate the volatile solids reduction for a digester that decants provided VSb equal VSd

FVSR: Fractional Volatile Solids Reduction

$$FVSR = 1 - VSb \ * (1-VSf) / VSf (1- VSb)$$

VSf	Feed Sludge Fractional Volatile Solid, (kg/kg)
VSb	Digested Sludge (digester bottom) Fractional Volatile Solids, (kg/kg)
VSd	Decantate Fractional Volatile Solids

For this equation to be valid VSb must equal VSd.

For digesters with decant withdrawal (decant high in solids) and no grit accumulation, where the volatile and fixed concentrations are known for all streams as well as the volumetric flow rates for the decant and digester sludge then the Approximate Mass Balance equation should be used.

FVSR: Fractional Volatile Solids Reduction

$$FVSR = Fyb - Byb - Dyd \ / Fyb$$

Fyb	(F)	Feed Sludge Volumetric Flow Rate (m3/d)
	(yb)	Feed Sludge Volatile Solids Concentration (kg/ m3)
Byb	(B)	Digester Sludge (bottom) Volumetric Flow Rate (m3/d)
	(Bb)	Digester Sludge (bottom) Volatile Solids Concentration (kg/ m3)
Dyd	(D)	Decantate Volumetric Flow Rate (m3/d)
	(yd)	Decantate Volumetric Solids Concentration (kg/ m3)

Because the Aerobic digester is cleaned every year the assumption is there is no grit accumulation in the digestive process.

Assumptions: Fixed Solids and Volatile Flows Streams.

Attachment C:

"I certify, under penalty of law, that the pathogen requirements in [insert either 503.32(a) or 503.32(b)], the management practices in 503.14 and the vector attraction reduction requirements in [insert 503.33(b)(1) through 503.33(b)(10)] have been met. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the pathogen requirements and vector attraction reduction requirements have been met. I also certify that all biosolids were land applied at the approved agronomic loading rate noted in the respective Department site authorization letter. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

Signature.. **Date.........................**

CITY OF YACHATS

441 NORTH HIGHWAY 101
P.O. BOX 345
YACHATS, OREGON 97498

February 12, 2001

Department of Enviromental Quality
Western Region - Salem Office
750 Front St. NE, Suite 120
Salem, OR 97301-1039

Re: 2000 Biosolids Report

The daily production of sludge by the Wastewater Treatment Plant averages 1000 gallons of liquid waste per day. The raw sewage received at the plant consists mostly of household waste with some motel and restaurants waste included. No industry is located in town.

The City disposes of its sludge through ground application. The sludge is delivered to the site using a tanker truck that holds 3000 gallons of liquid waste. The site is located in a 94-acre farm owned by Mr. & Mrs. Flesher. The farm is divided into several fenced fields to allow the required 30 days waiting period before cattle is permitted to graze.

To stabilize the sludge, 50 pounds of hydrated lime is added to each 3000-gallon load. The PH of the sludge is measured and recorded at 30 minutes, 2 hours and 24 hours after loading.

Included with this report is a signed Certification For Pathogen Reduction in compliance with the Class B requirements in Section 503.32(b) and the Vector Attraction Reduction Requirements as per Section 503.33(b)(6) and the sites restrictions in Section 503.32(b)(5) for each site.

Also included are copies of the sludge analysis conducted in August 1999 and August 2000.

Submitted by:

Rod Carrasco
Public Works Superintendent

PS: Receipt of annual report submittal requested.

CITY OF YACHATS

441 NORTH HIGHWAY 101
P.O. BOX 345
YACHATS, OREGON 97498

CERTIFICATION FOR PATHOGEN REDUCTION
BIOSOLIDS 2000 ANNUAL REPORT

I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirements in section 503.32(b), the vector attraction reduction requirement in Section 503.33(b)(6) and the site restrictions in Section 503.32(b)(5) for each site in which Class B sewage was applied, was prepared under my direction and supervision in accordance with the system designed to ensure qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment.

Signed R. Carrasco Date 8/12/01

Rod Carrasco
Public Works Superintendent

CITY OF YACHATS
PO BOX 345
YACHATS, OR 97498

2000 SLUDGE MANAGEMENT REPORT

Formula: 3,000 gal = 1 load
2.98 total solids 1/00 - 8/00 1.75 total solids 8/00 - 12/00

3,000 gal x .0175 total solids x 8.34 lbs = 438 lbs/load
3,000 gal X .0298 total solids x 8.34 lbs = 746 lbs/load

			lbs/load	lbs/ acre/ yr
Lead	15.3 mg/1,000,000 mg	x 438	= 0.007	0.050
	24.7 mg/1,000,000 mg	x 746	= 0.018	0.159
Zinc	798 mg/ 1,000,000 mg	x 438	= 0.34	3.010
	841 mg/ 1,000,000 mg	x 746	= 0.68	6.030
Copper	435 mg/1,000,000 mg	x 438	= 0.19	1.370
	423 mg/1,000,000 mg	x 746	= 0.32	2.830
Nickel	13.6 mg/1,000,000 mg	x 438	= 0.005	0.036
	15.8 mg/1,000,000 mg	x 746	= 0.012	0.106
Cadmium	2.80 mg/1,000,000 mg	x 438	= 0.001	0.007
	2.70 mg/1,000,000 mg	x 746	= 0.002	0.017
Arsenic	0 mg/1,000,000 mg	x 298	= 0.000	0.000
	0 mg/1,000,000 mg	x 746	= 0.000	0.000
Chromium	16.8 mg/1,000,000 mg	x 438	= 0.007	0.050
	13.4 mg/1,000,000 mg	x 746	= 0.100	0.887
Mercury	0.6 mg/1,000,000 mg	x 438	= 0.000	0.000
	0.6 mg/1,000,000 mg	x 746	= 0.000	0.000
Molybdenum	6.20 mg/1,000,000 mg	x 438	= 0.002	0.014
	4.90 mg/1,000,000 mg	x 746	= 0.004	0.035
Selenium	0 mg/1,000,000 mg	x 438	= 0.000	0.000
	0 mg/1,000,000 mg	x 746	= 0.000	0.000

A = lbs/load B = # of loads C = # of acres

50 lbs of lime is added to each load: 12.0^{+} pH for 2 hrs 11.5^{+} after 22 hrs

$\frac{50 \times 55}{3.2} = 859$ lbs/acre/yr $\frac{50X45}{3.0} = 750$ lbs/acre/yr $\frac{A \times B}{C}$

Rod Carrasco
Public Works Superintendent
January 10, 2000

RC : rc

f:\shared data\reports\public works reports\sludge management report 1999.doc

Analysis of
Drinking Water
aste Water
dustrial Chemicals
S aste
Ba ology

Analytical Laboratory & Consultants, Inc.
361 West Fifth Avenue
Eugene, OR 97401
Oregon Certified Lab OR016
541-485-8404

Lab Report No. 19218
Client P.O.
Date Received 8/22/00 0925

ANALYSIS REPORT

ttention Julie Fiore
ent Northwestern Aquatic Sciences
PO Box 1437
Newport, OR 97365

Collected Date 8/21/00 Time 0900
Collected by Not Reported
Matrix/Client ID Secondary Sewage Sludge
Project ID City of Yachats NAS #6414F

503 BIOSOLIDS ANALYSIS

ARAMETER	METHOD	DATE ANALYZED	RESULTS	
senic (Total)	EPA 7062	9/25/00 MB/AB	ND @ 5.0	mg/kg dry weight
admium (Total)	EPA 213.2/7131	9/22/00 MB/AB	2.8	mg/kg dry weight
ium (Total)	EPA 218.2/7191	9/22/00 MB/AB	16.8	mg/kg dry weight
opper (Total)	EPA 220.1/7210	9/22/00 MB/AB	435	mg/kg dry weight
ad (Total)	EPA 239.2/7421	9/25/00 MB/AB	15.3	mg/kg dry weight
ercury (Total)	EPA 245.1/7470	9/12/00 MB/AB	0.6	mg/kg dry weight
olybdenum (Total)	EPA 246.2/7481	9/21/00 MB/AB	6.2	mg/kg dry weight
ckel (Total)	EPA 249.2/7521	9/21/00 MB/AB	13.6	mg/kg dry weight
elenium (Total)	EPA 270.2/7740	9/21/00 MB/AB	ND @ 5.0	mg/kg dry weight
nc (Total)	EPA 289.1/7950	9/27/00 MB/JH	798	mg/kg dry weight
otal Nitrogen (TKN)	EPA 351.3	9/1/00 PM/JH	9.30	% dry weight
trate Nitrogen	EPA 353.3	8/22/00 MD/JH	ND @ 0.01	% dry weight
mmonia Nitrogen	EPA 350.2	8/3/00 PM/JH	1.80	% dry weight
tal Phosphorus	EPA 365.3	9/7/00 MD/JH	2.36	% dry weight
tassium (Total)	EPA 258.1/7610	9/28/00 MB/JH	0.95	% dry weight
H	EPA 150.1/9040	8/22/00 MD/JH	7.6	
tal Solids	EPA 160.3	8/22/00 MD/JH	1.75	% wet weight
olatile Solids	EPA 160.4	8/22/00 MD/JH	76.9	% dry weight

ND = Not Detected at Level Indicated

APPROVED Roy E. White DATE 9/28/00

.of
ng Water
de Water
dustrial Chemicals
olid Waste
acteriology

Analytical Laboratory & Consultants, Inc.
361 West Fifth Ave.
Eugene, OR 97401
Oregon Certified Lab #16
(541) 485-8404

Lab Report No. 05822
Client P.O.
Date Received 8/11/99 0940

ANALYSIS REPORT

ttention Julie Fiore
lient Northwestern Aquatic Sciences
P. O. Box 1437
Newport, OR 97365

Collected Date 8/10/99 Time 0900
Collected by Kevin
Source NAS #3827F
Location City of Yachats

BIOSOLIDS ANALYSIS

PARAMETER	METHOD	DATE ANALYZED	RESULTS	
Arsenic (Total)	EPA 7062	JH/RJ 8/25/99	ND @ 5.0	mg/kg dry weight
Cadmium (Total)	EPA 213.2/713	JH/RJ 8/16/99	2.7	mg/kg dry weight
Chromium (Total)	EPA 218.2/7191	JH/RJ 8/18/99	13.4	mg/kg dry weight
Copper (Total)	EPA 220.1/7210	JH/JW 8/14/99	423	mg/kg dry weight
Lead (Total)	EPA 239.2/7421	JH/RJ 8/24/99	24.7	mg/kg dry weight
Mercury (Total)	EPA 245.1/7470	JH/RJ 8/26/99	0.6	mg/kg dry weight
Molybdenum (Total)	EPA 246.2/7481	JH/RJ 8/22/99	4.9	mg/kg dry weight
Nickel (Total)	EPA 249.2/7521	JH/RJ 8/22/99	15.8	mg/kg dry weight
Selenium (Total)	EPA 270.2/7740	JH/RJ 8/20/99	ND @ 11.0	mg/kg dry weight
Zinc (Total)	EPA 289.1/7950	JH/JW 8/19/99	841	mg/kg dry weight
Total Nitrogen (TKN)	EPA 351.3	JH/JW 8/25/99	6.89	% dry weight
Nitrate Nitrogen	EPA 353.3	JH/MB 8/17/99	ND @ 0.01	% dry weight
Ammonia Nitrogen	EPA 350.2	JH/JW 8/25/99	1.24	% dry weight
Total Phosphorus	EPA 365.3	JH/MB 8/19/99	2.94	% dry weight
Potassium (Total)	EPA 258.1/7610	JH/RJ 8/23/99	0.86	% dry weight
pH	EPA 150.1/9040	JH/MB 8/11/99	7.5	
Total Solids	EPA 160.3	JH/MB 8/12/99	2.98	% wet weight
Volatile Solids	EPA 160.4	JH/MB 8/12/99	71.6	% dry weight

ND means "not detected"

APPROVED

DATE 9/1/99

Analysis of
• Drinking Water
• Waste Water
• Industrial Chemicals
• Solid Waste
• Bacteriology

Analytical Laboratory & Consultants, Inc.
361 West Fifth Avenue
Eugene, OR 97401
Oregon Certified Lab OR016
541-485-8404

Lab Report No. 24525
Client P.O.
Date Received 1/24/01 1455
Lab Report Page 3 of 3

ANALYSIS REPORT

Attention Rod Carrasco
Client City of Yachats
PO Box 345
Yachats, OR 97498

Collected Date 1/22/01 Time 1400 Comp
Collected by Kevin Chesshir
Matrix/Client ID Soil / Sample 5A2
Project ID Yachats WWTP

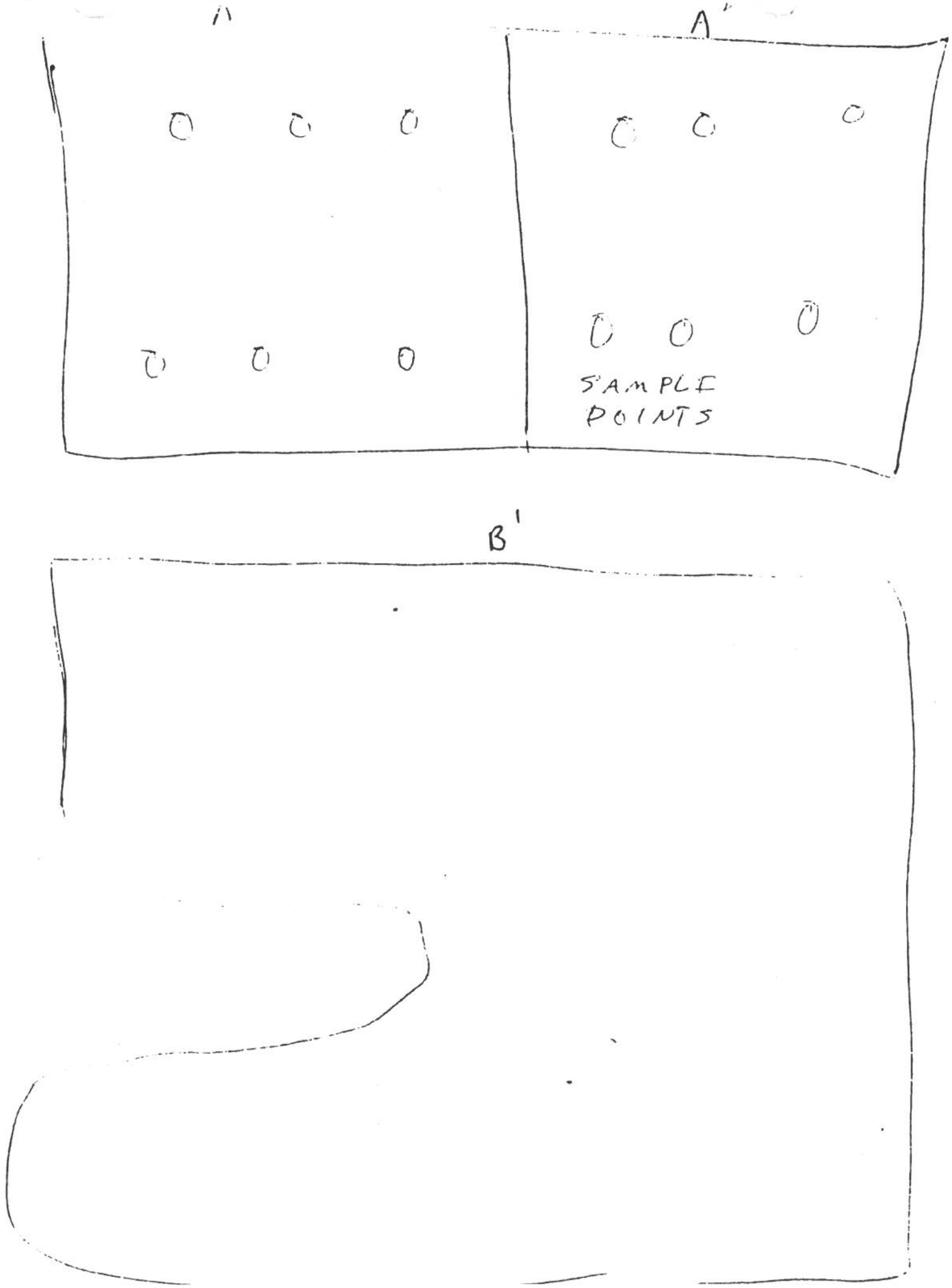
SOIL ANALYSIS

PARAMETER	METHOD	DATE ANALYZED	RESULTS	
Total Nitrogen (TKN)	EPA 351.3	1/30/01 PM/JH	0.57	% dry weight
Nitrate Nitrogen	EPA 353.3	1/25/01 MD/JH	ND @ 0.01	% dry weight

ND = Not Detected at Reporting Limit

APPROVED [signature] Laboratory Supervisor DATE 2/2/01

24525.wpe BIOSOLIDS 503 1-4-01 WPS



5A 6.9 acres
5B 28.3 acres
Jim Flesher 14-11-34

AGRICULTURAL APPLICATION SITE LOG

ite Name Flecher, Jim Site Acreage 94.36

Site Location T 14 ; R 11 ; Sec. 34 WM County Lincoln NPDES/WPCF No. 100812

Ultimate Site Loading __________ Dry Tons/Acre (Based on the 8-11, 1999 sludge chemical analysis with the following metal being the limiting parameter __________).

746

$$\left[\frac{\text{Gallons} \times 0.0298\ \%\ \text{Solids} \times 8.34}{2000\ \text{lbs/ton}} = \text{Dry Tons}\right]$$

lbs.	loads	Date	P.H.	lbs.	loads	P.H.	Date	
746	1	1-28-00	12.1	746	1	12.3.	5-31-00	5A2
746	1	1-29-00	12.1	746	1	12.2	6-1-00	5A1
746	1	2-10-00	11.9	746	1	12.5	6-2-00	5A1
746	1	2-18-00	12.2	746	1	12.3	6-20-00	5A1
746	1	2-19-00	12.3	746	1	12.2	6-22-00	5A1
746	1	3-2-00	12.4	746	1	12.2	6-23-00	5A1
746	1	3-21-00	12.2	746	1	12.0	6-27-00	5A1
746	1	3-29-00	12.3	746	1	12.0	6-28-00	5A1
746	1	4-1-00	12.3	746	1	12.1	6-29-00	5A1
746	1	4-4-00	12.2	746	1	12.1	7-5-00	5A1
746	1	4-5-00	12.2	746	1	12.2	7-12-00	5A2
746	1	4-6-00	12.2	746	1	12.2	7-13-00	5A2
746	1	4-7-00	12.3	746	1	12.3	7-14-00	5A2
746	1	4-11-00	12.2	746	1	12.2	7-18-00	5A2
746	1	4-12-00	12.3	746	1	11.9	7-19-00	5A2
746	1	4-27-00	12.5	746	1	12.3	7-20-00	5A2
746	1	5-2-00	12.3	746	1	12.1	7-24-00	5A1
746	1	5-3-00	12.3	746	1	12.0	7-26-00	5A1
746	1	5-9-00	12.4	746	1	12.4	7-27-00	5A1
746	1	5-10-00	12.3	746		12.2	7-28-00	5A1
746	1	5-16-00	12.3	746	1	12.3	8-3-00	5A1
746	1	5-17-00	12.1	746	1	12.2	8-5-00	5A1
746	1	5-18-00	12.2	746	1	[illegible]	8-9-00	5A1
746	1	5-23-00	12.1	746	1	12.1	8-10-00	5A1
746	1	5-24-00	12.1	746	1	12.3	8-13-00	5A1
746	1	5-25-00	12.3	746	1	12.5	8-17-00	5A2
746	1	5-26-00	12.0	746	1	12.4	8-18-00	5A2
746	1	5-30-00	12.3					

THIS LOG SHALL BECOME PART OF THE AGRICULTURAL APPLICATION SITE AUTHORIZATION AND MUST BE AVAILABLE FOR DEPARTMENT INSPECTION FOR THE LIFE OF THE APPLICATION SITE

AGRICULTURAL APPLICATION SITE LOG

Site Name *Flescher, Jim* Site Acreage *94.36*

Site Location T *14* ; R *11* ; Sec. *34* WH County *Lincoln* NPDES/WPCF No. *100312*

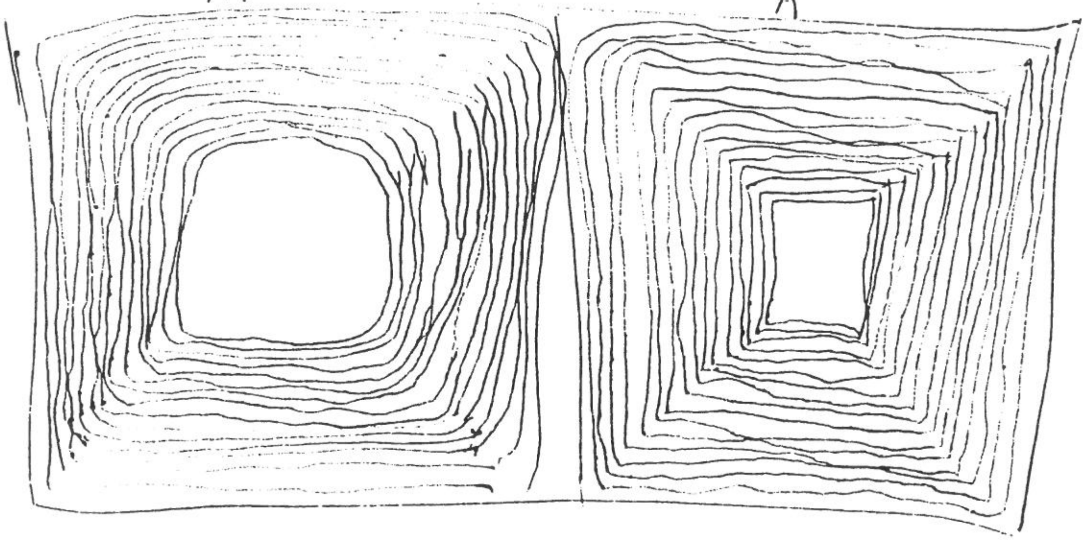
Ultimate Site Loading ________ Dry Tons/Acre (Based on the *8-22-00* , *t* sludge chemical analysis with the following metal being the limiting parameter ____ ______).

438 $\left[\frac{\text{Gallons} \times 0.\underline{0125}\ \%\ \text{Solids} \times 8.34}{2000\ \text{lbs/ton}} = \text{Dry Tons} \right]$ *45 loads*

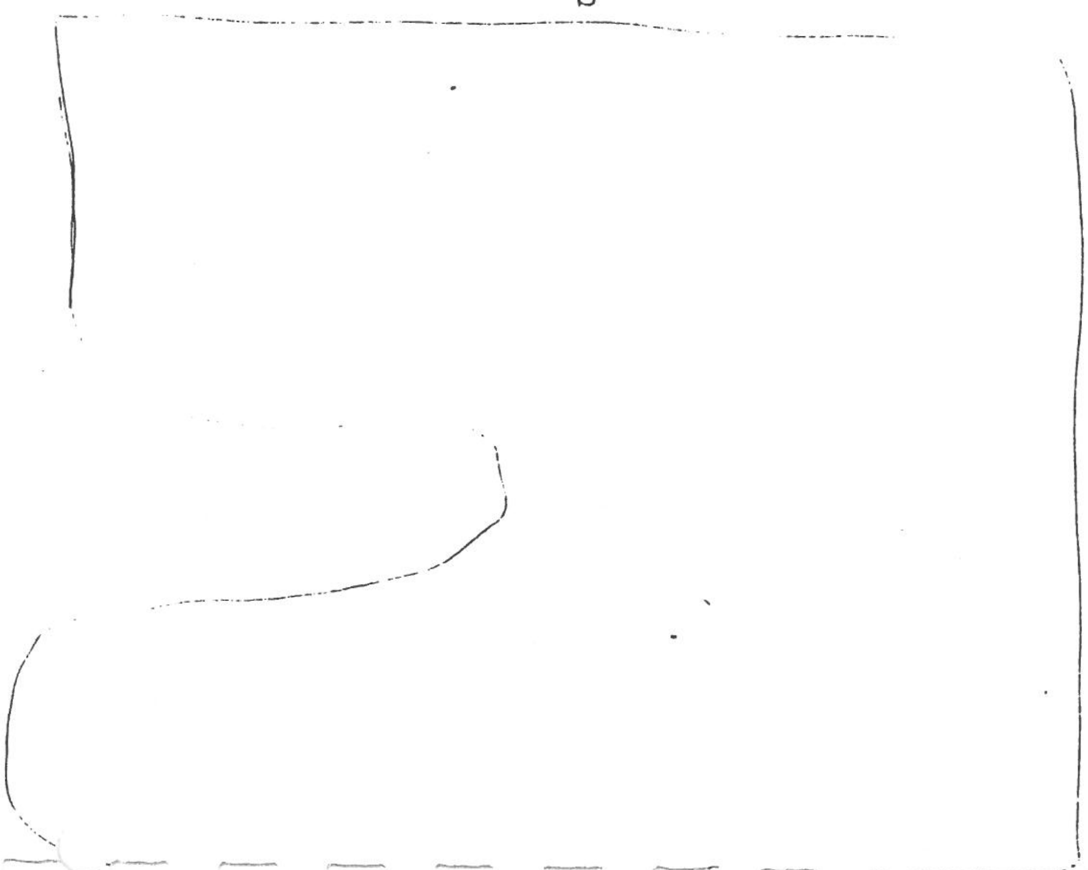
	lbs.	loads	Date	P.H.	lbs.	loads	P.H.	Date	
5A2	438	1	8-23-00	12.1	876	2	12.3.	10-18-00	5A1
5A2	438	1	8-24-00	12-1	876	2	12.3	10-19-00	5A1
5A2	438	1	8-25-00	12.0	438	1	12.0	10-27-00	5A1
5A2	438	1	8-26-00	12.2	876	2	12.9	11-14-00	5A2
5A2	438	1	8-28-00	12.2	438	1	12.9	11-15-00	5A2
5A1	438	1	9-6-00	12.0	438 -	1	12.9	11-16-00	5A
5A1	438	1	9-7-00	12.2	876	2	12.8	11-17-00	5A
5A1	438	1	9-8-00	12.2	438	1	12.8	11-27-00	5A1
5A1	438	1	9-9-00	12.3	438	1	12.8	12-1-00	5
5A1	438	1	9-12-00	12.2	438	1	12.8	12-5-00	5A1
5A1	438	1	9-13-00	12.2	438	1	12.7	12-6-00	5A1
5A1	438	1	9-14-00	12.1					
5A1	438	1	9-15-00	12.0					
5A1	438	1	9-16-00	12.0					
5A2	438		9-18-00	12.5					
5A2	438	1	9-19-00	12.4					
5A2	438	1	9-20-00	12.5					
5A2	438	1	9-21-00	12.4					
5A2	438	1	9-22-00	12.2					
5A2	438	1	9-26-00	12.4					
5A2	438	1	9-27-00	12.3					
5A2	438	1	9-29-00	12.4					
5A2	438	1	10-[illegible]-00	[illegible].5					
5A2	438	[illegible]	[illegible]-00	[illegible]					
5A2	438	[illegible]	10-7-00	12.[illegible]					
5A2	438	1	[illegible]-00	12.1					
5A2	876	2	10-10-00	12.4					
5A2	876	2	10-11-00	12.4					

THIS LOG SHALL BECOME PART OF THE AGRICULTURAL APPLICATION SITE AUTHORIZATION AND MUST BE AVAILABLE FOR DEPARTMENT INSPECTION FOR THE LIFE OF THE APPLICATION SITE

A1 A'



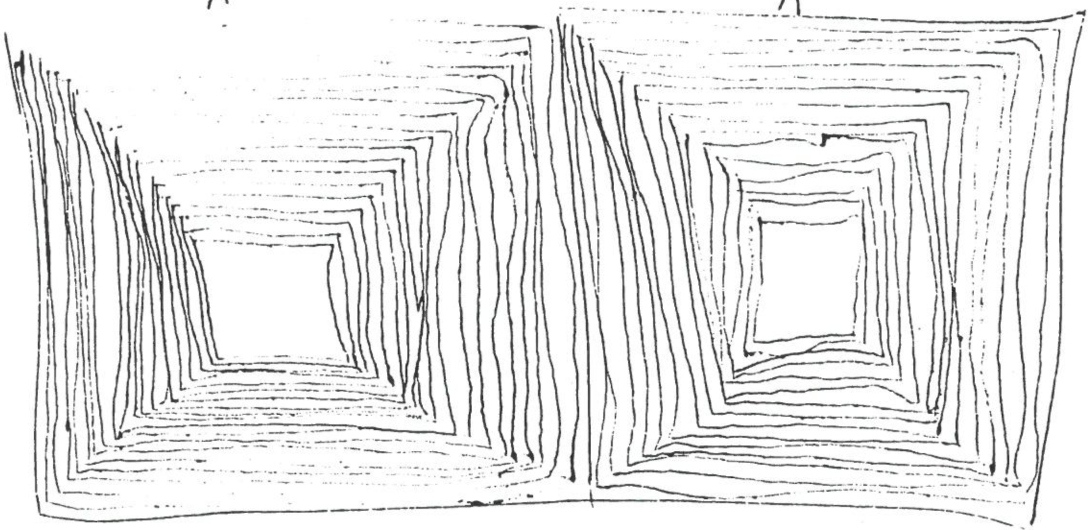
B'



SA – 6 2 [illegible]
SE [illegible] acres
Jim F[illegible] 17-11-37

SA1	1-28-00	3000 Gls
SA1	1-29-00	3000 Gls
SA2	2-10-00	3000 Gls
SA2	2-16-00	3000 Gls
SA2	2-19-00	3000 Gls
SA1	3-2-00	3000 Gls
SA2	3-21-00	3000 Gls
SA1	3-29-00	3000 Gls
SA1	4-1-00	3000 Gls
SA1	4-4-00	3000 Gls
SA1	4-5-00	3000 Gls
SA1	4-6-00	3000 Gls
SA1	4-7-00	3000 Gls
SA2	4-11-00	3000 Gls
SA2	4-12-00	3000 Gls
SA2	4-[illegible]-00	3000 Gls
SA2	5-2-00	3000 Gls
SA1	5-3-00	3000 Gls
SA1	5-9-00	3000 Gls
SA1	5-15-00	3000 Gls
SA1	5-16-00	3000 Gls
SA1	5-17-00	3000 Gls
SA2	5-18-00	3000 Gls
SA2	5-23-00	3000 Gls
SA2	5-24-00	3000 Gls
SA2	5-25-00	3000 Gls
SA2	5-26-00	3000 Gls
SA2	5-30-00	3000 Gls
SA2	5-31-00	3000 Gls
SA1	6-1-00	3000 Gls
SA1	6-2-00	3000 Gls
SA1	6-19-00	3000 Gls

A A'



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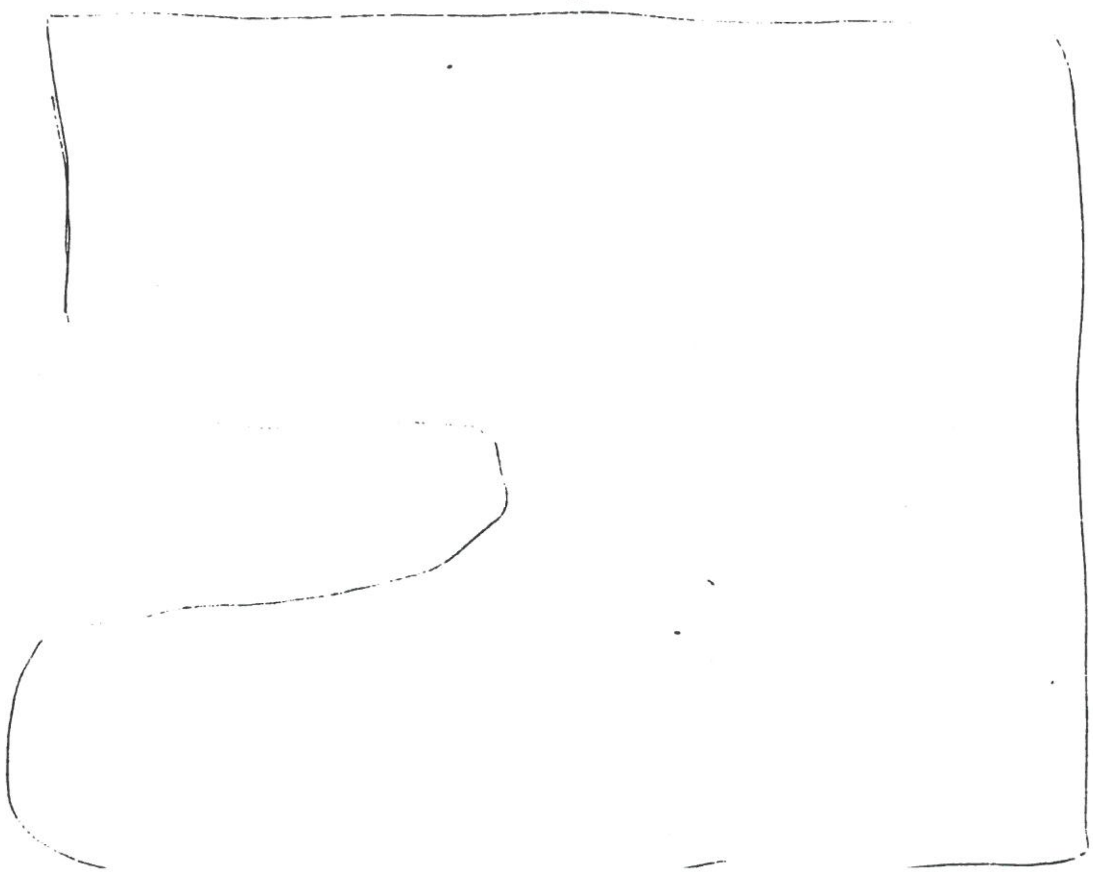
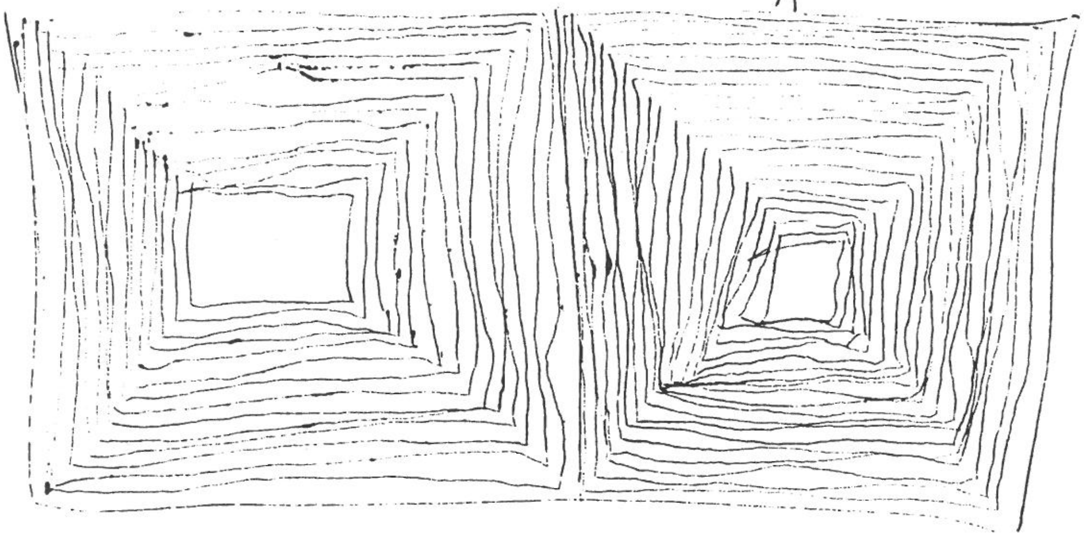
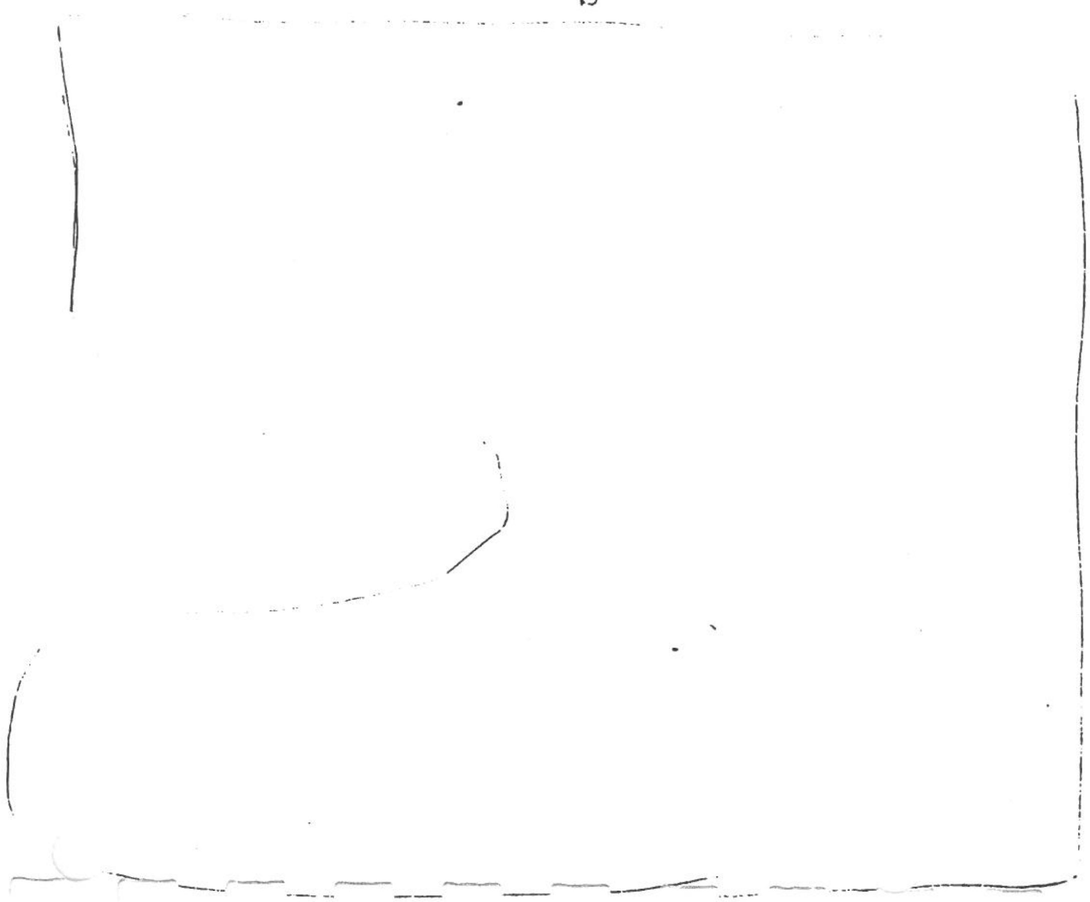


5A1	6-20-00	3000 6/s
5A1	6-22-00	3000 6/s
5A1	6-23-00	3000 6/s
5A1	6-27-00	3000 6/s
5A1	6-28-00	3000 6/s
5A1	6-29-00	3000 6/s
5A1	7-5-00	3000 6/s
5A2	7-12-00	3000 6/s
5A2	7-13-00	3000 6/s
5A2	7-14-00	3000 6/s
5A2	7-18-00	3000 6/s
5A2	7-19-00	3000 6/s
5A2	7-20-00	3000 6/s
5A1	7-24-00	3000 6/s
5A1	7-26-00	3000 6/s
5A1	7-27-00	3000 6/s
5A1	7-28-00	3000 6/s
5A2	8-3-00	3000 6/s
5A1	8-8-00	3000 6/s
5A1	8-9-00	3000 6/s
5A1	8-10-00	3000 6/s
5A1	8-14-00	3000 6/s
5A2	8-17-00	3000 6/s
5A2	8-18-00	3000 6/s
5A2	8-22-00	3000 6/s
5A2	8-24-00	3000 6/s
5A2	8-25-00	3000 6/s
5A2	8-26-00	3000 6/s
5A2	8-28-00	3000 6/s
5A1	9-6-00	3000 6/s
5A1	9-7-00	3000 6/s
5A1	9-8-00	3000 6/s

A



B'



5A1	9-9-00	3000 6/s
5A1	9-12-00	3000 6/s
5A1	9-13-00	3000 6/s
5A1	9-14-00	3000 6/s
5A1	9-15-00	3000 6/s
5A1	9-16-00	3000 6/s
5A1	9-18-00	3000 6/s
5A2	9-19-00	3000 6/s
5A2	9-20-00	3000 6/s
5A2	9-21-00	3000 6/s
5A2	9-22-00	3000 6/s
5A2	9-26-00	3000 6/s
5A2	9-27-00	3000 6/s
5A2	9-29-00	3000 6/s
5A2	10-6-00	6000 6/s
5A2	10-7-00	6000 6/s
5A2	10-10-00	6000 6/s
5A2	10-11-00	6000 6/s
5A1	10-18-00	6000 6/s
5A1	10-19-00	6000 6/s
5A1	10-27-00	3000 6/s
5A2	11-01-00	6000 6/s
5A2	11-15-00	3000 6/s
5A2	11-16-00	3000 6/s
5A2	11-17-00	6000 6/s
5A1	11-27-00	3000 6/s
5A1	12-1-00	3000 6/s
5A1	12-5-00	3000 6/s
5A1	12-6-00	3000 6/s

Optimization Study

Appendix

F

City of Yachats
441 Hwy 101 N.
P O Box 345
Yachats, OR 97498

October 2, 2003

Mr. Ruben Kretzchmar
DEQ – Western Region
340 N. Front Street
Coos Bay, OR 97420

RE: EPA Optimization Report

Per our conversation this morning, I am sending you this copy of the EPA Optimization Report for the Yachats Wastewater Treatment Facility, prepared by Bob Dillard, Operations Consultant.

I apologize for not getting these documents to you sooner.

If you need any further information, please call me at 541-547-3565 or 541-961-1805.

Sincerely,

John C. McClintock

John McClintock
Public Works Director

Cc WWTP
File

RECEIVED
AUG 1 0 2004

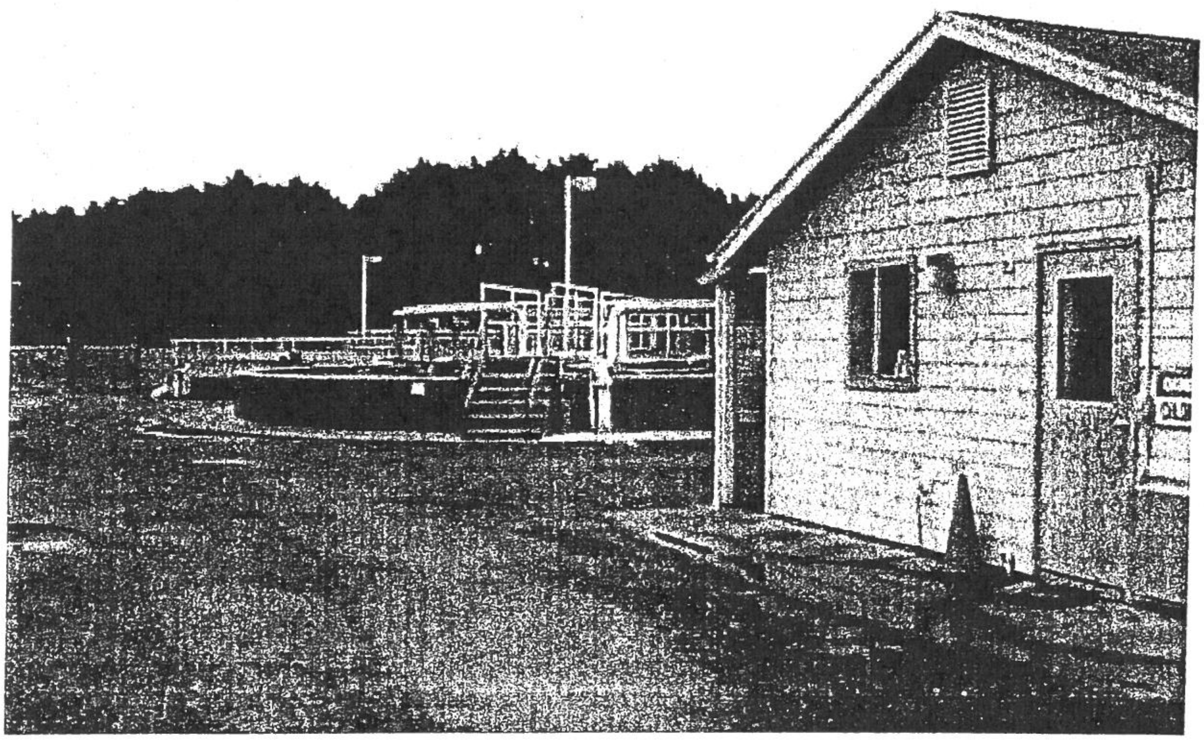
PHONE (541)547-3565 RELAY OREGON (800)735-2900 (T.D.D.) FAX (541)547-3063
E-MAIL CITYHALL@CI.YACHATS.OR.US WEB SITE WWW.CI.YACHATS.OR.US

City of Yachats

Wastewater Treatment Plant

Optimization Study

The City of Yachats constructed the original treatment plant in 1974 and upgraded the facility in 1994. It has a peak design of 1.9 million gallons per day. Since the upgrade the plant has exceeded the peak flow design on numerous occasions. The city experiences very high increases in plant loadings during peak tourism seasons and on weekends. The peak events occur on the weekends when an operator is not present and testing is not performed. The actual effects on the plant are most likely not reflected in their discharge monitoring reports.



Plant Description

Headworks

Wastewater enters the treatment plant at the headworks where the flow is measured by a magnetic flow meter. Rag removal along with large debris is removed next by a fine mesh screening system. Wastewater then flows through a grit removal system for removal of sand and other debris prior to secondary treatment.

Aeration Basins:

Flow leaves the headworks and enters 2 complete mix aeration basins where aeration and mixing is accomplished by diffused air.

Final Clarifier:

Mixed liquor from the aeration basin flows to the final clarifier for solids separation. Settled sludge is returned to the aeration basin and the clarified water is discharged to the chlorine contact chamber. The scum that floats to the surface of the clarifier is currently returned to the aeration basins. Waste sludge is pumped by a separate pump to the aerobic digester.

Chlorine contact chamber:

Flow from the clarifier enters the chlorine contact chamber. Chlorine is introduced, and mixed with a chlorine inductor. The chlorine contact chamber is covered. From the chlorine contact tank the disinfected effluent is discharged through the plant outfall.

Aerobic Digesters

Waste sludge from the final clarifier is pumped to one of three aerobic digesters. As the sludge is being stabilized it becomes biosolids. The third stage is used for sludge separation and decanting. Lime is also added to the third stage as part of the lime stabilization process to meet the Class B biosolids requirements prior to disposal.

Wastewater Treatment Plant Status

Headworks:

Intermittent flows were noted at the plant influent. The influent flowmeter fluctuates to the point that it is almost useless for tracking diurnal flow rates.

Rag and grit disposal is not easily accomplished due to the location of the discharge points for each unit. The existing equipment used to transfer the debris has the potential for an accident for plant personnel.

Aeration Basins:

The wastewater flow to each of two aeration basin appears to be uneven due to the level of the weirs being off. The concentrations of MLSS appear to be different in each basin also. The return sludge rate from the secondary clarifier is well below what is needed to keep solids balance in the system. Some gasification was noted in the secondary clarifier, which is another indication that the return sludge needs to be increased.

The return sludge control is limited because of the air lift pumps are inefficient and hard to keep at a consistent rate.

Final Clarifier:

It has been noted that the final clarifier accumulated an excessive amounts of grease and experiences gasification during warm weather. The grease that is carrying through the treatment process is created in most part from restaurants in the area. Large amounts of grease will inhibit the biological process performance. The gasification is most likely caused by denitrification and low return sludge rates.

Chlorine Contact Chamber:

The chlorine inductor was out of service and in need of repair. It will need to be kept in service to insure proper disinfection of the final effluent. Intermittent plant flows and a constant feed chlorine system contributes to a fluctuating chlorine residual throughout the day. This most likely leads to under and over chlorination.

Biosolids Program:

Currently very little testing is done of the aerobic digesters. Lime stabilization is being used prior to disposal. The lime is messy and if not handled properly can be of a health risk when proper precautions are not taken.

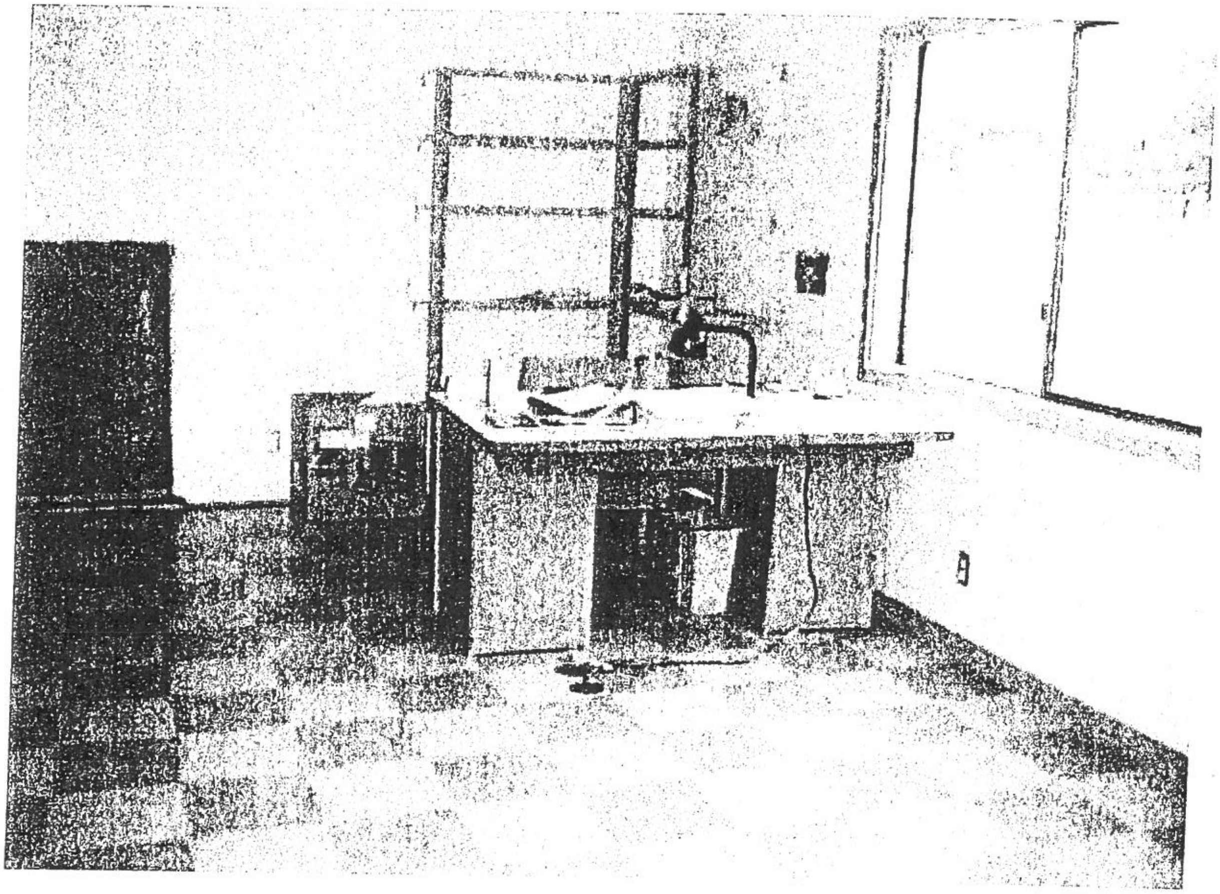
There are permitted year-round sites that allow hauling of biosolids when needed. A routine program of site evaluation should be done.

Lab:

Existing lab data is limited and the discharge monitoring report is not kept up on a daily basis. Very little process testing is being performed. The lab equipment is old. Fecal Coliform testing is done by an outside lab.

Existing plant performance might not truly be reflective of plant performance due to the fact that peak load events are during the week ends when the plant is not manned and samples are not taken.

The existing lab is small, cramped and in need of organization. There has been an attempt to move the lab into a larger room. The room is still available.



Extra room that is being converted to a lab.

Recommendations

1. Relocate or install a new flowmeter on the effluent side of plant. This will allow a smoother signal that can be used for:

    a. Controlling the flow proportional automatic chlorinator.
    b. Possible future control of a proportional automatic sampler.
    c. Possible future control of a return activated sludge pump.

2. Level the V-notch weirs in the aeration basins to help even flows to each basin.

3. Relocate the RAS directly into the Raw influent flow to get better mixing at the inlet to the aeration basin. A possible baffle might work.

4. Discontinue transferring grease from the scum pit to the aeration basin. It is recycling back to the clarifier. The high grease content can effect the microbial activity of the biomass in the aeration basin. Pump the clear water to the aeration basin and the grease on the surface of the scum pit to the digester.

5. Final Clarifier:

    a. Increase return sludge rates, this will reduce clarifier sludge detention times and should reduce or stop the gasification in the clarifier.
    b. Keep the sludge blanket in the clarifier less than 3 ft.
    c. Pump the grease from the scum pit to the digester instead of the aeration basin. This should reduce the grease on the surface of the clarifier.
    d. Repair the chlorine inductor for better chlorine disinfection of the plant effluent.

6. Process Control

    a. Do a solids balance on the activated sludge system. This controls the solids inventory and will help with the gasification in the secondary clarifier.
    b. Experiment with using the existing WAS/Scum centrifugal pump as a RAS pump and continue to use the air lift pump (currently use for RAS) as a waste sludge pump. There would be some intermittent disruption of RAS pumping when the scum is being pumped.
    c. Run Dissolved Oxygen testing on the aeration basins, and digesters on a routine basis and set operating levels.
    d. Increase process control testing to determine suspended solids concentrations in aeration basin and the digester to determine SVI's on the activated sludge and VSS% reduction on digestion.

e. New lab equipment should be obtained.

1. A new dissolved oxygen meter is a high priority
2. Fecal Coliform testing can easily be done in house and save the manpower it takes to run the samples to Newport.
3. A new BOD incubator should be considered.

Grease Traps. A pretreatment program should be either implemented or enforced. There are programs provide by the state that would help with setting up a program for dealing with fats, oils, and greases. (FOG). Currently plant staff ad degreaser to the pump station wet well. This will help the pump station but not the treatment plant.

The discharge monitoring reports are not kept up on a daily basis. Anyone should be able to come into the plant and easily find current plant data and performance.

BOB DILLARD CONSULTING

May 30, 2002

Dyer Partnership Engineers & Planners
275 Market Street
Coos Bay, OR 97420
Attention: Steve Majors

Dear Steve:

Attached is an outline for our visit to the Yachats Wastewater Treatment plant on May 22, 2002.

Plant conditions: Intermittent flows were noted at the plant. The influent flow meter is intended to control the chlorine feed rate but is not efficient in doing so because of intermittent flows to the headworks. Therefore the proportional chlorinator is not being used. The manual chlorinator is being used for a steady feed rate. (The use of the manual chlorinator probably leads to over chlorination at night.)

Suggestion: Locate the flowmeter on the effluent and have it available for control of the chlorination, possible sampler control and RAS control in the future.

Headworks: Disposal of grit and rags is not accomplished easily and therefore a very messy situation. A potential accident is there due to the way the debris is transferred to the disposal containers.

Aeration Basins: The flow to the two (2) aeration basins appear uneven. The RAS control is limited and return rates were well below the rate needed to keep a solids balance in the system. Gasification was noted in the final clarifier. The return rates at the time of visit might have been 50 gpm. The low return rates was probably the main cause of the gasification in the clarifier.

Suggestions:

1. Level the v-notch weirs

2. Relocate the RAS directly into the Influent stream to get better mixing at the inlet to the aeration basin.

3. Discontinue recycling grease from the scum pit to the aeration basin. It is just recycling back to the clarifier. Pump the clear water to the aeration basin and the grease to the digester.

Final Clarifier:

At the time of the visit the final clarifier had a lot of grease on the surface, gasification occurring, and an estimated relatively high depth of sludge blanket.

Suggestions:

1. Increase return sludge rates to transfer sludge back to the basins and reduce clarifier detention time. This should help with the gasification.

2. Keep a sludge blanket of less than 3 ft.

3. Pump grease to the digester. This will keep a more active biomass population and reduce the grease on the secondary clarifier.

Process Control

A solids balance in the activated sludge process would allow a stable operation and improved effluent treatment.

Experiment with using the existing WAS/Scum centrifugal pump as a RAS pump and continue to use air lift pump for wasting to the digester.

The return sludge rate could be interrupted while pumping scum from the secondary clarifier. A standard operating procedure should be set up for opening and closing the required valves. The well used for the RAS and Scum is shallow and the wasting through the RAS line should help kept line flowing.

Lab.

Increased process control should be evaluated to include routine analysis of suspended solids in the mixed liquor, return sludge, and waste sludge. This would help to determine F/M ratios, SVI and to solids inventory.

Install automatic samplers on influent and effluent for representative results and use results for calculating F/M ratios, VSS reductions in digester. Etc. This better reflect the changes in diurnal flows.

Run dissolved oxygen testing on the aeration basins and the aerobic digesters for process monitoring.

Biosolids Program

Aerobic Digester:; Suspended and volatile solids analysis on the digester would determine what the volatile suspended reduction is. An evaluation of what it would take to produce a class B sludge should be done to determine if lime stabilization continues to be necessary or there are better alternatives.

Biosolids Disposal

Currently there are application sites permitted year around. There is a question whether these sites will continue to be available. There are also questions on where any new sites that might be obtained would be permitted for winter application. New sites need to be obtained and a sludge management plan needs to be developed.

Notes:

1. The chlorine inductor in the chlorine is currently out of service.

2. The chlorine contact chamber probably should be cleaned more often. Use of the dewatering well might make this process easier.

3. New lab equipment should include a good microscope, a new d.o. meter, and a incubator for BODs. Fecal Coliforms testing on site would reduce cost of offsite analysis.

Lift stations.

It is assumed at this time that the main pump station that delivers wastewater to the treatment plant will be upgraded. Consideration for controlling flows to the facility should be made.

Please contact me if you have any questions. I might be in your area in the next couple of weeks. I would like to get together if we can.

Sincerely,

Bob Dillard

Bob Dillard
Operations Consultant

3835 EDGEWOOD DRIVE, NORTH BEND, OR. 97459
PHONE: 541-756-6078

Grease Reduction Information

Appendix

G

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Western Region
1102 Lincoln
Suite 210
Eugene, OR 97401
(541) 686-7838

April 2, 2001

Mayor Lee Corbin
City of Yachats
PO Box 345
Yachats, OR 97498

Re: **NOTICE OF NONCOMPLIANCE**
ENF-WQ/M-WRE-2001-026
City of Yachats
NPDES Permit # 100812
File No. 99260
Lincoln County

Dear Mayor Corbin:

I have reviewed the Discharge Monitoring Report (DMR) submitted for the months of October, 1999 through January, 2001 for the City of Yachats wastewater treatment plant. During the review, the following National Pollutant Discharge Elimination System (NPDES) permit violations were noted:

Schedule A:

Date	Parameter	Permit Limit	Reported Value	Class Violation
Dec. 12-18, 1999	BOD5 weekly avg. lbs.	50 lbs.	65 lbs.	Class II
June, 2000	Fecal Coliform bacteria weekly avg.	400org/100 ml	540 org/100ml	Class II

Schedule B, Condition 1. lists the minimum influent and effluent monitoring and reporting requirements for various parameters. General Condition C.5. requires monitoring results to be summarized each month on a DMR and submitted to the Department. Failure to monitor and report at these frequencies is a violation of the permit. The following reporting violations were documented:

Oct, 1999 – June 2000 — The bottom portion of the DMR was not filled out to calculate the monthly averages of BOD and TSS % removal, concentration or pounds discharged. Influent averages were also not filled in.

The violations listed above are Class II violations are considered to be significant violations of Oregon environmental law. Should similar violation occur, we may refer your file to the Department's Office of Compliance and Enforcement with a recommendation to proceed with a more formal enforcement action which may result in a civil penalty. Civil penalties can be assessed for each day of violation.

Another area of concern I have is with regard to the recent sewage backups and overflows due to blockages caused by oil and grease buildup in service laterals. These have occurred several times in the last six months or so, and seem to have been avoidable if the City had a program in place to enforce the grease ordinance that already exists. The intent of the grease trap ordinance is to keep these materials out of the service laterals, collection system and treatment plant to prevent these types of problems. The ordinance has little effect if the City does not enforce it by requiring businesses to pump grease out of the traps, and having some type of enforcement action if they do not comply.

I was provided a copy of the City's rules with regard to the limitations set for public sewers (Section 8.08.040). In these rules under Section C, it states that "no person shall discharge or cause to be discharged...2. Any water or waste containing fats, wax, grease or oils...in excess of 100 mg/l or containing substances which may solidify or become viscous...."

The section goes on to say that any person who has such discharges shall have a grease trap for pretreatment and that the City will enforce the grease trap ordinance to protect the sewer system and to prevent any nuisance or adverse public health conditions.

My understanding is that these recent blockages have caused sewage to backup and overflow on private business property which has created both nuisance and public health concerns and that the Lincoln County Health Dept. has been contacted and also has concern over this matter.

Excess grease and oil can cause upset conditions at the plant and result in decreased treatment efficiency as well as causing problems in the collection system. This can result in permit violations and subsequent enforcement action by the DEQ if the problem is discovered to be associated with a preventable cause such as failure to enforce your grease ordinance.

As you likely know, the wastewater strength into your system is already very high due to the type of contributors that you have in the system (i.e. many hotels and restaurants per capita). This is another compelling reason to make every attempt to keep these high strength oils and grease out of your system.

I am available to aid the City in enforcing the grease ordinance by offering some suggestions and to review proposed letters or notices that you may develop to require compliance. I have been impressed with your operator, Kevin Cheshire's efforts since he has taken over the responsibilities of the collection system and treatment plant in trying to resolve this problem. The City needs to be firmly-behind these efforts if he is to have any success, and if the City is to avoid possible enforcement action by the Health

Department and/or the DEQ. Please take whatever steps are necessary to correct this problem.

If you should have any questions, please contact me in Eugene at (541) 686-7838 ext. 234.

Sincerely,

Julie M. Berndt
Natural Resource Specialist
Western Region - Eugene

Cc: Rod Carrasco; City of Yachats
Amy Chapman
Lincoln County Health Dept.
36 SW Nye
Newport, OR 97365

Grease Interceptor/Grease Trap Maintenance Procedure for Food Preparation Facilities

The Monterey Regional Water Pollution Control Agency (MRWPCA) has implemented a Regional Grease Program in our service area to reduce the amount of grease entering the sanitary sewer system from food serving establishments. Incorporated with this program is the need for proper cleaning and maintenance of grease interceptors and grease traps located at these establishments.

In order to meet all MRWPCA requirements and keep these food serving establishments in full discharge compliance, the following procedures should be followed for servicing these grease removal units:

Grease Interceptors shall be completely pumped (i.e.- dry-pumped removing the grease mat, liquids, sludge, and wash down material from the interior walls).

Grease Traps shall be completely pumped (i.e.- dry-pumped removing the grease mat, liquids, and solids from walls, screens, baffles and air-relief chambers).

Report any problems/damage with the interceptor/trap to the business manager/owner and the MRWPCA Source Control Division (i.e.- missing or broken baffles, screens, and pipes).

MRWPCA prohibits the discharge of wastes pumped from a grease interceptor/trap back into the sanitary sewer or the clean interceptor/trap.

Bacteria products used in the maintenance of interceptors or traps must be pre-approved by the MRWPCA. Products having a content of enzymes, surfactants or solvents that is greater than 10% of the volume will not be approved for use.

MRWPCA appreciates your cooperation in this matter. Please contact the Source Control Division at (831) 883-1118 or (831) 424-1108 if you have any questions concerning the above requirements.

Monterey Regional Water Pollution Control Agency Source Control Division Restaurant Information Bulletin

How Does A Grease Trap Operate?

A grease trap is a relatively simple device composed of a flow restrictor, an inlet, two or three baffles (depending on the brand), a lid and air-tight seal, and an outlet. Baffles are scientifically placed to allow efficient separating of grease and oils and are easily removable. Water draining to the grease trap passes through a flow control fitting which regulates the velocity of the water to the capacity of the trap. As the water enters the grease trap at this controlled rate of flow it is free of turbulence. It then passes over a series of separator baffles that are designed to cause greases, fats and oils to become separated and released from the wastewater. Once released, these contaminants rise to the top of the grease trap by natural flotation and are accumulated until removed. The wastewater now relieved of over 90 per cent of the contaminant oils and greases, continues to flow through the trap/interceptor and into the sanitary sewer system.

Separation efficiencies for each trap are determined by the shape of the inlet, outlet baffles, and by flow travel characteristics within the trap. Separation efficiency decreases as the retained volume of grease/oil products increases. For example, a 40-pound grease trap may have 95 per cent separation efficiency with no grease present in the trap and only 20 per cent separation efficiency with a full 40 pounds of grease in the trap. In other words, the more grease in the grease trap, the less grease will separate from the water and float to the top. Instead, the grease will go down the drain, with the rest of the water and thus defeat the whole purpose of having the grease trap.

It is, the responsibility of each restaurant as a regulated business activity to ensure the pretreatment of wastewater by performing the following tasks:

1. Make sure the **FLOW RESTRICTOR** is present

2. Make sure the **BAFFLES** are present (two or three, depending on the brand)

3. Make sure the trap is **CLEANED** as often as necessary to ensure that the grease/oil is separating out from the water; this will vary from restaurant to restaurant

CLEANING GREASE TRAPS

Every grease trap/interceptor needs to be cleaned. The length of time between cleanings will vary with the type and size of the grease trap/interceptor relative to the amount of grease and oil washed down the sink to the trap. If the sink in which the greasy pots and/or dishes are washed is not connected to the grease trap, then, of course, no grease will be collected in the trap at all (just on the inside of the restaurants' drain pipes).

Many restaurants clean their grease traps each week at a designated time and day (i.e., Wednesday evenings after closing or Sunday morning before opening). It is beneficial to clean the trap often for the following reasons:

1. Keeps the rancid grease and oil odors at a minimum

2. Helps keep the grease from emulsifying (mixing with water) and then going down the drain

What Is a Grease Trap and How Does One Affect Me?

A grease trap is a device designed and installed in order to separate and retain grease and oil from the normal wastes and permit normal liquid wastes to discharge into the sewer system.

In the MRWPCA service area, grease traps are a major concern for all of us, since the leading industry is tourism. In order to accommodate these tourists, the Monterey Peninsula provides some of the most varied and unique restaurants to be seen anywhere. Presently, there are hundreds of these establishments serving the area and a proportionate amount of grease and oil derived from their operation is entering the regional sewer system and creating pumping and processing problems. This excess of grease and oil is mainly due to inefficient pretreatment practices. With installation and proper maintenance of grease traps/interceptors, there should be a minimum amount of grease and oil entering the sanitary sewer system, therefore reducing the problems at MRWPCA pump stations and the Regional Treatment Plant.

Our goal at the MRWPCA Source Control Division is to make sure every industry and commercial business activity in the MRWPCA service area is providing the proper pretreatment for their wastewater as mandated by the Regional Water Quality Control Board, Environmental Protection Agency as well as our own Sewer Use Ordinance 92-02.

INTERAGENCY POLICY ON THE USE OF GREASE TRAP & GREASE INTERCEPTOR ADDITIVES JULY 12, 1995

The agencies listed below have completed a joint project testing bacteria products designed for use in treating grease traps or grease interceptors (GT/GI) at restaurant kitchens. The products tested were found to have no detrimental effect on the efficiency of the GT/GI. Therefore, the following policy has been developed to allow the use of such products:

1. The owners or managers of restaurants and other facilities that wish to use such products must obtain approval from the appropriate agency. Each site wishing to use a product must obtain separate approval.

2. A Material Safety Data Sheet (MSDS) must be submitted to the appropriate agency for approval of the product prior to beginning treatment. The MSDS, or other information submitted, must identify all active and inactive ingredients of the product.

3. The products used must be composed of active bacteria and be designed to decompose the grease in the GT/GI. Products which rely on enzymes, solvents, surfactants, or other chemicals, are not permitted.

4. No alterations may be made to the GT/GI unless approved by the agency. Repairs to baffles and internal piping will be permitted. Alterations that would interfere with normal GT/GI functioning will not be permitted.

5. The GT/GI may not be aerated, agitated or otherwise mixed or stirred at any time.

6. The appropriate agency may prohibit the use of a product either in general or in a specific location if pass-through of grease or other problems in the collection system or treatment plant occur.

7. GT/GI cleaning or pumping schedules may not be altered without prior request by the restaurant owner or manager and approval by the appropriate agency. The use of such a product will not eliminate, and may not reduce the need for routine cleaning and pumping of the GT/GI.

8. The product being used may not be changed without prior approval of the new product by the appropriate agency.

If you have any questions about the policy, please call the contact person listed on the following page having jurisdiction in the area where the product may be used.

Contacts for questions or approvals for the use of grease trap, and grease interceptor additives are:

City of Santa Cruz
Contact: Robert Barrett, (831) 429-3488

City of Watsonville &
City of Scotts Valley
Contact: Larry Bush, (831) 728-6042

CITY OF
SANTA CRUZ

FOOD SERVICE FACILITY WASTEWATER DISCHARGE QUESTIONNAIRE

INSTRUCTIONS

Food service related facilities discharging to the City of Santa Cruz Wastewater Treatment Facility are required to complete a wastewater discharge questionnaire. Please use current operating data, if available, or best estimates based on similar operations. Information submitted will be used to assess the size trap or interceptor to be installed and a confirmation letter will be sent shortly thereafter. Please read the Grease Trap/Interceptor Program Information document and complete all necessary forms before mailing to:

City of Santa Cruz Wastewater Treatment Facility
110 California Street
Santa Cruz, CA 95060
Attn: Environmental Compliance Manager

GENERAL INFORMATION

Business Name: ______________________________

Street Address: ______________________________

Mailing Address: ______________________________

Owner/Manager: ______________ Phone #: ____________ Fax: ____________

Trap or Interceptor Size: ____________ Cleaning Frequency: ______________

Type of facility (e.g. fast food, caterer, cafeteria): ______________________

Average number of employees: ________ Days/hrs of operation: ______________

Busiest hours of day: ____________ Maximum number of meals served per hour: ______

Peak discharge rate to sanitary sewer: _____gal/hr. Seating Capacity: ______________

Full list of menu items (attach list if needed): ______________________

EQUIPMENT INFORMATION

The following is a list of equipment associated with wastewater generating activities. Please check all that apply:

[ ] washable dishes
[ ] dish sink (s) how many? _____
[ ] pot sink (s) how many? _____
[ ] mop sink (s) how many? _____
[ ] floor sink (s) how many? _____
[ ] vegetable sink (s) how many? _____
[ ] bar/cocktail sink (s) how many? _____
[ ] garbage grinder (prohibited by local code)
[ ] disposable dishes
[ ] dishwasher
[ ] soup vat (s) how many? _____
[ ] grill hood cleaning
[ ] wok range cleaning
[ ] refuse container cleaning
[ ] restroom cleaning
[ ] other ___________________

Temperature range of dishwasher water: _____ Flow rate of dishwasher: __________________

GREASE REMOVAL DEVICE (for existing systems)

Size and type of unit (description): ____

Location: _________________________________ Frequency of servicing: ________________

INFORMATION IS BASED ON: (check boxes that apply)

[ ] current operating data
[ ] best estimate (source): ____

Certification Statement:
I certify that the information contained in this application is true and correct to the best of my knowledge. I have read the Grease trap/Interceptor Document, Food Service Facility Best Management Practices and information on additives. I agree to install, maintain and routinely clean the appropriate system in accordance with local regulations. I also understand that a cleaning log or servicing records must be kept for a twelve-month period and made available for inspection and/or copies furnished upon request by the City of Santa Cruz representative

___________________________________ ___________________________________
Signature * **Date**

___________________________________ ___________________________________
Printed Name **Title**

***Questionnaire must be signed by the owner or by an official designee of the business.**

Grease - Is it really a problem?

Grease is "hydrophobic," which means it prefers to cling to surfaces that are free of water.

Grease will build from the top down in the sewer line while heavier debris may collect on the bottom as the wastewater flows through the sewer line.

The grease continues to build restricting the flow of waste water. Sometime these layers break off and create a plug downstream.

Eventually, grease will form a total blockage in the sewer line.

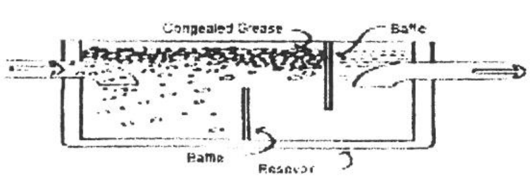
Large amounts of oil and grease in the waste water can cause sewer lines to clog, sewer lift station failures, wastewater treatment plant problems and environmental concerns.

Grease is one waste that the sewer system cannot handle and therefore needs to be kept out of the system.

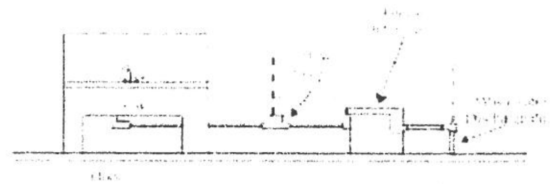
Grease trap (interceptor)

All full service and fast food restaurants should have a trap as part of the kitchen system to capture oil and grease from the wastewater.

A grease trap slows down the flow of hot greasy water allowing it to cool. As the hot water cools, the oil and grease separate and float to the top of the trap. The cooler water continues to flow down the pipe to the sewer. The grease is trapped by "baffles," which cover the inlet and outlet of the tank, and should prevent grease from flowing out of the trap.



Larger outside grease traps (or interceptors) are usually located a few feet from the building exterior area. Outside grease traps are more effective, require periodic inspection and cleaning.



Small inside grease traps are usually located in the floor near sink or rear exit. These traps require frequent maintenance and are typically ineffective.

What size grease trap do I need?

The size of a grease trap depends largely on your type of business and how much waste your business produces. The more waste produced usually means the bigger the grease trap will need to be.

Sizing considerations

- Type of food being prepared.
- Seating capacity.
- Retention time needed for efficient removal of grease.
- Frequency of maintenance.
- Accessibility of trap.
- What equipment is connected to the trap.

How do I maintain the grease trap?

To be effective, grease traps must be cleaned out regularly and the contents completely removed. The frequency of cleaning the grease trap and pumping out grease and solids will depend on the nature and volume of the wastewater.

Inside traps should be cleaned weekly.

- Bail out any water to facilitate cleaning.
- Dip the grease out of the trap and place in a water tight container.
- Scrape grease from sides and lid into container.
- Place container in trash receptacle.

Note: Clean the trap the day before trash is picked up to avoid nuisance complaints.

Outside traps should be inspected monthly.

- Use a "dip stick" to measure the grease layer.
- Contact pumper to clean out trap.
- Be sure that the contractor scrapes all sides, and that all the tank contents are removed.
- Inspect the trap for potential problems while it is empty.

Best Management Practices for Restaurants

Food service establishments can reduce the waste that goes down the drain by using best management practices (BMPs).

BMPs are a schedule of activities, maintenance procedures, prohibitions, and other management practices to prevent or reduce pollution in the sewer system.

BMPs could help extend the cleaning and pumping frequency of the grease removal system, and prevent unnecessary and expensive repairs or closures.

Example BMPs

Scrape all plate waste into a lined garbage can. Place with regular trash for disposal.

Prewash plates, pots, etc, by spraying them off with cold water over a small mesh catch basin placed over a drain. This catch basin should be cleaned into a garbage can as needed.

Place all oil and grease from pots, pans, etc, into a "waste grease bucket." Liquid oil and grease from waste bucket or other devices must be taken to the grease dumpster.

Spillage around the dumpster usually occurs due to overfilling of the waste bucket or dumpster being too full. ***To prevent spillage, take more than one trip to the dumpster and have it emptied before it becomes too full.***

To avoid complaints, use good judgement and care when disposing of waste into the trash or grease dumpster.

Contain any oil and grease spill. Absorb it with dry material (cat litter, wood shavings, etc). Place in plastic bag then discard with regular trash.

Do not put any oil or grease down a drain.

Do not pour or allow any waste to go into an alley, street, or the storm drain.

Inform each employee and document that they have been informed of your BMPs, and the procedures for handling and disposing of grease.

Post your BMPs in a visible place.

Bacteria/Enzyme Treatment

Bacteria and enzymes are ineffective in a grease trap or interceptor where retention time is inadequate, where there are surges in flow volume, where there are changes in grease volumes, or changes in the wastewater temperature. ***The City does not endorse the use of bacteria or enzymes since they can make grease a problem down stream.***

Excessive use of drain cleaners can damage your sewer line causing major problems and costly repairs.

Remember

- ✓ Inspect system components periodically.
- ✓ Clean drain lines regularly.
- ✓ Properly dispose of grease and oil.
- ✓ Clean the trap frequently to reduce grease volume and cleaning time.
- ✓ Document all cleanings, inspections, and training.

Don't

- Obstruct grease trap.
- Use hot water to flush sewer lines.
- Rely on drain cleaners, enzymes, or bacteria agents.

For more information contact the City of Loveland Pretreatment Coordinator at (970) 962-3719.

DEPARTMENT OF ENVIRONMENTAL RESOURCES MANAGEMENT

DERM-WASTEWATER SECTION KITCHEN OIL, GREASE & WASTE DISPOSAL PROGRAM

MIAMI-DADE COUNTY
DEPARTMENT OF ENVIRONMENTAL RESOURCES MANAGEMENT
WATER & SEWER DIVISION

Miami-Dade County
Department of Environmental Resources Management

Kitchen Oil, Grease and Waste Disposal Program

Introduction

Food preparation is almost impossible without the use of fats, oils and grease. Establishments such as restaurants, bakeries, meat markets, etc. are the major places where these products are used extensively and on a large scale, however there is a residential connection. Residential grease discharges overwhelm commercial facilities by a large margin and are considered to play a very significant role in oil and grease discharge to the public sanitary sewer system.

In the early 1990's Miami-Dade County experienced a number of sewer infrastructure problems which resulted in a lawsuit by the United States Government. In this lawsuit a federal consent decree was settled upon in two parts. The First Partial Consent Decree (FPCD) required the County to repair it's sewer system, which include pump stations and the Biscayne Bay Crossing pipe construction; implement a sewer allocation program to monitor and prevent overuse of the gravity and force-main collection and transmission system. The FPCD also required Miami-Dade County to create a program, whereby non-residential facilities would be monitored for grease discharge through a permit program. The Grease Discharge Ordinance (#94-132) was approved and adopted in June 1994 by the Miami-Dade County Board of County Commissioners.

Prior to September 1994, no regulations existed for governing the operation of grease traps or interceptors that discharge wastewater to the sanitary sewer collection system, although construction and installation requirements were available under the South Florida Building Code (SFBC). In many cases grease pretreatment devices were not considered where cooking facilities opened and only when considered by the municipal building official. Recently, the building code was revised to demand grease pretreatment devices to be installed where food is commercially prepared and/or served. The original intent for some locations was for warehouses or non-food retail outlets, which later became food preparation establishments therefore, not all restaurants have grease interceptors.

Chapter 24, Code of Miami-Dade County, addresses issues concerning sewage overflows caused by grease-related blockages where raw sewage may carry harmful bacteria, viruses, pathogens and bio-aerosols. The diseases they cause range in severity from mild gastroenteritis (cramps and diarrhea) to life-threatening ailments such as cholera, dysentery, infectious hepatitis, etc. According to the Environmental Protection Agency (EPA), forty-three (43) percent of sanitary sewer overflows were caused by pipe blockages. The remaining fifty-seven (57) percent may have resulted from having an insufficient system capacity, infiltration and inflow of groundwater and stormwater, power failures, and pipe breaks.

The problem of oil and grease blockages in sewer pipes is universal. Residential and non-residential facilities contribute their share disproportionately, however efforts are being made to minimize the number of grease blockages that may originate from non-residential sources through a permit program that is administered by the County. In the process DERM has the ability to educate all users of oil and grease on how grease waste can be minimized and properly disposed of to protect our fragile environment.

I. What is Oil and Grease?

Everyone knows oils and grease are used for cooking, baking and preparing foods of all variety, but few people realize that they are lipid-based compounds that originate from animal and vegetable matter. Lipids are substances, including fats, oils, grease and waxes, combined with proteins and carbohydrates, which make up structural components of living cells. An important property of oil and grease is it's ability to separate and float on water, in other words, they are hydrophobic compounds. Grease will tend to cling to sewer pipes and the surface of a grease build-up causing a clog to form from the top of the pipe.

A. TRI-GLYCERIDES, MONO-GLYCERIDES AND DI-GLYCERIDES

A grease molecule is made up of fatty acids attached to a glycerol molecule. The technical names for grease molecules are mono-glyceride (one fatty acid with one glycerol), di-glyceride (two fatty acid molecules with one glycerol), and tri-glyceride (three fatty acid molecules with one glyceride).

Seed oils are 95%, by weight, various tri-glycerides with the remaining weight composed of free fatty acids. Tri-glycerides are chemically stable molecules and are difficult to break down. A small percentage of lipids are mono-glyceride and di-glyceride.

PROPERTIES OF COMMON FATS AND OILS

Substance	Melting Point	Melting Point	*Density	*Density
	° Fahrenheit	°Celsius	lbs./gal	kg./l
Tallow	108	42	7.88	0.945
Palm Oil	95	35	7.63	0.915
Cocoa Butter	93	34	8.04	0.964
Coconut Oil	77	25	7.67	0.920
Palm Kernel Oil	75	24	7.70	0.923
Peanut Oil	37	3	7.62	0.914
Water	**32**	**0**	**8.34**	**1.000**
Cotton Seed Oil	30	-1	7.65	0.917
Olive Oil	21	-6	7.66	0.918
Poppy Seed Oil	5	-15	7.71	0.925
Sesame Oil	3	-16	7.66	0.919
Soybean Oil	3	-16	7.73	0.927
Corn Oil	-4	-20	7.69	0.922

- Density is measured as mass per unit volume. In the case of oils and water, it is the measure of the weight of the substance per gallon. As you can see the density of each oil substance is less than that of water. Essentially, each substance will float on any water surface. Conversely, any substance with a greater density will sink to the bottom. A perfect example of density is the addition of oil and vinegar. Oil will float on vinegar because they have different polarities. This is why they never mix.

B. WHO GENERATES GREASE?

A variety of commercial, residential, public, private, and industrial facilities produce grease waste that is discharged to the sanitary sewer system. They include:

1. COMMERCIAL:

Restaurants use a large amount of grease for processing and cooking. Most grease and oil from fryers are collected and disposed of, however, some facilities utilize a recycle company that will render the product. Bakeries, catering locations, bars and grills, ice cream parlors, delicatessens, slaughterhouses, meat markets, and supermarkets are common commercial facilities. A common misconception is that ice cream, coffee shops, and sandwich delicatessens do not discharge grease waste. Very few people realize that ice cream is nothing more than a bucket of fat, coffee beans contain a high amount of essential oil, and cold cuts and mayonnaise are high in fat and grease.

2. RESIDENTIAL:

Residential locations are the greatest contributors of oils and grease into the sanitary sewer collection system. Unfortunately, there are no regulations for controlling the amount of oils and grease discharge on this level. It is the responsibility of the resident, or property owner, to minimize the grease waste discharged from the property. In certain cases, excessive, uncontrolled grease waste can cause damage to a septic tank drainfield. Investigations are ongoing where condominiums and high-density apartments would be required to have separate grease waste line discharge to an in-ground grease interceptor system.

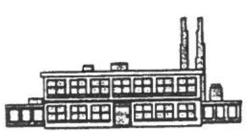
3. PUBLIC:

School kitchens and cafeterias, fire station kitchens, prison kitchens, hospital kitchens, sports complexes, fairgrounds, parks and campgrounds, and other non-commercial facilities where food is prepared. Most locations are required, under the South Florida Building Code, to have grease interceptors installed. These facilities will discharge a fair amount of sewage to the public sewer collection system.

4. PRIVATE:

Private facilities may include churches with full service kitchens, nursing homes, resorts, college and universities, ships, country clubs, business clubs, hotels, and other privately owned businesses where food is prepared. Most private facilities such as these contribute a small amount of oil and grease to the system because of the low volume of sewage discharged.

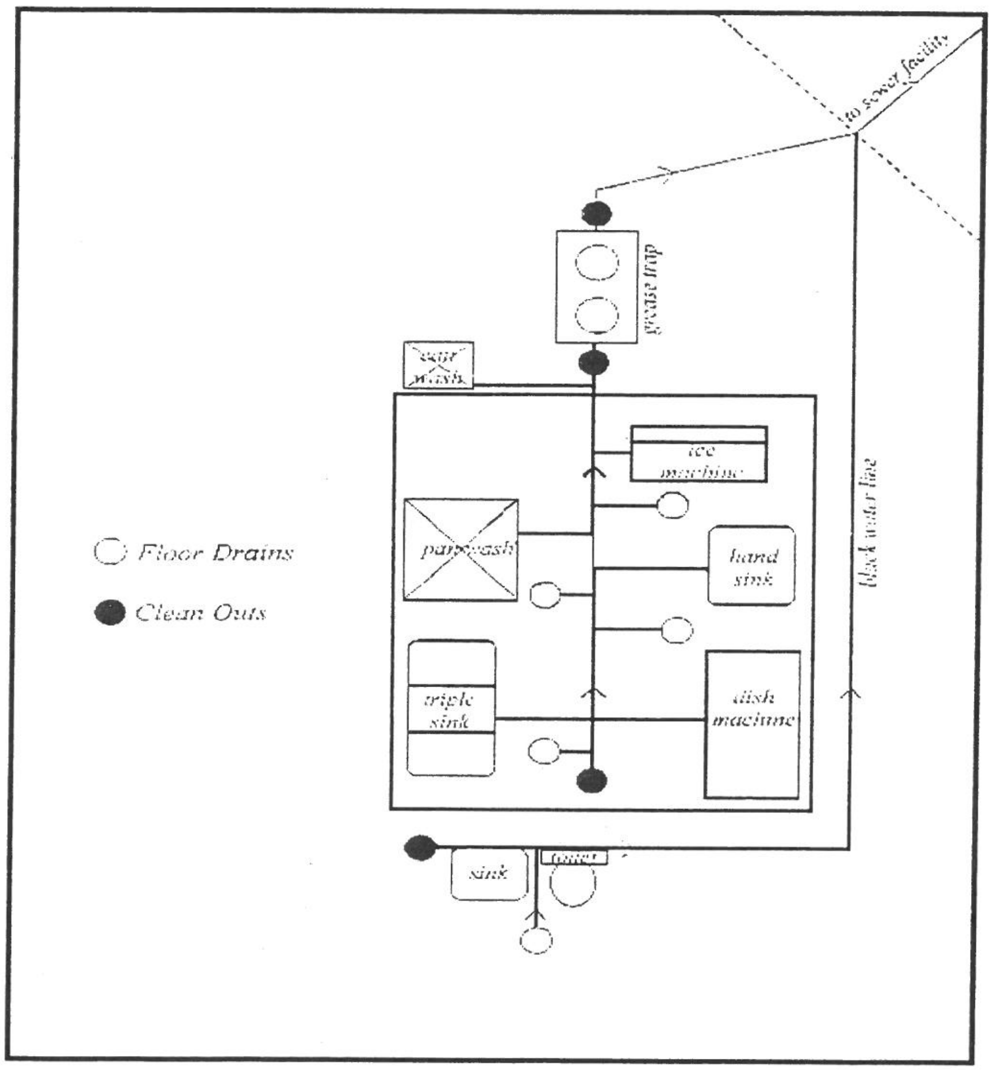
5. INDUSTRIAL



Some industrial facilities include airport catering, food processing plants, industrial feeders, bottling plants, and other businesses where food products are manufactured, usually on a large scale. Industrial waste is generally regulated and monitored under the "Clean Water Act" of 1979.

C. TYPICAL GREASE WASTE LINE FLOOR DIAGRAM

A typical kitchen floor design will show several locations where grease waste flows to the outside grease interceptor. Compartment and hand sinks, dishwashers, ice machines can or mop wash basins, and floor drains are common entry points, however be aware that bathrooms have separate waste lines, which leads directly to the sanitary sewer. A clean out is an access point to a waste line. This access point allows plumbers the ability to remove items that may get stuck inside a pipe.

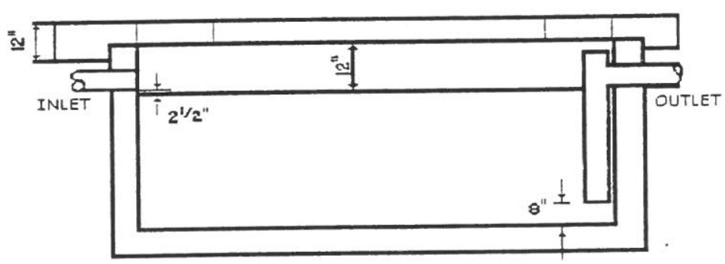


II. Grease Pre-treatment Devices

Grease pretreatment devices come in many forms. Before a unit is installed, it must be one that has been approved of by the building officials of the tri-county area as required by the South Florida Building Code. The most common type is the In-ground concrete system. These are the ones that range in volume from 750 to 2000 gallons and have manholes as access entry points. Information in the Grease Discharge Program reveals that eighty (80) percent of all grease interceptors are of the in-ground type. The next most common type is the electronic recovery unit, or the automatic grease recovery units (AGRU), which are followed by the manual grease recovery units (MGRU). Together they represent a little more than ten (10) percent of the systems here. Roughly ten (10) percent of non-residential facilities, where oils and grease are introduced to the sanitary system, do not have grease pretreatment devices at all.

A. IN-GROUND GREASE INTERCEPTORS

The majority of food service establishments utilize this type of grease interceptor as a pretreatment device. They are large capacity outside interceptors for the most part, which are located in the front, on the sides, or back of the facility, depending upon where the kitchen waste line exits the building. Easily, they are recognized by their steel manhole covers with clean-outs before and after the system used for in-line cleaning access. In some cases, there are some tanks that are made of fiberglass instead of reinforced concrete. To save money some property owners may elect to utilize an abandoned septic tank in lieu of installing a grease interceptor. The differences are few. Most concrete tanks will last a very long time if they are properly maintained in a timely manner. If properly maintained, this type of tank should have a life expectancy of twenty to thirty years, however the actual life is dependent upon how well the system is taken care of, and what products are introduced. Chlorine is used to clean surface areas inside the kitchen, but it is harmful to the concrete grease interceptor.

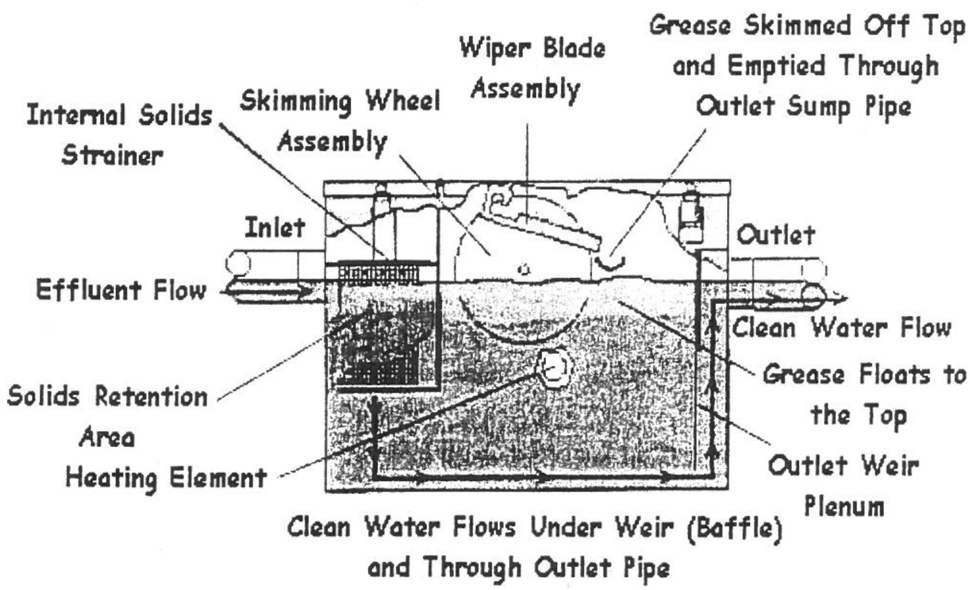


HOW IT WORKS

Kitchen waste from compartment sinks and floor drains enters the grease interceptor from the inlet side of the tank. Usually the water is warm to hot with dissolved grease molecules. In time the water will cool and grease will coagulate and begin to float on the water surface. Food particles will settle to the bottom until removed by a liquid waste transporter. There is an outlet tee (or baffle) which allows the oil and grease to remain inside of the tank and allow wastewater to flow freely to the sanitary sewer, or drainfield in the case of someone having a septic tank system. The South Florida Building Code requires the outlet tee to extend from the discharge point to within eight (8) inches off the tank bottom. If the system is properly maintained in conjunction with a grease minimization program, then water discharged should contain oil and grease of less than 100 mg/l, as a grab sample. When the system is poorly maintained the oil and grease level can be higher than the level allowed by the Miami-Dade County Sewer Discharge Standard (see Section IV, Building and Environmental Regulations).

B. AUTOMATIC GREASE RECOVERY UNITS

There are times when it may be impossible to install an in-ground unit at the facility. Another kind of system that is approved by the building officials is the Automatic Grease Recovery Unit (AGRU). These devices are electronic by design, to apply heat to liquefy grease prior to removal. Two systems are common in Miami-Dade County. They are Thermaco's "Big Dipper" and Zurn's "1190" systems. Kitchen waste originates from sinks, floor drains, and other locations, therefore where the AGRU is installed is a critical issue. It is important that each discharge point connect to the AGRU, otherwise some oils and grease will be allowed to enter the sanitary sewer untreated. That's where the in-floor vault comes into play. An in-floor vault is a concrete compartment found usually inside the kitchen, covered by a metal plate. Many facility operators will mistake the in-floor vault for a grease trap. Actually, they are constructed to hold the recovery unit. In some cases, the recovery unit is placed near the three-compartment sink where a vault system is not available. AGRU's are never installed outside of the facility due to the possibility of vandalism, and the affects of natural elements on the system. These devices have shown the ability to rust under certain conditions.

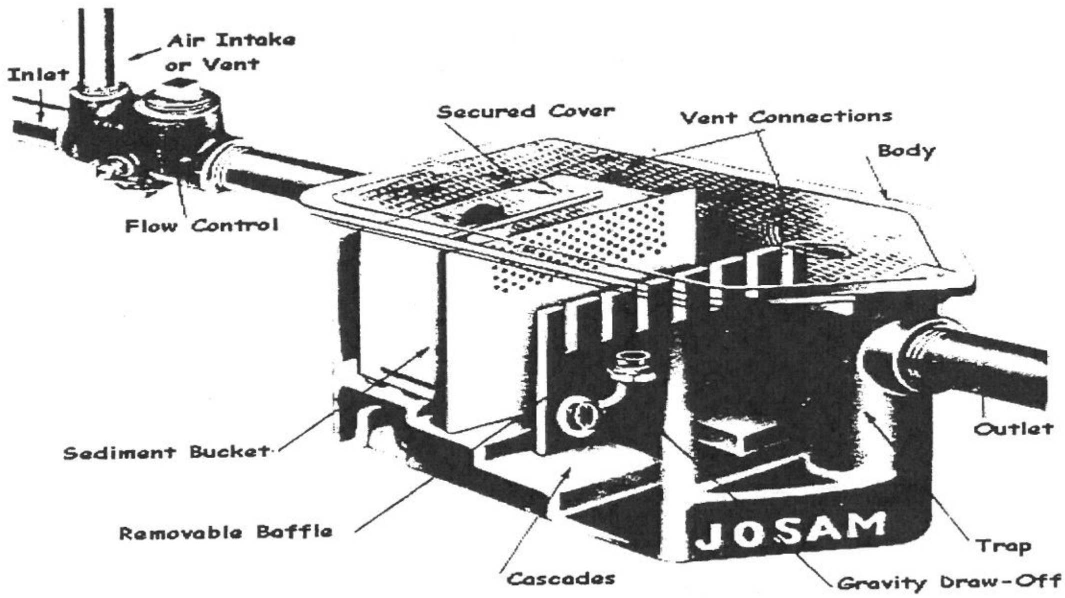


HOW IT WORKS

Automatic Grease Recovery Units (AGRU) are not designed to be an unattended device, that is, it demands the facility operator take action to assure that it works properly. As you can see above, AGRU's have moving parts, as well as, a heating element, which requires connection to an electrical outlet. One may find an AGRU underneath a three-compartment sink, or inside of a vault in the kitchen area. A vault situated AGRU will accept wastewater from floor drains, as well as, from the sink, but the under the sink units will accept flow from the sinks only. Wastewater flows from the inlet pipe, then to a metal strainer in the solids retention area. The strainer collects food particles and allows wastewater to enter the system. The strainer must be cleaned periodically to prevent a stoppage of water flow to the system, also, if not cleaned, it may cause an odor problem. A heating element warms the water inside to allow the oil and grease to be skimmed off, collected and discharged through an outlet sump pipe. The oil and grease is collected in a reservoir to be disposed of with the solid waste.

C. MANUAL GREASE RECOVERY UNITS

Like the electronic system, the Manual Grease Recovery Unit (MGRU) is designed to control the amount of grease discharged to the sanitary sewer system. The major difference of each system can be measured in terms of unit price and how each system works. Automatic grease recovery units are electrical, whereas, manual grease recovery units are simple iron cast containers with baffle separation technology. They are design to be low maintenance low cost grease pretreatment devices. Each unit requires frequent maintenance to ensure the system functions properly, however the MGRU does not have moving parts and require no electrical connection.



HOW IT WORKS

Wastewater flows into the unit through an inlet pipe from a three-compartment sink. An air intake or vent is required. This allows water to flow through the pipe to the system. Although some units are located outside of the building, they are usually situated inside the kitchen area. Some may be located in a vault compartment, however this is rare. The water enters a small, baffled compartment, where the sediment bucket lies, then to a larger area when the oil and grease is separated from the water. Similar to an in-ground system, the effluent (water leaving the system) goes through a baffled compartment to the discharge point. If properly maintained, the effluent should contain less than 100 mg/l, oil and grease.

D. PROBLEMS AND FREQUENCY OF MAINTENANCE

Maintenance of a grease pretreatment system is just as important as using one. It begins with education of the system and understanding how it should be operated to achieve maximum treatment. It is important that the facility operator knows what kind of system he uses, what are the system's limitations, what kind of waste goes into it, why some chemicals are not used, and most of all, where the system is located. Automatic and manual recovery units require daily maintenance, however in-ground grease interceptors should be inspected once per month and cleaned on a regular basis. The actual amount of solids accumulation is dependent upon many variables, like the number and size of the tank system, customer volume, water usage, etc. In most cases, in-ground grease interceptors need to be pumped out, or cleaned on a quarterly schedule.

Contrary to popular belief grease interceptors usually do not have the same life span as the building structure. In fact, when they are not properly maintained on a regular basis organic acids and solvents will begin to dissolve the concrete walls, thereby causing the contents to exfiltrate to the groundwater supply. To keep your in-ground concrete grease interceptor in good working condition you should abide by each permit condition and follow the advice of the regulatory department.

E. KEEP YOUR GREASE INTERCEPTOR SYSTEM IN GOOD WORKING ORDER

1. *Do not pour prohibited substances such as chemical solvents, bleach, or acids down your drains. Not only will acid ruin your pipes, it can destroy the beneficial grease eating bacteria. Chemical solvents may temporarily alleviate a clog and the problem becomes somebody's downstream. Solvents are prohibited for use in a grease interceptor and may be costly in penalties under enforcement provisions of Miami-Dade County.*

2. *Have the total content of the grease interceptor removed on a routine basis or as often as necessary to prevent problems that may occur with your system. If grease is left to accumulate inside a grease interceptor, it will harden and removal may be difficult and costly.*

3. *When a leak is discovered, a qualified Liquid Waste Transporter or Plumber may be able to repair the tank before severe damage occurs. If the problem persists, then a new interceptor will have to be installed to prevent further contamination of groundwater.*

4. *Each in-ground grease interceptor is required, by the South Florida Building Code, to have steel manholes covers over the inlet and outlet areas, as well as, an outlet tee or baffle extending to within eight (8) inches of the tank bottom. In some cases, the outlet tee will disconnect from the tank during maintenance operations and is often found on base of the interceptor. At each pump-out inspection the tank is checked for damages that may have occurred since the last maintenance cycle. Make sure the outlet tee is in place.*

5. *Do not landscape or pave over the grease interceptor. Specific conditions of the operating permit requires access to the interceptor. Usually, grease interceptors that are covered are the ones that are not attended to on a routine basis. The DERM Inspector will initiate enforcement action to assure access is available and maintained for each interceptor.*

Penalties for violating the Miami-Dade County Environmental Protection Ordinance may cost up to $500 per day and can lead to civil action against you in a court of competent jurisdiction. You may contact DERM at 372-6500 for assistance in solving your grease related problems.

A. Best Management Practices for Grease Discharge

Grease waste minimization begins at the source. Every kitchen should have a manager, or someone in charge of overseeing proper waste disposal from the beginning to the end of the kitchen operation. This person must be able to recognize common practices and modify them so that grease wastes controlled at the discharge point. By having a sound plan for grease disposal, the facility operator may save hundreds of dollars in reduced maintenance and plumbing cost. The following practices can help in reducing grease waste:

1. *Do not pour oils and grease down your sink, instead collect grease onto paper towels (if possible) and place used oils and grease in a leak proof container. You may dispose the used oil and grease with your solid waste.*

2. *Do not use prohibited substances such as chlorine, acids, and solvents with your grease interceptor. These prohibited substances can cause major damage to your grease pretreatment system.*
3. *Recycle your used oils with a company that will render it to make other products such as soap and animal food.*

4. *Do not dump food waste which are high in fat content down the disposal, the garbage bin is the best way to dispose unwanted scraps.*

5. *Get to know your grease interceptor by inspecting it before and after each cleaning. The interceptor should be free of liquid and solid grease that may cling to the interior walls.*

6. *Remove the contents in your grease interceptor regularly and properly. By not maintaining your grease interceptor properly, repair and pump-outs may become costly.*

7. *Repair your grease interceptor promptly when a problem has surfaced. You may be contaminating Miami-Dade County's drinking water source by allowing damaged tanks to exist.*

8. *Become aware of each Specific & General Condition of your Annual Operating Permit. Penalties may be costly and are avoidable if violations are corrected in a reasonable timeframe.*

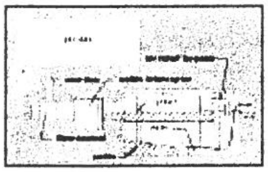
For More Information on the Grease Discharge Program

Call DERM at (305) 372-6500

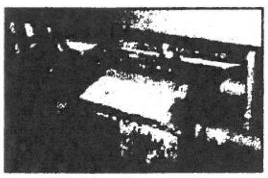
Grease Trap Guidelines

What are Grease Traps?

Grease traps are devices placed on kitchen cleaning appliances such as sinks, woks, and any other drains that collect grease. Properly maintained grease traps help prevent unwanted grease build-up in a private building's sewer or a Boston Water and Sewer Commission sewer.



Grease Traps are Required in Restaurants and Food Establishments



Click for larger view

Cooking grease that gets washed off cooking appliances and kitchenware can end up causing significant problems in building drains and BWSC sewers. Commission regulations governing the use of sanitary and combined sewers and storm drains require properly installed and maintained grease traps in all restaurants and food establish- ments in Boston. Article 111, Section 15 states "Grease traps shall be required on sewers into which significant amounts of animal or vegetable fat, oil or grease may be discharged so that a discharge concentration does not exceed 100 milligrams per liter...the Commission shall have the right to inspect such facilities in accordance with Article VII of these regulations." For a complete copy of the regulations, please contact BWSC at (617) 989-7000.

Are There Different Types of Grease Traps?

Two Types of grease traps exist:

- Traps located in an establishment near the fixture it serves.
- Large traps located outside the building in the ground that serve the entire kitchen.

What Fixtures in my Food

How Do I Clean the Grease Traps and How Often?

These methods of cleaning are for guideline purposes only; many traps are designed differently and require specific methods for cleaning. Consult the equipment manufacturer for instructions.

- Grease traps should be cleaned when 25% of the liquid level of the trap is grease or oil, once a month minimum for point of use traps and quarterly for large in-ground interceptors.
- The cover should be removed carefully to avoid damage to the gasket.
- Ladle off the layer of grease and oil floating on top of the water.
- Remove any baffles and scrape clean. After cleaning, the baffles can be rinsed off in the sink that flows to the trap.
- Using a strainer, scrape the bottom of the trap to remove all non-floatable food particles and debris.
- Clean the bypass vent with a flexible probe or wire.
- Reinstall baffles and cover.

***Note**: The grease trap should be completely emptied once a month. Many establishments have an independent contractor that specializes in grease trap cleaning perform the work.*

All interior grease trap installations are subject to state and local plumbing codes.

Can I Add Cleaning Agents to to Help Clear the Grease Faster?

No. Never add bleach, emulsifiers, enzymes, or any other chemical to the grease trap. These agents harm the natural bacteria that eat grease and oil in grease traps. The only additive allowed into the sewer system by BWSC is bacteria. Bacteria consume fat, oil and grease in the trap, turning them into water and carbon dioxide.

What Methods of Disposal are Available for Used Grease?

The food establishment's waste hauler or renderer that removes used fryolator grease and oil normally accepts materials removed

Establishment Require a Grease Trap?

Significant amounts of grease in buildings and BWSC sewers can come from the following fixtures:

- Pot Sinks
- Rinse Sinks at Dishwashers[1]
- Dishwashers Outside Trap Only[2]
- Woks
- Floor Drains and Sinks
- Automatic Hood Washers

1 Garbage disposals should not be installed on these sinks

2 Dishwashers cannot flow through a point of use trap inside a building

from the grease trap. Large in-ground grease traps normally hold 500 gallons or more and are usually cleaned by a contractor equipped to deal with the large quantities of grease, oil and non-floatables. It is the responsibility of the establishment owner to ensure the trap is completely cleaned.

How May I Receive Assistance from BWSC for Cleaning?

BWSC will provide Grease Control Logs for the establishment owner to maintain regarding the cleaning of the Establishment's grease traps. The log notes the date the trap is cleaned, amount of material removed, and a signature confirming the work was performed.

Proper maintenance of grease traps is essential to the smooth and sanitary operation of a food establishment.

For additional information regarding the proper maintenance and care of grease traps, please contact BWSC's Discharge Enforcement Unit at (617) 989-7000.

Food Service

Back City Home Up Next

POLLUTION PREVENTION

Grease Ordinance

Discharging Grease into Sewers

WHAT YOU SHOULD KNOW

A thriving business community is vital to the City of Longmont and its neighborhoods. A healthy economy is a priority of the City and benefits everyone. When businesses disregard sewer regulations and improperly dispose of grease, fat or oil, sewer lines can become clogged causing sewage to backup into basements of homes and commercial establishments. When this happens, the entire community suffers. To address this problem, the Pollution Prevention Office is helping businesses comply with the City sewer regulations. The Pollution Prevention Office is educating not only restaurant owners but also operators of nursing homes, laundries, and dry cleaners to keep grease and other materials and chemicals out of the sewers.

To work effectively, sewer systems need to be properly maintained from the drain to the treatment plant. If wastes are disposed of correctly, the City's sewer system can handle them without any problems. Grease is an example of a waste that the sewer system cannot handle, and therefore should not be put down drains. The City needs businesses and individuals to do their part in maintaining the system. Repeated repairs and maintenance deplete City resources, and are disruptive to residences and businesses alike. Furthermore, the Longmont Municipal Code requires proper disposal of grease by commercial establishments.

It costs the City of Longmont $11,000 a year to maintain known grease problem areas and another $26,000 a year to have grease hauled from the Wastewater Treatment Plant. Reducing the grease that is put down the drains by 50 percent could potentially save the City over $18,000 per year.

GREASE REDUCTION PRACTICES

Grease is a concern due to the fact that this material solidifies as it cools and could potentially block sewer main lines. Follow the practices listed below to reduce grease discharge.

- Educate kitchen staff on best management practices.
- Clean interceptor/trap at scheduled intervals – recommended when 60 % cap is reached.
- Document all cleanings.

- Wipe off greasy pots, pans, and kitchen utensils instead of hosing down in the
- Degreasers, emulsifiers, and hot water are not recommended to clean lines – break down grease in the facility, but the grease can congeal downstream in s lines.
- Keep fatty liquids such as salad dressings, creams, and butter from going dow drain.
- Stop grease spills from reaching floor drains by wiping up instead of hosing do
- Keep outdoor grease containers and dumpsters covered. Store grease conta away form storm drains.
- Contract with a reputable grease recycler. Check the Yellow Pages for p numbers of grease recyclers or ask other restaurants who they use.

HOW GREASE INTERCEPTORS WORK

Every business that disposes of grease, fat or oil (i.e., restaurants, food handling operations, hospitals, day care and senior centers) may need a grease interceptor to prevent these materials from entering and clogging sewer lines. This equipment works by separating the grease and oils from wastewater. Greasy wastewater entering into the interceptor passes through a flow control fitting that regulates the flow of the wastewater. The wastewater then passes over a series of separator baffles, or regulating devices within the interceptor, causing separation of grease, fat, and oil. The contaminants float to the top of the interceptor and accumulates until manually removed. The wastewater continues to flow through the interceptor, into a discharge pipe, and then to the sewer system.

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FAIRVIEW SEWER & WASTE MANAGEMENT

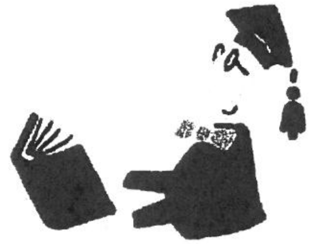
Sewage disposal is provided by a system of sewer pipes and lift stations for certain part of the city. All sewage flows to a series of five total retention lagoon ponds located northeast of the city.

Don't Flush the Floss!

There are many products in your home that should be disposed of in the trash and not flushed down your toilet. Grease, fats and anything that is not biodegradable should be put in the trash. Specifically anything containing plastic, but also diapers, latex products, sanitary napkins and even tissue! You might be surprised to learn that tissue shouldn't be put in your toilet because it is not designed to break down like toilet paper.

During a recent tour of another city's facilities, an employee of the District Maintenance Department demonstrated on of the problems dental floss can create. He pulled up a submersible pump that is used to move waste from a gravity line to a pressure line, and it was completely entangled in dental floss. He then had to use a knife to cut away the floss. The District Manager explained this is part of the reason why the District spends a lot of money on maintenance every year.

So, remember, if you want to help us keep your sewer rates as low as possible, after flossing your teeth-"toss the floss, don't flush the floss".



Fats, Oils and Grease aren't just bad for your arteries and your waistline; they're bad for sewers, too.

Most of us know grease as the byproduct of cooking. Grease is found in such things as:

* Meat fats	* Food scraps	* Lard
* Baking goods	* Cooking oil	* Sauces
* Butter & margarine	* Shortening	* Dairy products

Too often, grease is washed into the plumbing system, generally through the kitchen sink and dishwasher. Grease sticks to the sides of sewer pipes (both on your property and in the streets). Over time, the grease can build up and block the entire pipe.

Home garbage disposals do not keep grease out of the plumbing system. These units only shred solid material into smaller pieces and do not prevent grease from going down the drain.

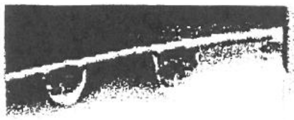
Commercial additives, including detergents that claim to dissolve grease, usually pass grease down the line and cause problems in other

areas.
The results can be:
* Raw sewage overflowing in your home or your neighbor's home;
* An expensive and unpleasant cleanup that often must be paid for by you, the homeowner;
* Raw sewage overflowing into parks, yards, and streets;
* Contact with potential disease-causing organisms; and
* An increase in operation and maintenance costs for the District, which causes higher sewer bills for customers.

The easiest way to solve the grease problem and help prevent overflows of raw sewage is to keep this material out of the sewer system in the first place.

How?

1. Never pour grease down sink drains or into toilets.
2. Scrape grease and food scraps from trays, plates, pots, pans, utensils, and grills and cooking surfaces into a can or the trash for disposal (or recycling where available).
3. Do not put grease down garbage disposals. Put baskets/strainers in sink drains to catch food scraps and other solids, and empty the drain baskets/strainers into the trash for disposal.
4. Speak with your friends and neighbors about the problem of grease in the sewer system and how to keep it out. Call if you have any questions.



About Us

How To Avoid Sewer Problems

The two most common causes of sewer backups are:

- Putting items down your sink that should be put into your garbage.
- Invasive tree roots.

That's the bad news. The good news is that both are often preventable. Here's what you can do to help avoid problems in your sewer system:

Don't put grease, oil or egg shells down your sink. When grease and egg shells combine they create a mixture similar to concrete; oil sticks to the pipe at the waterline. Both of these conditions can clog the sewer line. Instead, keep a small, empty container handy to contain these items. When the container is full, put it outside with the garbage.

Avoid trees with shallow, spreading root systems. Tree roots tend to grow towards sources of water—like sewer pipes. Two of the most troublesome species of trees are the fruitless mulberry and the Modesto ash. If you're upgrading your home's landscaping, you can save yourself headaches and money by choosing trees with deep root systems.

After you select a tree, follow proper planting procedures. Be sure to dig a hole deep enough to cut below Sacramento's heavy clay deposits. If your hole is too shallow, the tree's roots won't be able to penetrate the clay, and they'll spread out horizontally. The tree won't be healthy . . . and neither will your sewer system.

Information on recommended and non-recommended landscape trees for the Sacramento area is available free of charge from the University of California Cooperative Extension for Sacramento County—telephone (916) 875-6913.

Speaking of things you shouldn't put down your sink . . .

Many consumer products are considered household hazardous waste. Never pour items like these into your sink or toilet:

- Motor Oil
- Antifreeze
- Gasoline
- Paint
- Insecticides
- Weedkiller
- Solvents
- Wood preservatives
- Lighter fluid
- Many other common consumer products

For more information about household hazardous waste and a schedule of collection days, call Sacramento County's Waste Management Hotline at (916) 363-9390.

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SITE GUIDE

SRCSD

Sacramento Regional County Sanitation District
10545 Armstrong Avenue, Suite 101
Mather, CA 95655

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Helpful Tips for Maintaining Your Sewer System

The wastewater treatment system in your residence or place of business conducts wastewater away quickly and efficiently, with a minimum of effort on your part. Using that system wisely benefits everyone. By following these simple steps:

1. You'll avoid clogging or other damage to your internal plumbing system, which could result in costly repairs
2. You'll keep the MCSE system operating smoothly, with a minimum of interruptions for maintenance
3. You'll help to protect the environment.

In Your Kitchen:

- Avoid pouring cooking grease down your drain. Use a can or jar and discard it in the trash.
- If you have a garbage disposal, always run cold water during the entire time it's operating, and be certain to let it run long enough to grind table scraps thoroughly.
- Don't put fibrous items, such as celery or corn on the cob, down your disposal. Avoid disposing of scraps that are too large or too hard for your disposal to grind thoroughly.

In Your Bathroom:

- Use a "hair snare" type device over the drain in your tub or shower to keep hair and debris from entering your system.
- Never throw paper towels, sanitary napkins, disposable diapers, plastic materials or anything other than toilet tissue down your toilet.

In Your Laundry Room:

- Use "hair snare" type inserts in your stationary tub and screening over your floor drain to keep lint from your washing machine out of the system.
- Don't dispose of paints, cleaning fluids, solvents or other similar materials in your floor drain. Contact the Mahoning County Solid Waste Department at 740-2060 for information on proper disposal of these items.

Outside the Home:

- If you have a drain in your garage or driveway, be sure that oil or grease from your car doesn't enter it. You can recycle old oil from an oil change at many service stations, garages or auto parts stores.

Businesses or Institutions

- In any building where food service facilities are provided, use a properly-installed and mainteined grease trap.