CITY OF YACHATS
LINCOLN COUNTY, OREGON

Wastewater System Master Plan

JULY 2002
PROJECT NO. 0510.01

DRAFT

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Engineers & Planners, Inc.

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City of Yachats

Lincoln County, Oregon

Wastewater System Master Plan

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Section ES

Executive Summary

ES.1 Background and Purpose

The City of Yachats has operated a public wastewater collection system and treatment plant (WWTP) 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 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.

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. In addition, there are 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 1,260 and peak population at 1,890.

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 Master Plan. 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, is expected to reduce I/I flows at the project sites by about 30% and bring peak flows back within design limits for the facility. Projected flows for 2025 exceed the WWTP capacity, even with the I/I work.

ES.3 System Condition

A comparison of wastewater flows at the treatment plant to local rain data showed that the system currently has both excessive inflow and infiltration. Infiltration and inflow (I/I) testing conducted in February 2002 identified several areas of high flows (see Appendix B). Smoke testing and television inspection of identified areas are recommended to identify problem areas for manhole repair, slip lining and, pipe replacement. Five leaking manholes were identified for repair during the I/I inspection.

Several areas of gravity sewers are installed at slopes lower than recommended by DEQ guidelines. Two pipe segments, on Yachats Park Road and Ocean View Drive were identified as being at or over capacity during peak flows. It is likely that manholes on these 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. However, the City is understaffed to provide adequate enforcement.

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 exceed 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 expansion of 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 to improve the operations of the existing facility and minimize permit violations during the construction stage. Phase 2 projects reduce I/I and grease blockages, while evaluating flows for the WWTP expansion. Phase 3 includes upgrading the existing pump stations and lines to handle future flows. The WWTP

expansion is included in Phase 4, with capacity improvements to the main sewer line on Yachats Park Road finishing the recommendations in Phase 5.

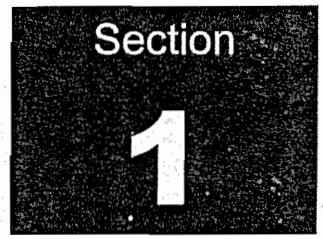
TABLE ES.4.1
CAPITAL COSTS OF RECOMMENDED PROJECTS

Phase	Year	Project #	Project Description	
1	2002	1	I/I Identification	$14,100
		6	Grease Removal*	$0
		10	Pontiac Pump Station Safety Improvements	$3,350
		11	Upgrade WWTP Laboratory	$50,000
		13	Supernatant Decanting	$10,000
		14	Automatic Sampling Stations	$18,000
		17	Biosolids Irrigation Sprayer	$4,700
		19	Additional Biosolids Disposal Sites*	$0
			Subtotal	**$100,150**
2	2003 to 2004	2	I/I rehabilitation	$286,000
		5	Grease Prevention	$6,675
		15	Facility Plan	$100,000
		12	New Effluent Meter	$21,000
		18	Manure Spreader	$3,500
			Subtotal	**$417,175**
3	2004 to 2005	4	Ocean View Drive	$36,000
		7	Main Pump Station Replacement	$385,000
		8	Ocean View Pump Station Replacement	$305,000
		9	Riverside Pump Station Replacement	$98,000
			Subtotal	$824,000
4	2005 to 2006	16	WWTP Expansion	**$3,600,000**
5	2007	3	Yachats Park Road	**$250,000**
Total				**$5,191,325**

* 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 50% USFS Cooperative grant for Phase 1, with a 25% Rural Development grant, and a 75% government loan for the remaining projects with the City funding $68,100 out of current funds. The worst-case financing alternative is obtaining a loan for 100% of the project. SDC funds collected would be used to pay a portion of the loan. To finance these measures and improvements the City will likely need to raise monthly user fees by between $19.83 and $24.85 per EDU. Financing is discussed in detail in Section 8.

Introduction



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 Master 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 System Master 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 Master 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 Master 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 Collection System Master Plan on July 13, 2000. Services are provided in accordance with a Professional Services Agreement dated August 23, 2000.

Study Area Characteristics

Section 2

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.

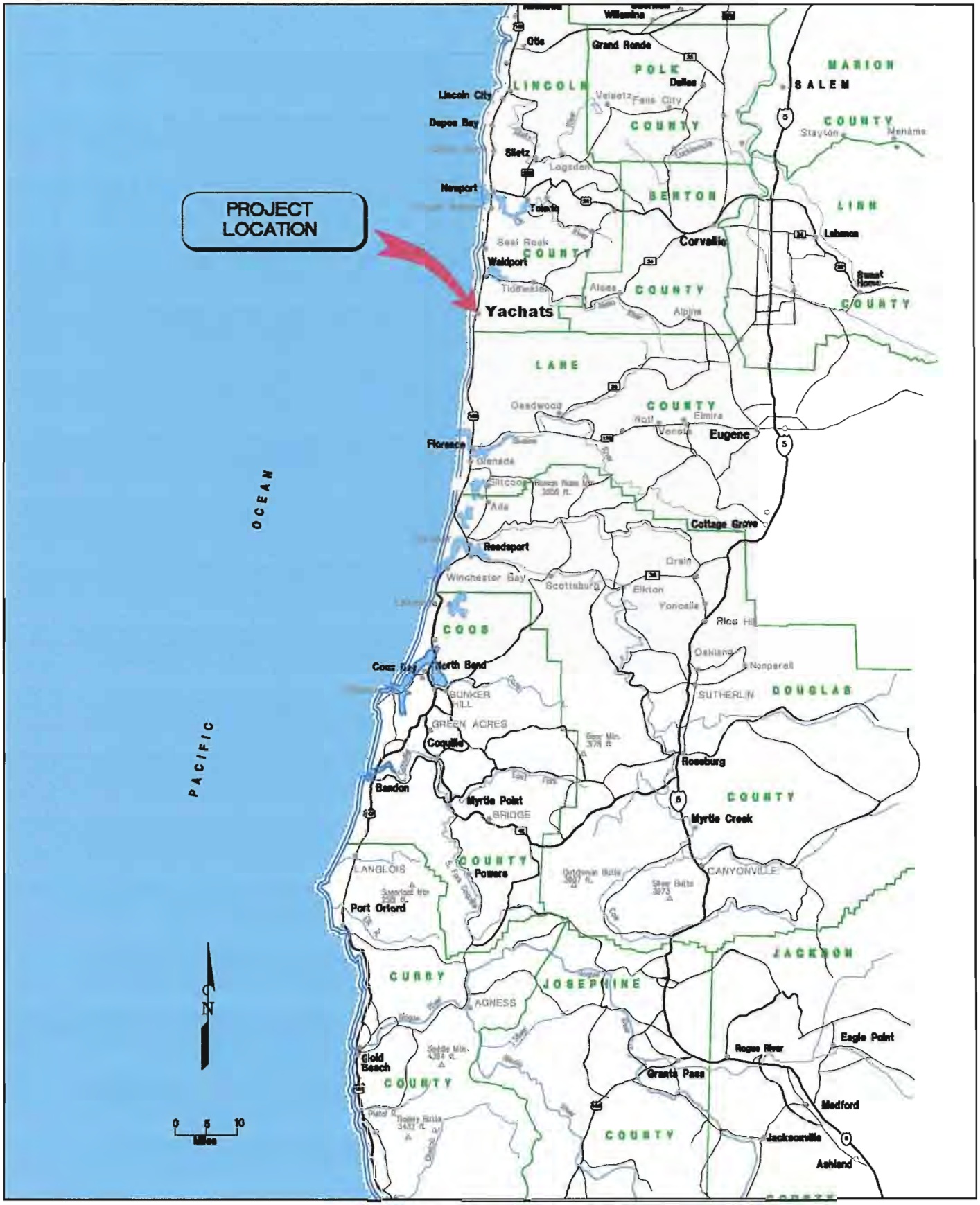
The area encompassed within the City Limits is just less than 600 acres (0.92 square miles). The study area for this Master Plan is located within the City Limits and the Urban Growth Boundary (UGB) as shown on Figure 2.1.2. The current UGB is the same as the City limits.

2.2 Physical Environment

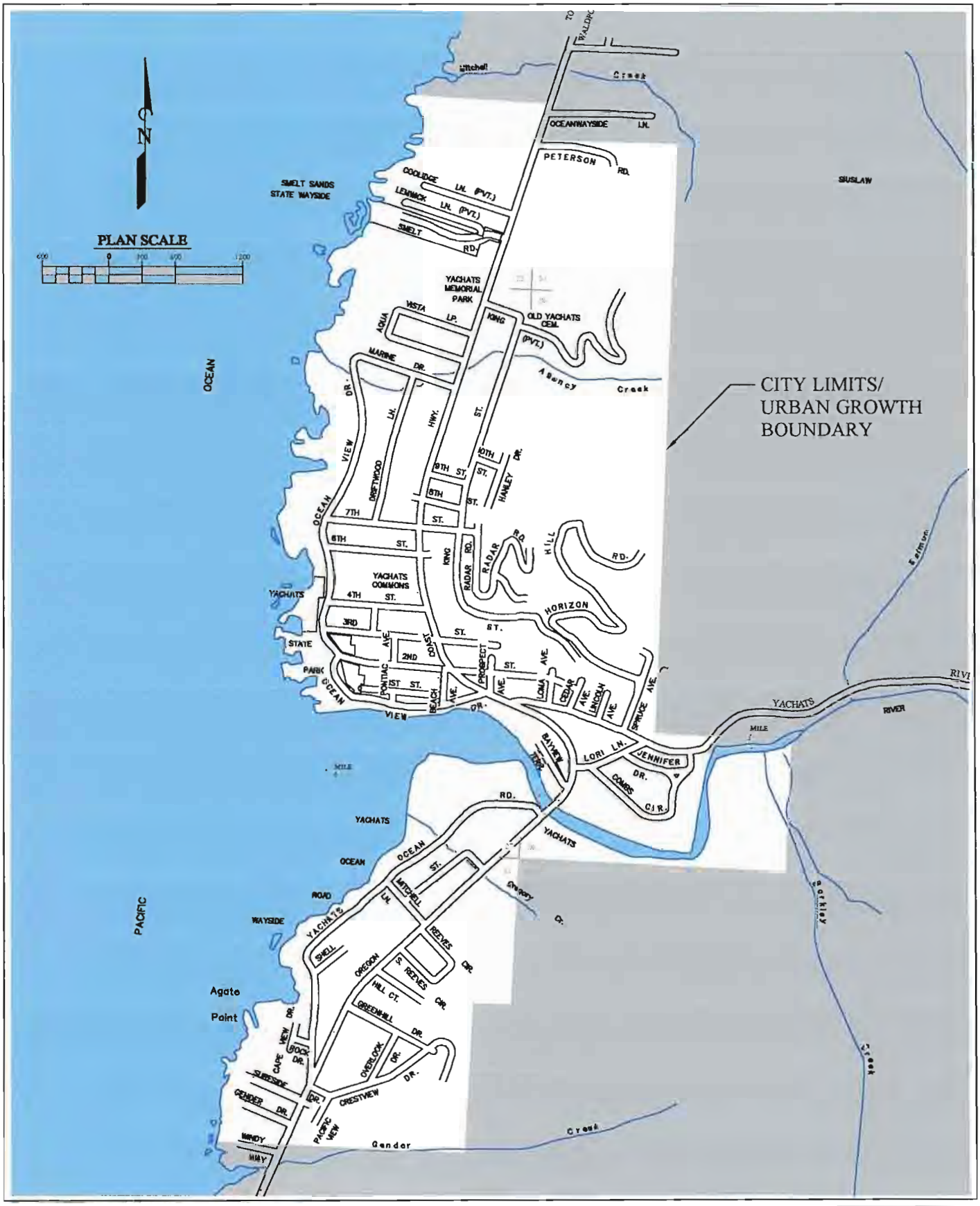
The following provides information about the physical environment in and around the City of Yachats.

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.



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	**CITY OF YACHATS** **WASTEWATER MASTER PLAN**	**FIGURE NO.** **2.1.1**
DATE: JULY, 2002 PROJECT NO.: 0510.01	**LOCATION MAP**	



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS*** ***WASTEWATER SYSTEM MASTER PLAN***	**FIGURE NO.** ***2.1.2***
DATE: JULY, 2002 PROJECT NO.: 0510.01	***AREA MAP***	

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.

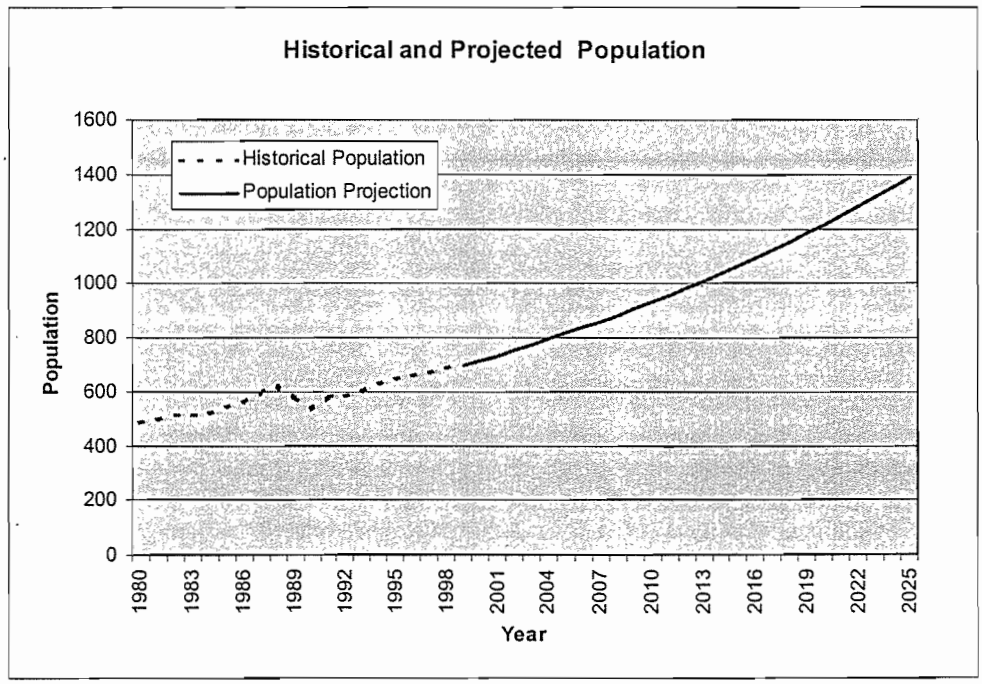
2.3 Socioeconomic Environment

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 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 Master Plan over the next 25 years (to the year 2025), which matches the growth rate chosen for other recent planning efforts for the City of Yachats. 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 Master 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 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. This means that 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. Figure 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	2005	2010	2015	2020	2025
Residential Population (1)	617	689	770	860	961	1,075
Peak Part-Time Residential (2)	427	476	532	595	665	743
Off-Peak Part-Time Residential (3)	214	238	266	297	332	371
Peak Tourist Population (4)	825	929	1,076	1,248	1,447	1,677
Off-Peak Tourist Population (5)	413	464	538	624	723	839
Total Peak Population	1,869	2,093	2,378	2,703	3,073	3,494
Total Off-Peak Population	1,294	1,391	1,574	1,781	2,017	2,285

(1) Beginning with 617 persons with moderate 2.25% (+ -) growth per year.

(2) Beginning with 435 persons 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. Assuming 1.85 persons per sewer account, the current sewered population is 1,786 or 96% of the population of 1,869 inside the City Limits. This Master Plan proposes improvements that will allow 100% of the population inside the UGB to be sewered.

Public Facilities

Public facilities within the Study Area and relevant to this facilities plan are the sewer system, water system, storm drainage system, street system, solid waste disposal, and related federal and state facilities. The City's comprehensive plan addresses public facilities and services. Their goal is to provide adequate public facilities and services consistent with the planned level of development within the UGB.

- **Water System.** Yachats obtains its water supply from two separate sources, both located on local drainages southeast of town. The primary source of supply is Reedy Creek. The secondary supply source is at Salmon Creek.

  The water treatment plant consists of two 350 gpm packaged units. The treatment process includes flocculation and coagulation, clarification, filtration, and disinfection. The water treatment plant was constructed in 1992.

  Treated water storage includes three reservoirs totaling 1.25 million gallons. Transmission and distribution piping consists of pipe sizes ranging from 2 inches to 8 inches in diameter, and totals more than 12 miles in length. Most of the system consists of dead end distribution lines, but there is a grid system within the downtown area.

  An emergency tie-in with the nearby Southwest Lincoln Water District is in place. The interconnection provides mutual support for each community in the event of a fire, water

shortage, water supply emergency or other water supply need.

There are approximately 684 water services connected to the City water system.

- **Street System.** Transportation elements including arterial, collector, and local streets exist within the Yachats UGB. The majority of the streets have asphalt concrete surface and are in good condition.

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 $23,667 based on the 1990 census. While it is assumed that the 2000 census will result in a higher MHI, the MHI used for the purposes of this study will be based on the 1990 census results.

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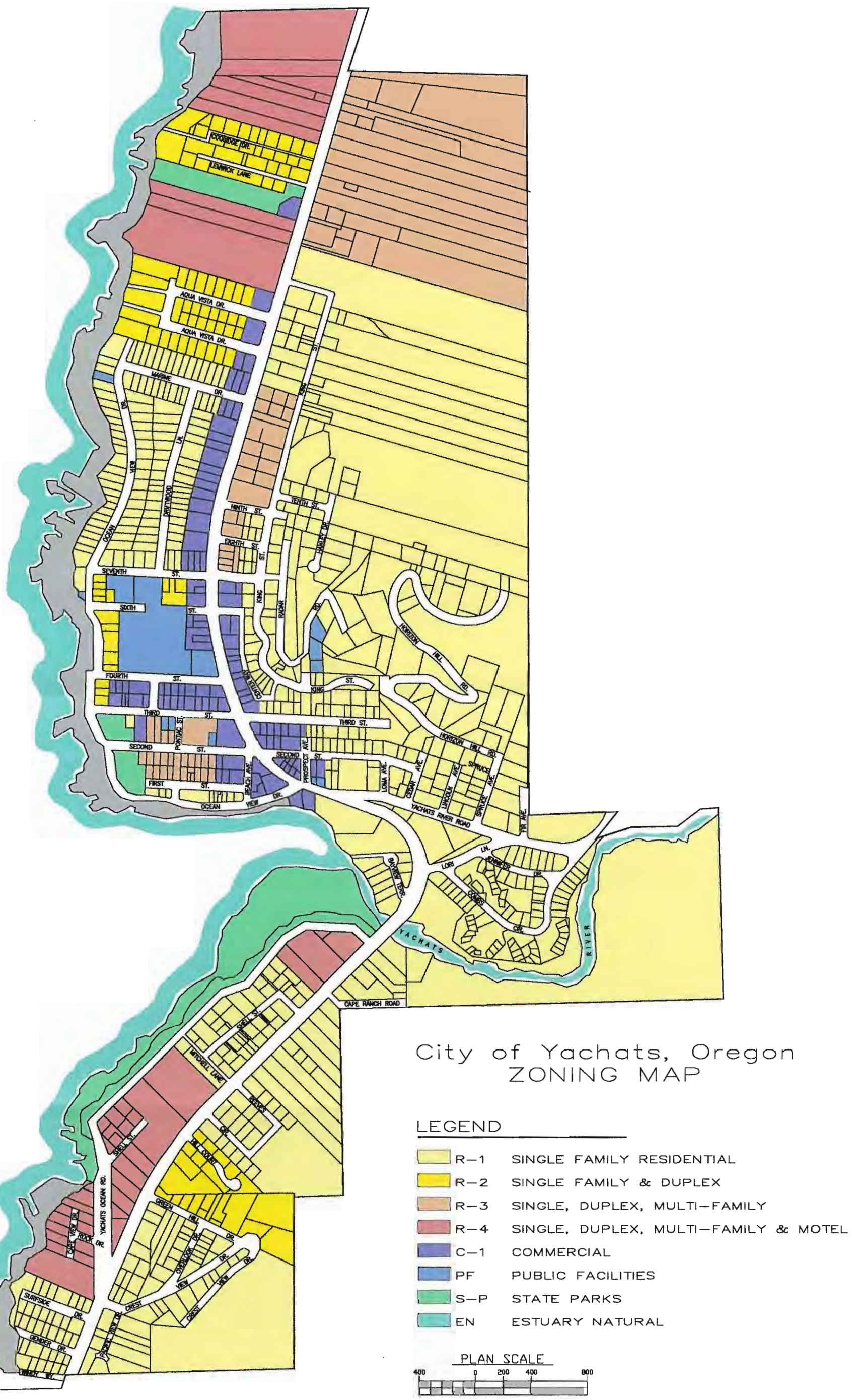


City of Yachats, Oregon
ZONING MAP

LEGEND

	R–1	SINGLE FAMILY RESIDENTIAL
	R–2	SINGLE FAMILY & DUPLEX
	R–3	SINGLE, DUPLEX, MULTI–FAMILY
	R–4	SINGLE, DUPLEX, MULTI–FAMILY & MOTEL
	C–1	COMMERCIAL
	PF	PUBLIC FACILITIES
	S–P	STATE PARKS
	EN	ESTUARY NATURAL

PLAN SCALE

400 0 200 400 800

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	***WASTEWATER SYSTEM MASTER PLAN***	FIGURE NO.
DATE: JULY, 2002	***ZONING MAP***	***2.3.2***
PROJECT NO.: 0510.01		

Section

3

Existing Wastewater Facilities

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.

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. Numerous other sanitary sewer extensions have been undertaken over the years to expand sewer services to nearly all residents living within the City Limits.

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.

Today, the Yachats wastewater system includes about eight 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 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 38,010 feet of mainline gravity pipe (8 to 12 inch dia.), approximately 7,370 feet of service connection piping (4 to 6inch dia.), 300 manholes, and 3,350 feet of pressure piping. The system also has five lift stations. Figure 3.2.1 illustrates the existing collection system.

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

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 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%.

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 outfall 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.

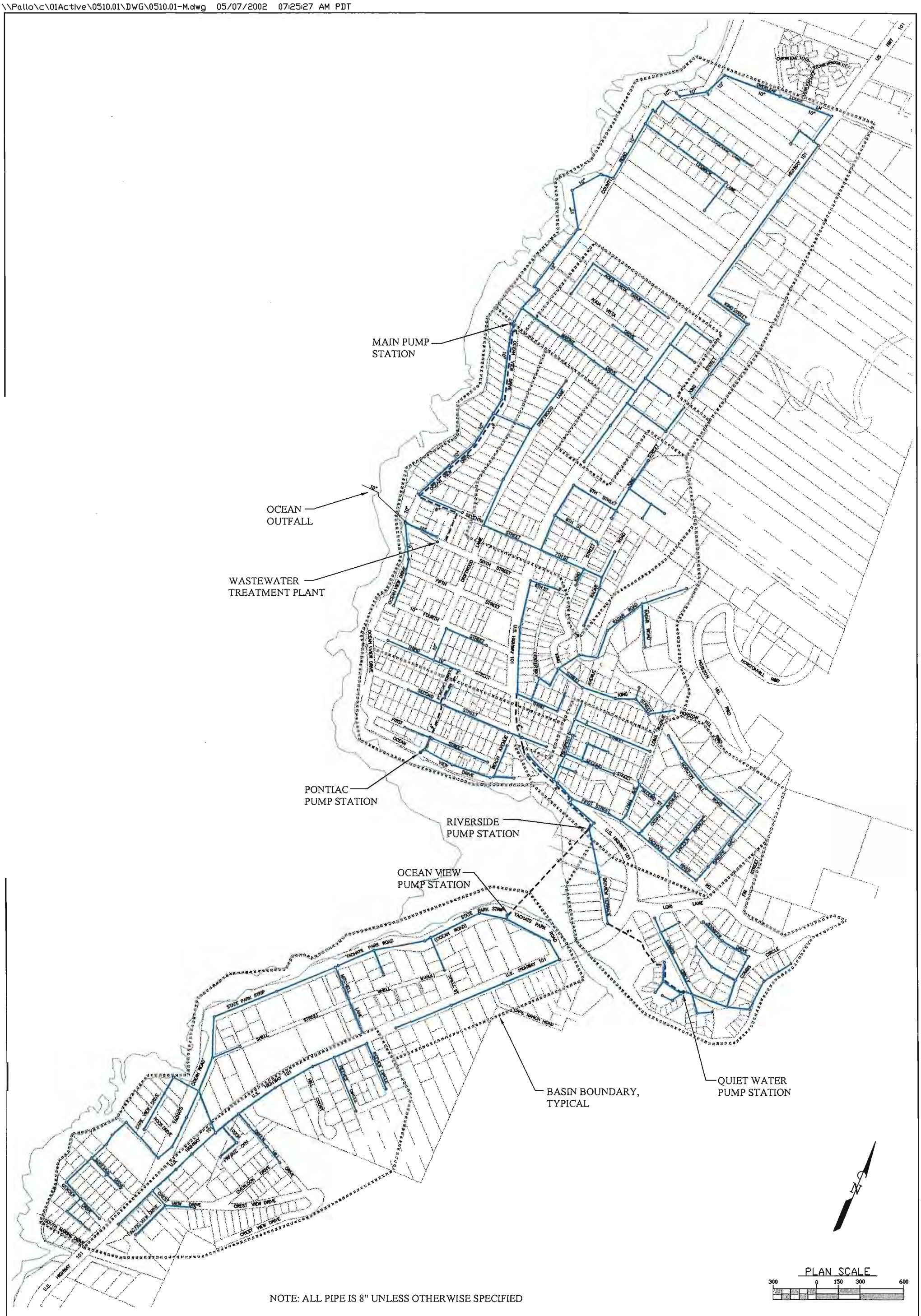
Approximately 118 dwellings are located within this sub-basin. The majority of the dwellings are single-family residential dwellings on typical residential lots, ¼-acre in size or less. A number of larger lots are located in the upland hills to the east of Highway 101. A handful of vacant lots are scattered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



NOTE: ALL PIPE IS 8" UNLESS OTHERWISE SPECIFIED

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	***CITY OF YACHATS***	FIGURE NO.
DATE: JULY, 2002	***EXISTING WASTEWATER SYSTEM & BASINS***	***3.2.1***
PROJECT NO.: 0510.01		

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.

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.

Key design data for the pump stations is summarized in Table 3.2.1.

TABLE 3.2.1
PUMP STATION DESIGN DATA

Pump Station	Main**	Pontiac	Riverside	Ocean View	Quiet Water
Date Built	1973	1973	1973	1973	1980
Last Upgrade	1992	1991	-	-	-
Level Control	Float Switch	Float Switch	Float Switch	Float Switch	Float Switch
Sulfide Control	None	None	None	None	None
Force Main Length (feet)	1,850	630	1,173	790	820
Force Main Dia. (inches)	6 & 10	4	6	4	4
Generator kW	N/A*	N/A*	N/A*	N/A*	N/A*
Pump Size (HP)	10	5	5	1.5	7.5
Rated Flow (GPM)	350 - 540	150	150	100	150
Head (FT)	58 - 47	21.5	38	4	50

* Two portable generators are available for emergency power, one is 35 HP and one is 30 HP
** First number for flow & head is with 6" main, second number is with 10" main

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 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 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 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. Figure 3.2.3 shows the inside of the dry-well for this pump station.

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. Figure 3.2.4 shows this pump station.

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 is 7-percent below the design capacity, it is well within acceptable ranges for pump performance.

Riverside Pump Station

This station is located near the intersection of First Street and Highway 101. 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. Figure 3.2.5 shows this pump station.

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.

During drawdown 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 (Park Road)

This station is located off of Yachats Park Road on the south side of the Yachats River. 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 in a portion of the original wastewater system that was developed in 1973. Figure 3.2.6 shows this pump station.

The station is a Smith and Loveless 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.

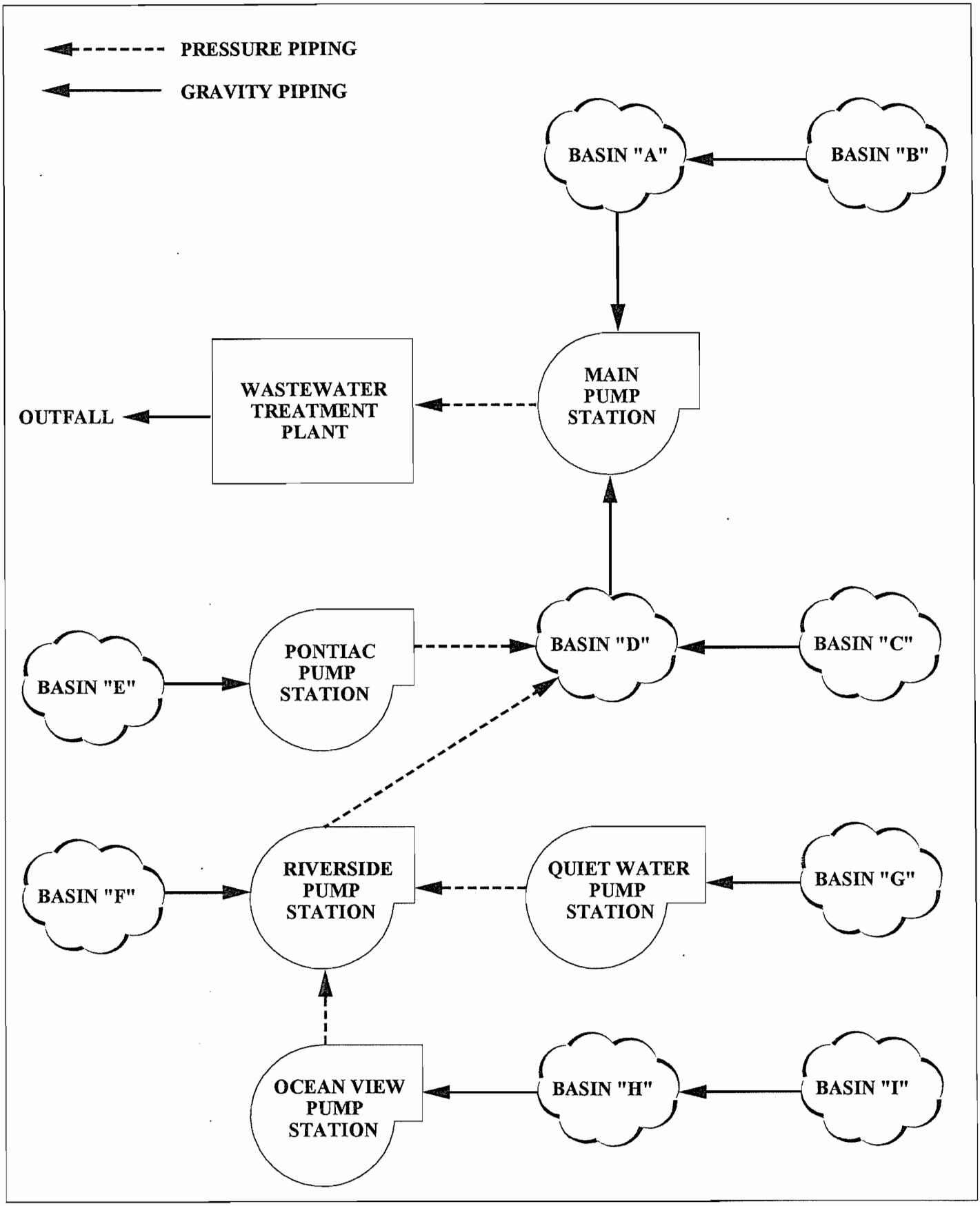
Quiet Water Pump Station

This pump station is located adjacent to Combs Circle in the Quiet Water Subdivision. 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". Figure 3.2.7 shows this pump station.

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.

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



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	*CITY OF YACHATS* *WASTEWATER SYSTEM MASTER PLAN*	FIGURE NO. *3.2.2*
DATE: JULY, 2002	*WASTEWATER SYSTEM SCHEMATIC*	
PROJECT NO.: 0510.01		

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

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 provided for a complete mix-activated sludge type operation and 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, an additional treatment unit was constructed adjacent to the original to add a secondary clarifier 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.

FIGURE 3.3.1
YACHATS WWTP, AERATION BASINS & DIGESTERS

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.

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 1999 & 2000 Jan. to May flows)	
Max. Month Wet Weather	1.13 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 2025 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 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. This 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. Jon Gasik of Oregon DEQ (2002) recommends 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. 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. Yachats has only one clarifier. 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 capacity.

Digesters

The existing digesters have a total capacity of 11,124 cubic feet (ft^3). The projected required capacity in 2025 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. Biosolids hauling site access 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.

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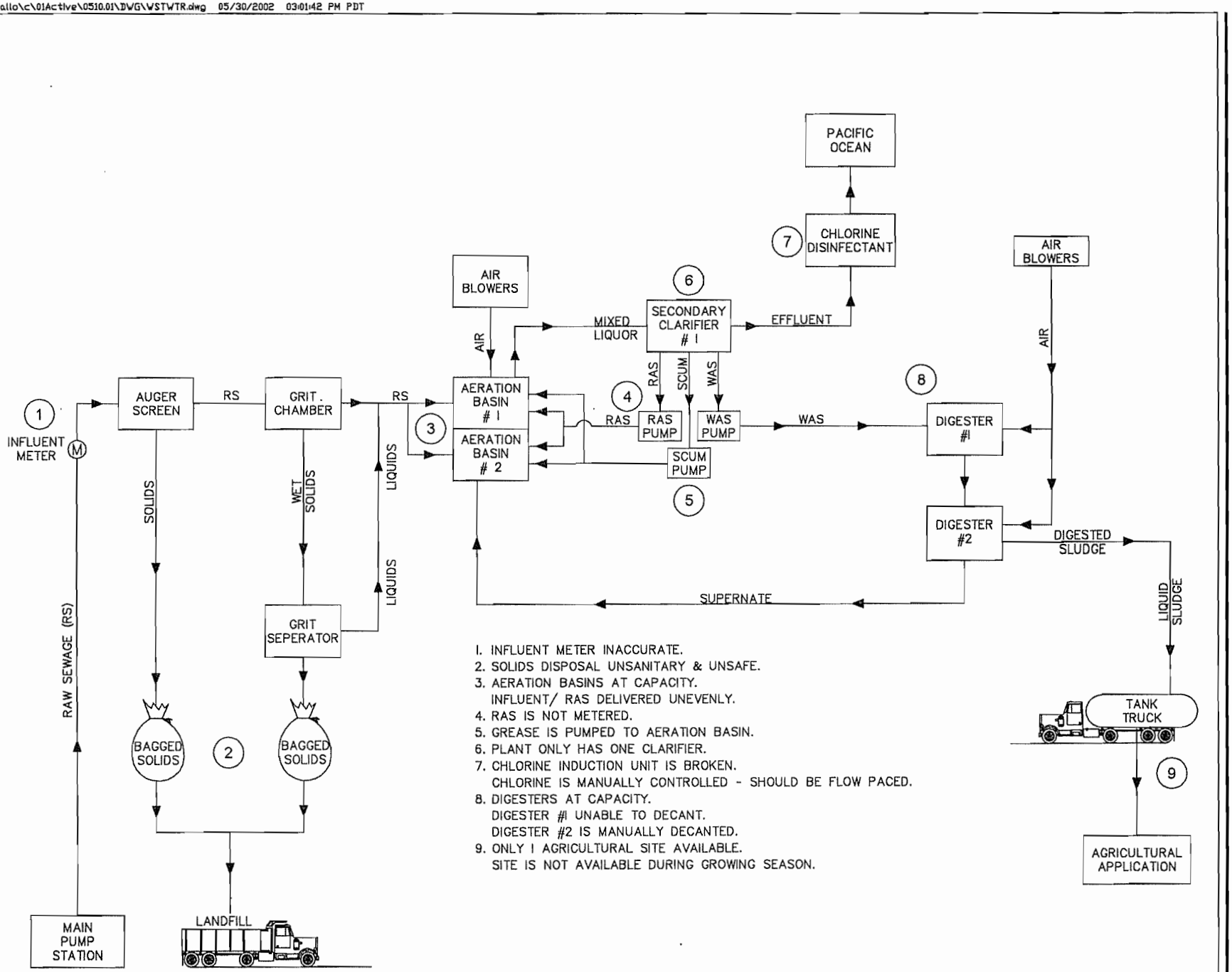


1. INFLUENT METER INACCURATE.
2. SOLIDS DISPOSAL UNSANITARY & UNSAFE.
3. AERATION BASINS AT CAPACITY.
   INFLUENT/ RAS DELIVERED UNEVENLY.
4. RAS IS NOT METERED.
5. GREASE IS PUMPED TO AERATION BASIN.
6. PLANT ONLY HAS ONE CLARIFIER.
7. CHLORINE INDUCTION UNIT IS BROKEN.
   CHLORINE IS MANUALLY CONTROLLED - SHOULD BE FLOW PACED.
8. DIGESTERS AT CAPACITY.
   DIGESTER #1 UNABLE TO DECANT.
   DIGESTER #2 IS MANUALLY DECANTED.
9. ONLY 1 AGRICULTURAL SITE AVAILABLE.
   SITE IS NOT AVAILABLE DURING GROWING SEASON.

THE DYER PARTNERSHIP
ENGINEERS & PLANNERS, INC.

DATE: JULY, 2002

PROJECT NO.: 0510.01

CITY OF YACHATS

WASTEWATER MASTER PLAN

EXISTING WASTEWATER TREATMENT PLANT FLOW DIAGRAM

FIGURE NO.

3.3.2

Disinfection

The existing disinfection system consists of two chlorine contact chambers with a total capacity of 7,925 ft^3, based on the O&M manual. Detention time is given as 65 minutes at ADWF and 14 minutes at peak daily flow. 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 greatest 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. This tends to result in over chlorination at night. Chlorination systems provide a possible hazard due to potential worker exposure to chlorine gas.

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.

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.

No deficiencies or problems are apparent with the outfall at this time or are expected within the planning period.

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.

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 available for spreading year-round with the exception of 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 300,000 gallons of sludge per year, without becoming overloaded with nitrogen. This meets current needs, but will not be adequate for the 25-year study period.

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 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.

3.7 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.

Five manholes were identified as leaking, during the 2002 flow mapping. Water infiltrating these manholes contribute 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.

DEQ MINIMUM SLOPE STANDARDS

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

DEFICIENCY

ADEQUATE

12" Ø @ .0018
705 GPM

10" Ø @ .0015
374 GPM

MAIN PUMP STATION

10" Ø @ .045
2158 GPM

OCEAN OUTFALL

WASTEWATER TREATMENT PLANT

PONTIAC PUMP STATION

8" Ø @ .0033
318 GPM

4" Ø PM
400 GPM ±

RIVERSIDE PUMP STATION

OCEAN VIEW PUMP STATION

8" Ø @ .0029
305 GPM

8" Ø @ .0005
130 GPM

8" Ø @ .0020
246 GPM

8" Ø @ .0040
350 GPM

8" Ø @ .0016
220 GPM

8" Ø @ .0026
283 GPM

BASIN BOUNDARY, TYPICAL

QUIET WATER PUMP STATION

PLAN SCALE
300 0 150 300 600

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: JULY, 2000	WASTEWATER SYSTEM - FLOW RATES AND DEFICIENCIES	3.6.1
PROJECT NO.: 0510.01		

Section

4

Wastewater Characteristics

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.

A summary of measured flowrates as developed from flow data from 1998 to 2001 is provided below in Table 4.1.1.

TABLE 4.1.1
YACHATS WWTP EXISTING FLOW RATES & LOADS

Parameter	Design	Current 2001	
Population	935	1890	
MMDWF	.197 Mgd	.17 Mgd	87 gpcd
MMWWF	-	.26 Mgd	206 gpcd
ADWF	.174 Mgd	.14 Mgd	75 gpcd
AWWF	-	.23 Mgd	179 gpcd
Base Sewage	-	.13 Mgd	68 gpcd
Base Infiltration	-	.01 Mgd	7 gpcd
Peak Month	.288 Mgd	.40 Mgd	315 gpcd
Peak Week	.439 Mgd	.67 Mgd	533 gpcd
Peak Day	.773 Mgd	1.18 Mgd	937 gpcd
PIF	1.9 Mgd	2.3 Mgd	1825 gpcd
BOD Avg. Day	206 ppd	201 ppd	143 mg/l
BOD Max. Month	535 ppd	443 ppd	281 mg/l
TSS Avg. Day	243 ppd	212 ppd	137 mg/l
TSS Max. Month	681 ppd	494 ppd	264 mg/l

Without the availability of hourly flow data, the PIF was determined with a common graphical method using the probability of occurrence of maximum and average flows and existing flow records. See Appendix C for a summary of this graphical solution.

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 1,260 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 existing peak day is approximately 1.18 Mgd (800 gpm) and the PIF is approximately 2.3 Mgd (1600 gpm). The base sewage flow is approximately 0.13 Mgd (90 gpm). I/I under peak day conditions is 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.

4.2 EPA – I/I Analysis

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

In order to provide contrast and perspective, it is helpful to determine the base sanitary sewer flow. To determine base or dry weather flows, 7 to 14 day periods during the driest summer months, where no rain is measured, are investigated. Total system flows are converted to per capita flows based on the summer, service population.

For the City of Yachats, eleven, one-week periods during the summer months from 1998 through 2001 were analyzed. The resulting average base or dry weather flow was calculated at approximately 67 gpcd. This base sanitary flow can be used for perspective when evaluating I/I levels.

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 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 above 120 gpcd are considered to be excessive I/I.

For the City of Yachats, eleven, one-week periods during the winter months from 1998 through 2001 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 164 gpcd. The results indicate that approximately 44 gpcd are present in the system as excessive infiltration. Therefore, the City of Yachats exceeds EPA criteria for acceptable infiltration levels.

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, 39 separate storm events during winter months from 1998 through 2001 were analyzed. Each storm event resulted in between one and seven inches of rainfall in a 24-hour period. Under these conditions, the resulting system flows were determined to average 365 gpcd. Based on the established EPA criteria, the results indicate that approximately 90 gpcd are considered as excessive I/I.

Based on established EPA guidelines, the City of Yachats does have a significant I/I problem. Table 4.2.1 summarizes the EPA I/I analysis. A more detailed summary of the analysis and I/I flow maps are provided in the Appendix.

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)	164	120
Inflow (High Rainfall levels)	365	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 1997 to 2001 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 1,260 persons and a dry weather sewered population of 1,890 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 slightly below typical levels.

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. However, BOD and TSS peak loading frequently exceeded the typical ranges.

TABLE 4.3.1
CITY OF YACHATS – WWTP INFLUENT CONCENTRATIONS AND LOADS

PARAMETER		WET WEATHER Average	WET WEATHER Range	DRY WEATHER Average	DRY WEATHER Range
BOD					
	mg/L	108	46 – 193	179	44 – 281
	ppd	187	98-1159	215	43 – 897
	ppcd	0.15	.08-.92	0.11	0.02 - 0.47
TSS					
	mg/L	115	57 – 264	158	74 – 257
	ppd	217	67 – 1,414	207	70 – 888
	ppcd	0.17	0.05 - 1.12	0.11	0.04 - 0.47

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 is provided in table 4.2.1.

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.

TABLE 4.4.1
UNIT DESIGN VALUES - WASTEWATER COMPOSITION

Parameter	BOD	TSS
Average load, ppcd (off-peak)	0.16	0.17
Average load, ppcd (peak)	0.11	0.11
Peaking Factors		
Maximum Month	2.2	1.4
Maximum Week	3.2	3.8
Maximum Day	5.8	6.7

4.5 Projected Flowrates

Yachats' population is projected to increase by 81% by 2025. This 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 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. This will 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 in Appendix C.

For Yachats, the existing sewered area is about 600 acres and the current peak I/I is about 2.17 Mgd. This gives an I/I value of 3,616 gallons per acre-day and puts Yachats above the curves for old and new sewers. The existing system has excessive I/I, so this finding is reasonable. Peak I/I is projected to grow to 3.5 Mgd by 2025 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 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 of 13 gpcd for 2025 was developed using the current 7-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 (2,285-1,260 = 1,025) multiplied by the factors discussed above. These were added onto the existing ADWF, AWWF, MMDWF, and MMWWF to project the flows for 2025.

4.6 Projected Wastewater Composition

It is estimated that the current sewered equivalent population is around 1,260 in the off-peak season. By the year 2025, the estimated equivalent population inside the city limits is 2,285. This 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 2001	Projected 2025
BOD		
Avg. Day	200	371
Max. Month	443	819
Max. Day	897	2,143
TSS		
Avg. Day	197	392
Max. Month	390	913
Max. Day	888	2,615

The WWTP is operating at 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 2025 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 2025*	
Population	3,494 (Peak)	
MMDWF	0.31 Mgd	88 gpcd
MMWWF	.41 Mgd	118 gpcd
ADWF	0.28 Mgd	81 gpcd
AWWF	0.38 Mgd	109 gpcd
Base Sewage	0.24 Mgd	68 gpcd
Base Infiltration	0.05 Mgd	13 gpcd
Peak Month	.63 Mgd	180 gpcd
Peak Week	1.07 Mgd	306 gpcd
Peak Day	1.88 Mgd	537 gpcd
PIF	3.66 Mgd	1,047 gpcd
BOD Avg. Day	371 ppd	.10 ppcd
BOD Max. Month	819 ppd	.23 ppcd
TSS Avg. Day	392 ppd	.11 ppcd
TSS Max. Month	913 ppd	.26 ppcd

*Projected is based on current flows and does not include an allowance for I/I reduction.

4.7 Disinfection

Final effluent is currently disinfected by gas-injected chlorine. Chlorine use averaged seven pounds per day in 2001, based on the plant DMRs. Chlorine levels are manually controlled, with use ranging from two pounds per day to a high of 33 pounds. Chlorine residuals averaged .96 mg/L for the same time period, with a high of 3.5 and a low of 0.2.

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.

Chlorine levels were not projected for future operation.

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. 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

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

month depending on the horsepower of the unit. Total O&M costs are estimated at $100 to $200 per year per unit.

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.

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. Jon Gasik of Oregon DEQ suggests the following guidelines:

- 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

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
WASTE DISCHARGE LIMITATIONS

Parameter	May 1-Oct 31		Nov 1-Apr 30		Year-round
	BOD	TSS	BOD	TSS	Fecal Coliform/ pH
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	50	50	-
Daily Maximum (ppd)	50	50	230	230	-
Minimum Removal (%)	85	85	85	85	-
Organisms /100 ml	-			-	400
PH	-			-	6<pH<9

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.

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.

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

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 update.

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 ten years are summarized in Table 5.3.1.

Estimates in this Plan are based on year 2001 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 2001

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
	Avg. Annual %	2.62%

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.

Section

6

Development of Alternatives

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.

Existing I/I Problems

The core problem within the existing 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. Smoke testing, the most efficient method of detecting inflow, is scheduled for September 2002, though the results will not be available in time for inclusion in this report.

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. Flow mapping in February 2002 located several areas of infiltration, and television inspection of selected sections of pipeline, as noted in Figure 6.1.1 is recommended. Maps showing flows discovered are included in Appendix B. As flows at the plant indicate much higher I/I flows than were apparent during the flow mapping, it is recommended that flow mapping be scheduled again during the 2002/2003 winter rains. This would allow for inflow remediation after the smoke testing and before the flow mapping.

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, for one thing, an increase in illegal downspout and area drain connections to the sanitary sewer, or a deterioration of the collection system.

About 2,500 feet of pipe was identified in the 2002 flow mapping as a potential I/I source. Television inspection is recommended for these sections. It is recommended that an additional 2,500 feet of adjacent pipe also be televised. Cleaning and inspection costs are about $1.50 per linear foot for a total budget of $7,500 including engineering review.

Manholes I-1, H-21, H-8, D-17, and A-13 were noted to be leaking during flow testing. Estimated cost to line a manhole is $1,000 each for a budget cost of $5,000.

Smoke testing will take about 60 man-hours and $100 for supplies. The City work force would most likely accomplish this task in-house. Using $25 per hour for in-house labor cost, the estimated smoke testing budget figure is $1,600.

Producing an engineering report to recommended specific I/I projects based on the smoke testing and television inspection is estimated at $5,000.

Sealing manhole lids against floodwaters may be done in two ways, installing a plastic liner pan and gasket or replacing the manhole rim and lid with a watertight assembly. Liner pans cost about $60 and the gasket and installation cost about $45 per manhole. Material cost for a new rim and watertight lid cost about $160 with an installed cost of about $500 per manhole. As a comprehensive manhole inspection and evaluation has not been performed, the number of manholes that are subject to flooding is unknown, though six will be used for budget purposes.

It is difficult to determine the extent of repair work that will be necessary until the smoke testing and television inspection work is complete. Based on the preliminary finding that there is about 2,500 lineal feet of suspect piping, 1,400 feet of substandard laterals in the right of way, and assuming that the pipe all requires inversion lining, a budget figure of $278,000 would be in order. If piping replacement is necessary, this cost could be significantly higher. See the Appendix for detailed cost estimates.

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 are now 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. The second pipe section runs between Manhole A-1 and Manhole D-1, adjacent to Main Pump Station. 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. These options will be examined for each of the two areas.

Yachats Park Road

The existing 8-inch sewer trunk along Yachats Park Road does not have sufficient capacity to carry flows generated along this line, together with flows currently generated by Basin I, without surcharging manholes. Contractor's as-built drawings for this line indicate slopes between .0005 and .0029. The section of pipe at a slope of .0005 is only ten feet long, and is not long enough to generate a significant amount of head-loss. The manhole upstream of this section most likely consistently surcharges a few inches during rainstorms. Of greater concern is about 1,660 feet of pipe laid at less than a slope of .0029. The capacity of this section is just adequate to carry current peak flows, but not the projected peak flow in 2025 of approximately 475 gpm. This line serves the area of Yachats with the most developable land available and so it is likely that flows on this line will increase.

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. Also at least one manhole (MH # H-11) has a shallow depth, making it a likely source of a sewer spill if the pipe surcharges.

2. **Line the pipe:** Lining this section of pipe increases the capacity to about 265 gpm, inadequate for future flows.

3. **Install larger pipe:** The estimated cost to replace the existing 8-inch pipe with 10-inch pipe is about $250,000. This would increase capacity to about 520 gpm, adequate for future flows.

4. **Install new pipe at steeper slopes:** Manholes on this section of pipe already exceed a depth of 20 feet. It is not advisable to install deeper manholes.

5. **Install additional pump station:** The estimated construction cost for a new packaged pump station, located near Manhole H-17 is about $250,000, including land acquisition and a 1,750 foot pressure main. The station would require about $7,000 a year in operations and maintenance costs for a present value to install the station of $340,000.

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 2025 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. **Line the pipe:** Lining this section of pipe increases the capacity to about 450 gpm, which is inadequate for future flows.

3. **Install larger pipe:** The estimated cost to replace the existing 10-inch pipe with 14-inch pipe for 80-feet of length is about $36,000. This would increase capacity to about 1,100 gpm, adequate for future flows.

4. **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.

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 are likely to 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.

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. **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.

3. **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 $385,000.

4. **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 $325,000.

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 2025, assuming a 33% reduction in I/I. 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. At a minimum, this station needs new impellors before the next winter season. The parts cost for two impellors and two volute gaskets is $1,500, including freight. Larger impellors could be installed for the same price to provide a capacity of 150 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 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 $305,000 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 #1, estimated at $255,000, the same capacity as Option #1, 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 $95,000.

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. **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 $40,500.

3. **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 $98,000.

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 $3,350 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. Additional information from smoke testing, television inspection of lines, and flow mapping is necessary to accurately calculate the future hydraulic load. 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 $18,000.

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 $21,000.

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, dangerous, 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 3.66 MGD for the year 2025. This is about twice the design hydraulic flow of the existing plant. The system has excessive I/I and the recommendation made in Section 6.1 is to smoke test, television inspect, and rehabilitate the collection system prior to

designing the WWTP improvements. Options for correcting treatment deficiencies are analyzed with the assumption that I/I is reduced about 30%, which would give a future peak hourly flow of about 2.7 MGD.

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 would be the most cost effective 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.

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

1. **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.

2. **Upgrade existing headworks**. Removing the existing screen and installing a mechanical auger screen sized for future flows is estimated to cost approximately $201,000. 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 $200,000. 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.

3. **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 $542,000. 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.

Biological Treatment

The biological treatment of the WWTP consists of the aeration basins, clarifier and digesters. The 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 2025 of 820 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.

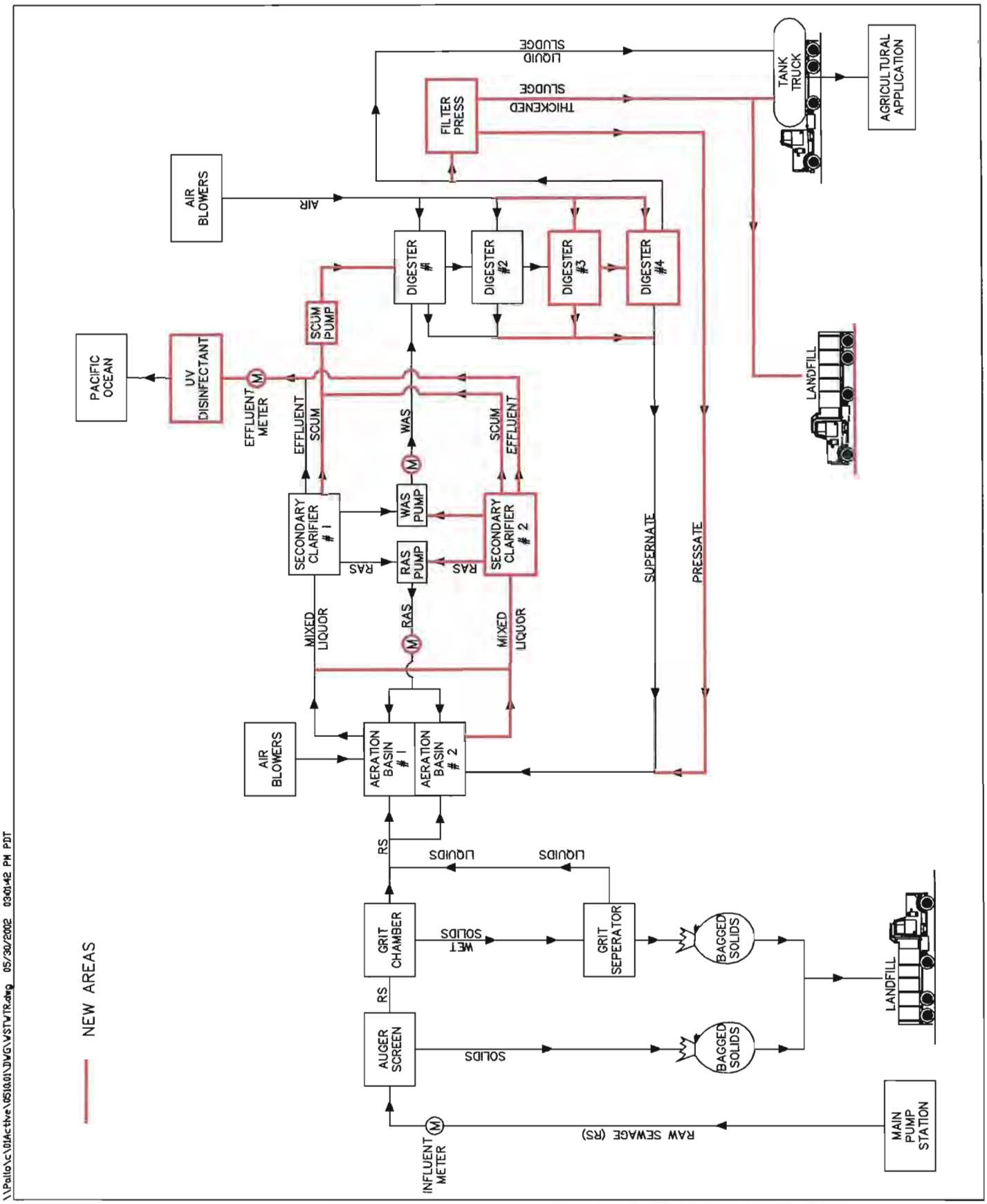
No Action – Option 1 is to leave the system as-is. The system is currently operating above the design hydraulic capacity and at the mass load capacity. Twice in 2001 the plant did not meet the permit requirements for Fecal Coliform. As mass loads rise with increasing population, it will become increasingly difficult to maintain effluent levels within permit limits. Continuing to operate the facility without reducing flows or improving treatment capacity is not an option.

Optimize Performance of WWTP – Option 2 would involve implementing the short-term projects listed above to optimize the performance of the existing plant. Assuming that the collection system rehabilitation reduces I/I by 30%, the existing peak flows should be within plant capacity. The mass loads on the plant will not go down significantly with the I/I work and the plant is operating at biological load during the maximum month. While the short-term projects and I/I rehabilitation are expected to enable the WWTP to operate within permit limits for existing loads, the plant is projected to exceed both hydraulic and treatment capacity during the planning period.

Expand Existing Plant – Option 3 would involve expanding the existing plant to accommodate existing and future flows through the year 2025. 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.

Converting the aeration basins to digesters would give a total digester volume of 157,800 gallons, more than adequate for projected treatment needs. Adding two aeration basins at 61,700 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.

One advantage of expanding the existing plant is that the City already has adequate land available at the existing site with relocation of the City shops. The construction of a new headworks as discussed above should allow for gravity flow through the new components, avoiding costly pumping. A disadvantage is that the site is adjacent to the library and construction could disrupt access to the library. Construction of the expanded plant (including a new headworks and disinfection) is estimated to cost approximately $3.6 million.



THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS*** ***WASTEWATER MASTER PLAN***	**FIGURE NO.** **6.3.1**
DATE: JULY, 2002	***PROPOSED WASTEWATER TREATMENT PLANT FLOW DIAGRAM***	
PROJECT NO.: 0510.01		

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 $162,000.

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.

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 $277,000.

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 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, and projected wastewater flows.

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.

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, and 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 $600,000.

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. Due to the limitations on space at the WWTP site, a remote location would be necessary, which would increase labor costs for storage.

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. 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. This would require the use of an irrigation spray gun and pipe at an approximate cost of $3,500. 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. The expansion of the WWTP discussed in Section 6.3 would provide approximately 40,000 gallons of storage space in the digesters, above that needed for treatment purposes. This will allow for approximately one month of in-plant storage based on projected biosolids production for the year 2025.

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.

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 $186,000.

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 $0 to $186,000.

TABLE 6.5.1
ALTERNATIVES FOR BIOSOLIDS DISPOSAL

Number	Alternative	Annual O&M Costs	Capital Construction Cost	Present Value Cost ($)
1	Wet Weather Land Application	$18,200	$3,500	$213,400
2	Sludge Drying Beds	$27,135	$3,500	$270,050
3	Filter Press & Store in Sludge Beds	$28,640	$186,000	$435,300

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	3	2	3
Capacity	3	2	2
Reliability	2	2	2
Operability	3	2	2
Ability to Construct	3	3	3
Environmental Factors	2	3	3
Community Impact	3	3	3
Total	22	19	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. Capacity issues would not be a concern with any option for at least ten-years, but there is little room for future biosolids storage expansion at the WWTP site.

For the planning period of this Wastewater Master Plan wet weather land application, is considered the most viable alternative for the City of Yachats' biosolids disposal needs.

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. 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.

Recommended Plan

Section 7

Section 7

Recommended Plan

7.1 Existing Piping System Improvements

Existing I/I Recommendations

It is recommended that work continue to identify and correct I/I in the existing system. Reductions in I/I should be made prior to or in conjunction with improvements for expansion.

TABLE 7.1.1
COST ESTIMATE SUMMARY FOR I/I REMEDIATION, PART 1

Description	Estimated Cost
Smoke Testing Collection Piping	$1,600
Television Inspecting 5,000 Feet of Pipe	$7,500
Watertight Lids for 6 Manholes	$3,000
Manhole Rehabilitation	$5,000
I/I Engineering Report	$5,000
Inversion Lining 2,500 Feet of Pipe	$278,000
Total	$300,100

Pipe Capacity Recommendations

Yachats Park Road

The recommended measure is to install larger pipe: The estimated cost to replace the existing 8-inch pipe with 10-inch pipe is about $250,000. This would increase capacity to about 520 gpm, adequate for future flows.

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 $36,000. This would increase capacity to about 1,100 gpm, adequate for future flows.

TABLE 7.1.2
COST ESTIMATE SUMMARY FOR IMPROVING PIPE CAPACITY

Description	Estimated Budget
Yachats Park Road	$250,000
Ocean View Drive	$36,000
Total	$228,000

Grease

The recommended approach for reducing grease in the system is a combination of the options discussed in Section 6. The first 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 7.1.3.

TABLE 7.1.3
COST ESTIMATE SUMMARY FOR GREASE PREVENTION PROGRAM

Description	Estimated Cost
Four month inspection	$1,000
Developing Handout	$850
Educational Site Visits	$850
Residential Flier	$575
Setting up Grease Removal Services	$2,200
Staff time for grease Removal Billing	$1,200
Total First Year	$6,675
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 $385,000.

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 $305,000 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 $98,000

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 $3,350 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	$385,000
Ocean View	Replace Station & Forcemain	$305,000
Ocean View	Replace impellors & Seals	$2,000
Riverside	Replace Station	$98,000
Pontiac	Install Railing, Fall Protection & Cowling Supports	$3,350
Quiet Water	No Recommendations	$0
Total		$793,350

7.3 Treatment Facility Expansion

The existing flows exceed the hydraulic capacity of the WWTP and mass loads are at the design treatment capacity. The recommendation is to expand the WWTP capacity to meet current and future projected flows for the year 2025 by building new aeration basins, a new clarifier, a new headworks and a new UV treatment system. The existing clarifier would be reused, but the effluent would be piped to the new UV disinfection system and the existing chlorine contact chamber surrounding the clarifier would be filled in. The original donut plant is currently used to provide both aeration and digestion chambers. The aeration chambers would be converted to provide adequate digestion space for future use.

The cost estimates used in this study were based on a successful I/I reduction program that would reduce peak I/I flows to the WWTP by 30%. This would allow the projected peak hourly flow for the WWTP to be reduced from 3.6 Mgd to 2.7 Mgd. All WWTP component capacity for the year 2025 is based on a peak hourly flow of 2.7 Mgd. The recommendation is to complete the I/I rehabilitation in areas with known problems and evaluate the effects on flows at the WWTP prior to proceeding with final sizing of components for the plant expansion. This reevaluation would be included in the facility plan required by DEQ prior to development of the actual construction documents for the expansion.

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. A plan view of the proposed wastewater treatment plant expansion 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 $3.6 million with an additional $100,000 for the facility plan. The proposed plant expansion is sized for the projected population in 2025.

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
Aeration Basin 1	Complete Mix	New	5,414 CF	8,250 CF
Aeration Basin 2	Complete Mix	New	5,414 CF	8,250 CF
Secondary Clarifier 1	Conventional Scraper	Existing	35 ft Dia	35 ft Dia
Secondary Clarifier 2	Conventional Scraper	New	-	35 ft Dia
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
Outfall	10" Ocean Outfall	Existing	3.1 Mgd	3.1 Mgd
Sludge Drying Beds	Sand/Gravel bed	Existing	3 @ 500 CF	3 @ 500 CF
Sludge Tank Truck	Spreader	Existing	3,000 gallons	3,000 gallons
Generator	Diesel	Existing	60 kW	*
Generator	Diesel	New	-	100 kW

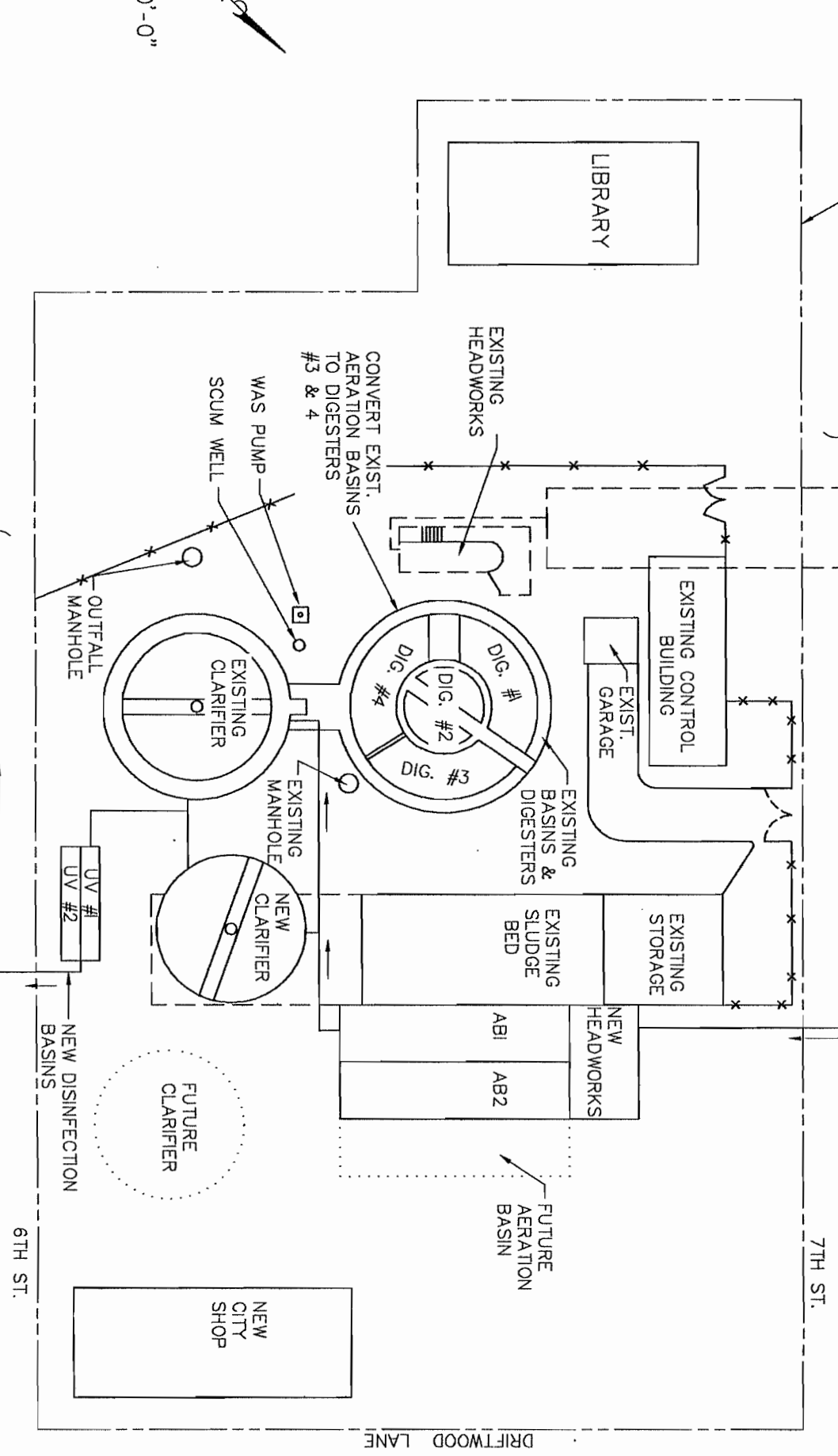
* Existing generator used for Main Pump Station

7.4 Biosolids Disposal

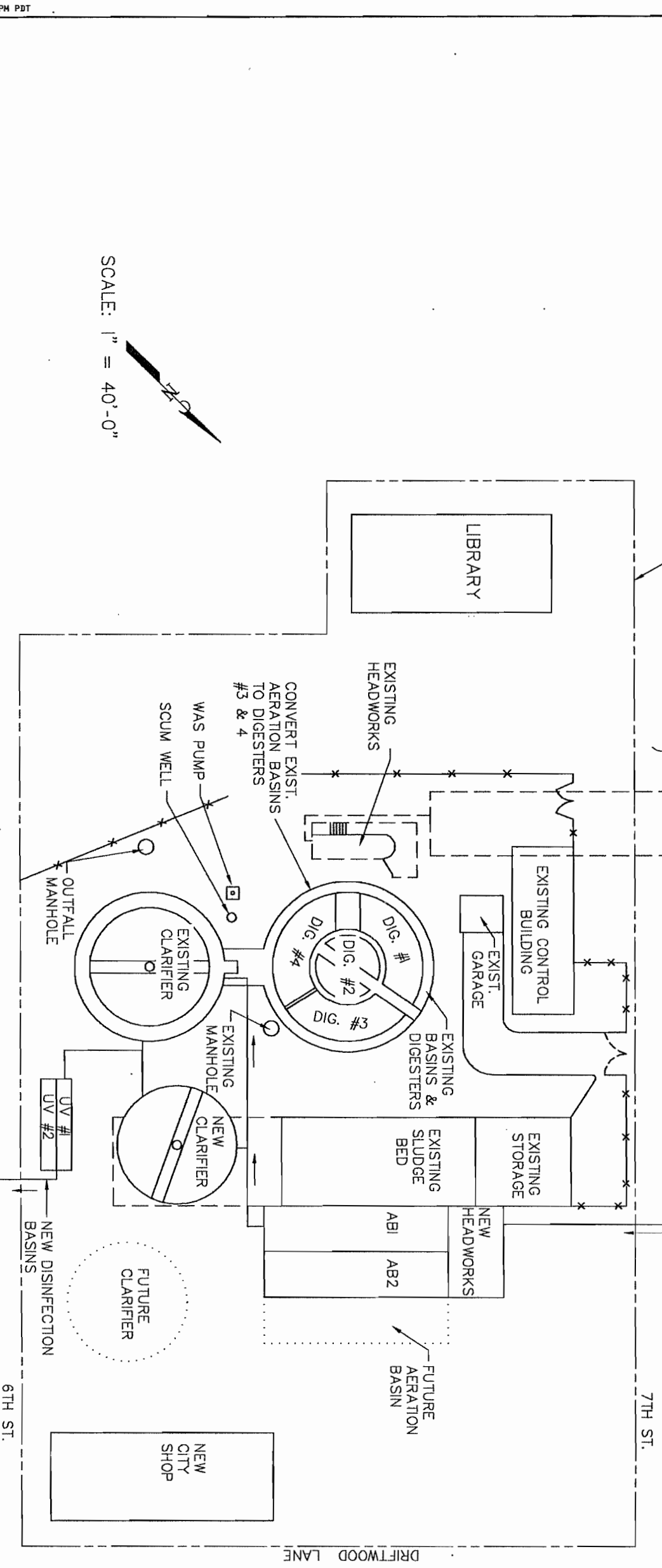
A large concern facing the WWTP operating staff is the timely removal and disposal of biosolids from the WWTP digesters. The conversion of the aeration basins to digesters will provide immediate surplus sludge storage. The additional storage should be enough to avoid wet weather application of sludge 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 develop alternative and wet weather application sites. This will require the purchase of an irrigation gun for spreading biosolids on fields while keeping the truck on adjacent roadways. While this measure involves minimal capital outlay for necessary spray equipment, there will be a considerable investment in staff time to obtain and maintain permits for these sites. Wet weather sites are needed for the upcoming winter season.

The City should continue to pursue opportunities to increase the flexibility for biosolids disposal. It is recommended that one sludge drying bed be used to run a dewatering test on digester biosolids during dry weather to check the feasibility of using the beds for dewatering and storage. The City may be able pay the City of Waldport for use of their sludge lagoons in winter or trade for dewatering and hauling biosolids for Waldport in the summer. 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.

SCALE: 1" = 40'-0"



THE DYER PARTNERSHIP ENGINEERS & PLANNERS	*CITY OF YACHATS PROPOSED WWTP LAYOUT*	FIGURE NO.
DATE: JULY, 2002	*SITE PLAN*	*7.3.1*
PROJECT NO.: 0510.01		



THE DYER PARTNERSHIP ENGINEERS & PLANNERS	*CITY OF YACHATS PROPOSED WWTP LAYOUT*	FIGURE NO.
DATE: JULY, 2002	*SITE PLAN*	*7.3.1*
PROJECT NO.: 0510.01		

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 $5.2 million.

TABLE 7.5.1
CAPITAL COSTS OF RECOMMENDED PROJECTS

#	Project Description	Annual O&M*	Capital
1	I/I Identification		$14,100
2	I/I rehabilitation		$286,000
3	Yachats Park Road		$250,000
4	Ocean View Drive		$36,000
5	Grease Prevention	$2,375	$6,675
6	Grease Removal**	$8,400	$0
7	Main Pump Station Replacement		$385,000
8	Ocean View Pump Station Replacement		$305,000
9	Riverside Pump Station Replacement		$98,000
10	Pontiac Pump Station Safety Improvements		$3,350
11	Upgrade WWTP Laboratory	$6,850	$50,000
12	New Effluent Meter	$1,000	$21,000
13	Supernatant Decanting		$10,000
14	Automatic Sampling Stations	$700	$18,000
15	Facility Plan		$100,000
16	WWTP Expansion	$34,000	$3,600,000
17	Biosolids Irrigation Sprayer		$4,700
18	Manure Spreader		$3,500
19	Additional Biosolids Disposal Sites	$3,500	0
	Total	$56,825	$5,191,325

* O&M costs are incremental costs for changes above existing conditions.
O&M savings for projects, such as pump station replacements, are not tabulated.
** 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	I/I Identification	$0	$14,100
2	I/I rehabilitation	$0	$286,000
3	Yachats Park Road	$250,000	$250,000
4	Ocean View Drive	$36,000	$36,000
5	Grease Prevention	$0	$6,675
6	Grease Removal*	$0	$0
7	Main Pump Station Replacement	$171,450	$385,000
8	Ocean View Pump Station Replacement	$305,000	$305,000
9	Riverside Pump Station Replacement	$98,000	$98,000
10	Pontiac Pump Station Safety Improvements	$0	$3,350
11	Upgrade WWTP Laboratory	$0	$50,000
12	New Effluent Meter	$0	$21,000
13	Supernatant Decanting	$0	$10,000
14	Automatic Sampling Stations	$0	$18,000
15	Facility Plan	$100,000	$100,000
16	WWTP Expansion	$3,600,000	$3,600,000
17	Biosolids Irrigation Sprayer	$2,350	$4,700
18	Manure Spreader	$1,750	$3,500
19	Additional Biosolids Disposal Sites	$0	$0
	Total	**$4,564,550**	**$5,191,325**

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

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. The Yachats system has been found to have excessive I/I. Rehabilitation to remove excessive inflow is always considered cost effective and removal of excess infiltration usually is less expensive than adding treatment capacity. An aggressive I/I rehabilitation program is recommended, followed by a reevaluation of WWTP flows, in order to minimize the budget required for capacity expansion construction. The existing WWTP is currently over capacity for hydraulic flow and at capacity for treatment loads. Implementation of the recommended short-term measures will help maximize the existing capacity during the evaluation, design, and construction process.

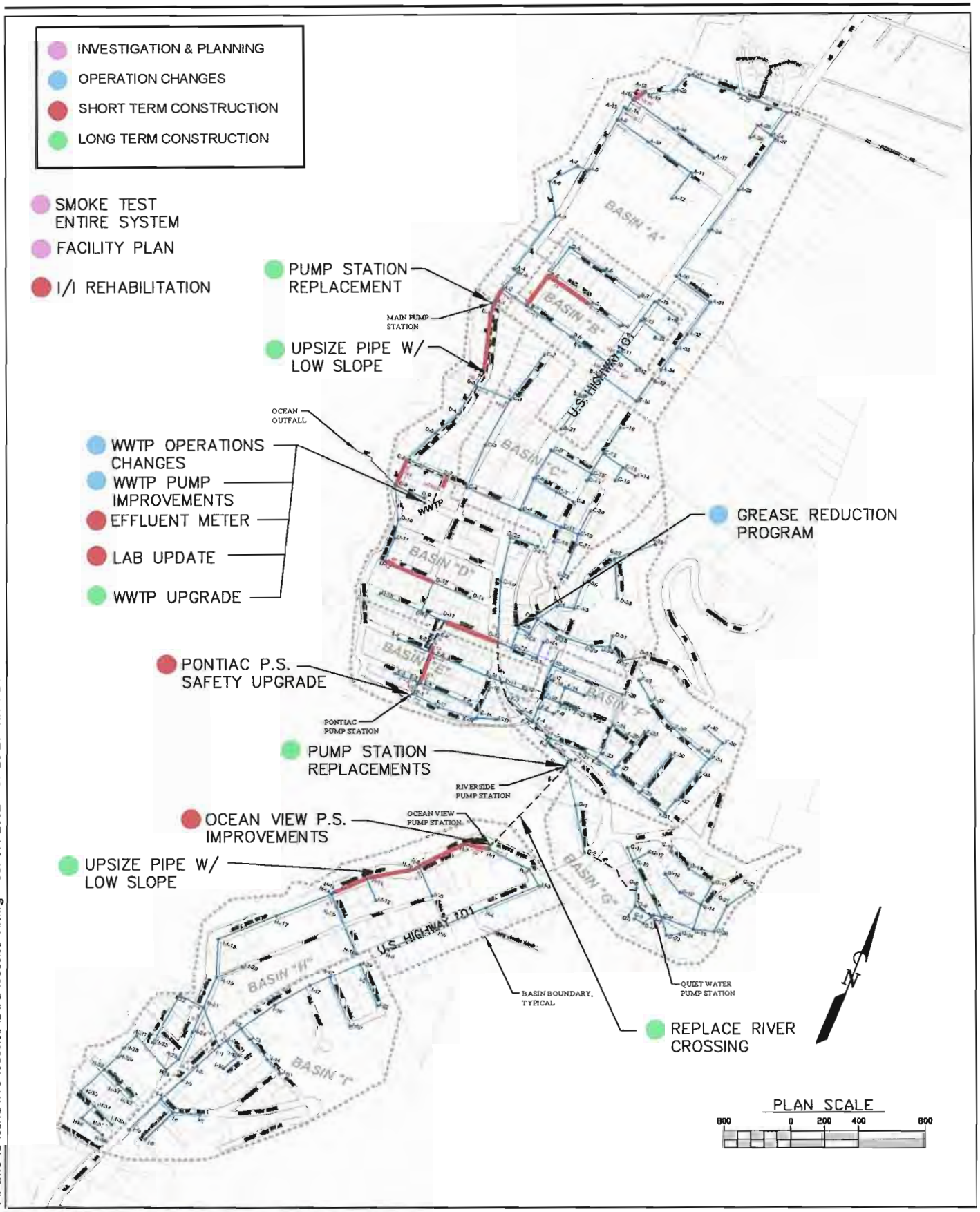
The following is a tentative schedule identifying the key activities and approximate implementation date for the improvements. Project groupings are shown in Table 7.6.1. Locations of the projects are shown in Figure 7.6.1. Figure 7.6.2 is a graphical timeline of the schedule.

Project Schedule

- Council Approval of Master Plan — September 2002
- Smoke test and television inspection of collection piping — September 2002
- WWTP operations changes — October 2002
- WWTP pump improvements — October 2002
- Ocean View Pump Station improvements — October 2002
- Laboratory update — October 2002
- Pontiac Pump Station improvements — October - November 2002
- Start grease reduction program — October 2002
- Install Effluent meter — November, 2002
- Start I/I Rehabilitation – Phase I
  - Design of I/I project — November 2002 – February 2003
  - DEQ approval of plans — March 2003
  - Advertise for bids for I/I rehabilitation — March – April 2003
  - I/I Rehabilitation Construction — April – October 2003
- Performance Evaluation — October – December 2003
- Facilities Plan for WWTP & Main, Riverside, and Ocean View PS — September 2003 – September 2004
- Start I/I Rehabilitation – Phase II
  - Design of I/I project — November 2003 – February 2004
  - DEQ approval of plans — March 2004
  - Advertise for bids for I/I rehabilitation — March – April 2004
  - I/I Rehabilitation Construction — April – October 2004
- DEQ approval of facilities plan — October 2004
- Design & Construction of River Crossing at the Bridge
  - Environmental Assessment — October 2004
  - Design of River Crossing project — November 2004 – February 2005
  - DEQ approval of plans — March 2005
  - Advertise for bids — March – April 2005
  - River Crossing construction — April – October 2005
- Design & Construction of Riverside & Ocean View Pump Stations — November 2004 – February 2006
  - Environmental Assessment — October 2004
  - Design of Pump Stations — November 2004 – February 2005
  - DEQ approval of plans — March 2005
  - Advertise for bids — March – April 2005
  - Pump Station construction — June – December 2005
- Start WWTP Expansion
  - Environmental Assessment — November 2004
  - Predesign Report — November 2004
  - DEQ Approval of Predesign Report & Environmental Assessment — December 2004
  - Site Surveys & Locates — December 2004
  - Design of WWTP project — January 2005 – November 2005
  - DEQ approval of plans — December 2005
  - Advertise for bids — January – February 2006
  - WWTP Expansion Construction — March – December 2006
  - Facility Commissioning — December 2006 - March 2007
  - Performance Evaluation — December 2006 – December 2007
- Design & Construction of Upsized Pipe on Yachats Park Road — April 2007-October 2007

TABLE 7.6.1
PROJECT PHASES

Phase	Year	Project #	Project Description	
1	2002	1	I/I Identification	$14,100
		6	Grease Removal	$0
		10	Pontiac Pump Station Safety Improvements	$3,350
		11	Upgrade WWTP Laboratory	$50,000
		13	Supernatant Decanting	$10,000
		14	Automatic Sampling Stations	$18,000
		17	Biosolids Irrigation Sprayer	$4,700
		19	Additional Biosolids Disposal Sites	$0
			Subtotal	**$100,150**
2	2003 to 2004	2	I/I rehabilitation	$286,000
		5	Grease Prevention	$6,675
		15	Facility Plan	$100,000
		12	New Effluent Meter	$21,000
		18	Manure Spreader	$3,500
			Subtotal	**$417,175**
3	2004 to 2005	4	Ocean View Drive	$36,000
		7	Main Pump Station Replacement	$385,000
		8	Ocean View Pump Station Replacement	$305,000
		9	Riverside Pump Station Replacement	$98,000
			Subtotal	**$824,000**
4	2005 to 2006	16	WWTP Expansion	**$3,600,000**
5	2007	3	Yachats Park Road	**$250,000**
Total				**$5,191,325**



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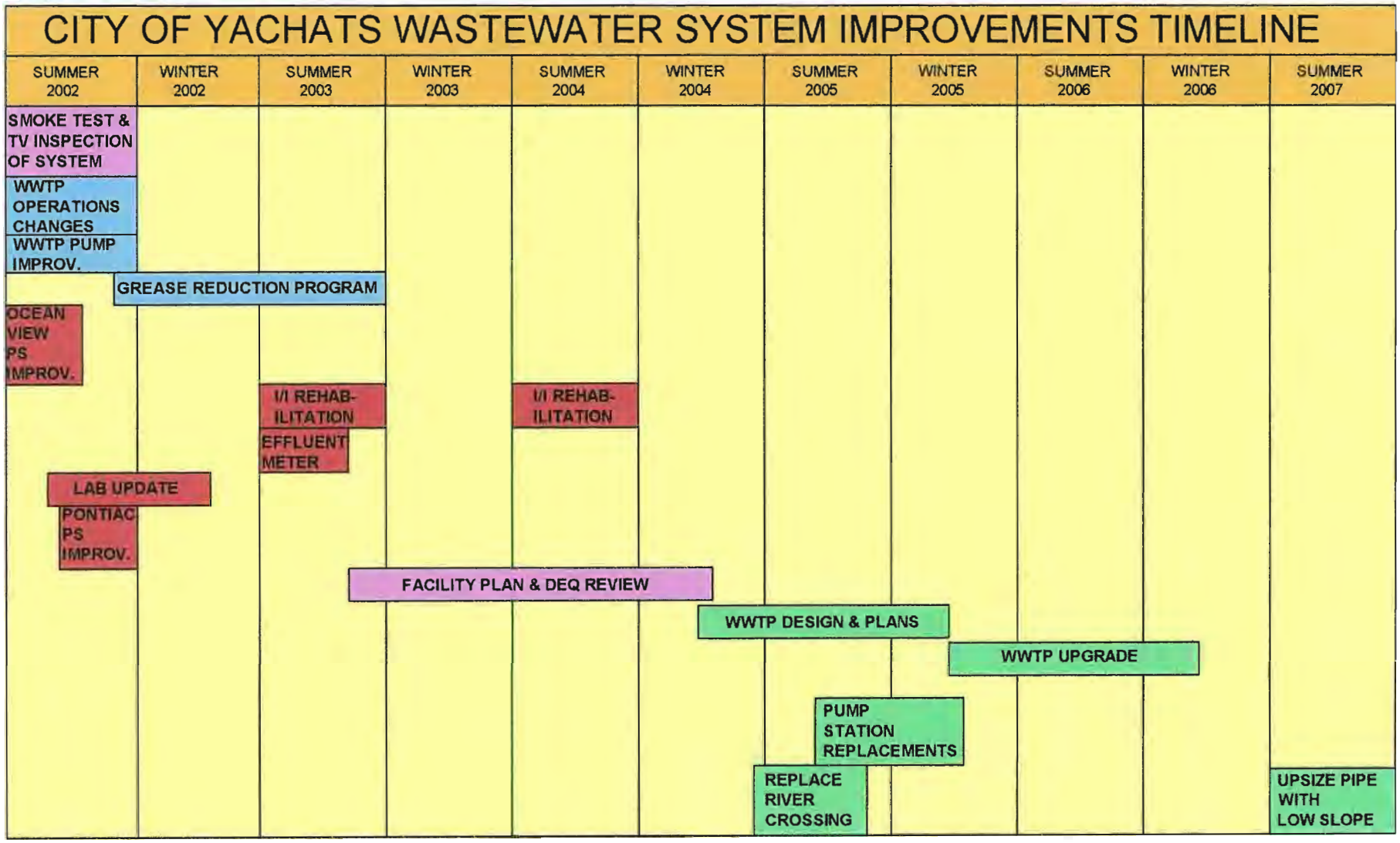
THE DYER PARTNERSHIP ENGINEERS & PLANNERS, INC.	***CITY OF YACHATS***	**FIGURE NO.**
DATE: JULY, 2002	***PROPOSED WASTEWATER IMPROVEMENT LOCATIONS***	**7.6.1**
PROJECT NO.: 0510.01		

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 1 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 $27,756 (Oregon non-metropolitan MHI). The market rate is currently 5.00%.

Intermediate rate. The intermediate rate is paid by those applicants whose MHI of the service area is less than $27,756 but greater than $22,205. The intermediate rate is currently 4.75%.

Poverty line rate. Those applicants whose MHI of the service area is below $22,205 (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.

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	45%	4.75%
>$27,756	0%	5.125%

[(a)] MHI<22,205 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, 2002.

The MHI in the City of Yachats, based on 1990 Census data, is $23,667. At this MHI, the City could be eligible for a grant of up to 45% of the total project cost. The City may also eligible for a RDA loan at the intermediate rate of 4.75%. Release of the US Census economic data for 2000 is expected by December 2002. Changes in income levels may disqualify the City for grants after the new data is adopted. Once the new economic data is available, grant funding for the City of Yachats should be reevaluated.

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 50 percent split between grant and loan 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. 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 3.55 percent. In addition, an initiation fee (1.5 percent of the loan amount) and a servicing fee (0.5 percent of the outstanding balance) are 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.

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.

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 $5.2 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 $48,500 (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. Most agencies are currently relying on 1990 Census data for calculating household income, but the 2000 data is being circulated and will soon be adopted by funding agencies. Yachats median income is expected to rise in comparison with the state average over the last ten years. Any applications for grants or loans should be submitted as soon as possible to take advantage of the 1990 income data for interest rates and program eligibility.

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 $40 to $45 per month. Sewer revenue currently averages $34.02 for user fees and $2.38 for the sewer construction bond (paid through property taxes)

for a total monthly average residential sewer cost of $36.40 per EDU. The actual cost to provide sewer service, based on the operating budget for 2002, is $22.98 per EDU per month for all users, with EDUs calculated based on average non-summer water consumption records, and after accounting for a $10,000 grant. 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	1	I/I Identification	$14,100	USFS Coop/City Funds
	6	Grease Removal*	$0	City Funds
	10	Pontiac PS Safety Improvements	$3,350	USFS Coop/SRF/City
	11	Upgrade WWTP Laboratory	$50,000	USFS Coop/TAT/City
	13	Supernatant Decanting	$10,000	USFS Coop/SRF/City
	14	Automatic Sampling Stations	$18,000	USFS Coop/SRF/City
	17	Biosolids Irrigation Sprayer	$4,700	USFS Coop/SRF/City
	19	Additional Biosolids Disposal Sites*	$0	City Funds
		Subtotal	**$100,150**	
2	2	I/I rehabilitation	$286,000	Water/Wastewater
	5	Grease Prevention	$6,675	TAT
	15	Facility Plan	$100,000	TAT/SRF/USFS/City
	12	New Effluent Meter	$21,000	Water/Wastewater
	18	Manure Spreader	$3,500	City Funds
		Subtotal	**$417,175**	
3	4	Ocean View Drive	$36,000	Rural Development
	7	Main Pump Station Replacement	$385,000	Rural Development
	8	Ocean View Pump Station Replacement	$305,000	Rural Development
	9	Riverside Pump Station Replacement	$98,000	Rural Development
		Subtotal	**$824,000**	
4	16	WWTP Expansion	**$3,600,000**	Rural Development
5	3	Yachats Park Road	**$250,000**	Rural Development
Total			**$5,191,325**	

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

DEQ has issued two notices of violation for the WWTP and three for the collection system in the past two years, but has not required a Mandated Order of Agreement (MAO) to remedy violations. The recent violations may be considered adequate reason for an agency to provide grant funds, but without an ongoing consistent violation, this will be a judgment call on the part of the presiding program administrator. The City is likely to qualify for between 25% and 45% grant funding, with 25% the most probable level. A higher level of grant funding might be anticipated from the USFS Cooperative Program for several small projects if they are grouped together. Projects with a high priority for improving the efficiency of system operations to minimize permit violations were grouped together for USFS funding. See Table 8.3.2 for a forecast of potential project funding.

TABLE 8.3.2
POTENTIAL PROJECT FUNDING TYPE

Phase	Project #	Grant				Loan			City	Total Cost
		COOP	RD	TAT	WW	SRF	RD	WW		
1	1	$7,500							$6,600	$14,100
	6								$0	$0
	10	$1,700							$1,650	$3,350
	11	$20,000		$10,000					$20,000	$50,000
	13	$5,000							$5,000	$10,000
	14	$9,000							$9,000	$18,000
	17	$2,350							$2,350	$4,700
	19								$0	$0
2	2				$71,500			$214,500		$286,000
	5			$6,675						$6,675
	15	$15,000		$10,000		$55,000			$20,000	$100,000
	12				$6,000			$15,000		$21,000
	18								$3,500	$3,500
3	4		$9,000				$27,000			$36,000
	7		$96,250				$288,750			$385,000
	8		$76,250				$228,750			$305,000
	9		$24,500				$73,500			$98,000
4	16		$900,000				$2,700,000			$3,600,000
5	3		$62,500				$187,500			$250,000
Total		**$60,550**	**$1,168,500**	**$26,675**	**$77,500**	**$55,000**	**$3,505,500**	**$229,500**	**$68,100**	**$5,191,325**

If the funding level in Table 8.3.3 is achieved, then the anticipated monthly sewer rate increase is $14.60 per month. Information on loan costs is summarized in Tables 8.3.3 and 8.3.4. The total anticipated sewer cost per EDU is $43.47 with grant funding and $48.49 if all funds are obtained through a loan. This sewer cost is average-to-high compared to rates in similar communities.

TABLE 8.3.3
FUNDING ALTERNATIVES

Funding Source	Loan Amount[(1)]	Grant Amount[(1)]	Effective Interest, %	Duration, Loan/yrs	Est. Monthly Rate Increase[(3)]
SRF	$55,000		3.55	20	
Rural Develop.	$3,505,500	$1,168,500	4.75	40	
Water Wastewater	$229,500	$77,500	5.28	25	
Cooperative USFS		$60,550			
TAT		$26,675			$14.60
Rural Develop.	$5,191,325	$0	3.55	40	$19.17
SRF[(2)]	$5,191,325	$0	4.75	20	$25.86
Water Wastewater	$5,191,325	$0	5.28	25	$24.84

[(1)] – Amount based on current dollars
[(2)] – Effective interest rate for SRF funding is based on 3.55% annual interest (Oct - Dec, 2001), 1.5% initiation fee, 0.5% servicing fee.
[(3)] – Amount based on 1,254 average EDUs per system water use

TABLE 8.3.4
ESTIMATED SEWER USE COST

	With 25% Grant Funding			With No Grant Funding*		
	Annual	Monthly	Monthly/EDU	Annual	Monthly	Monthly/EDU
Total EDUs	1,254			1,254		
Existing Annual System Costs	$320,100	$26,675	$21.26	$320,100	$26,675	$21.26
Existing Tax Based Debt Service	$35,800	$2,983	$2.38	$35,800	$2,983	$2.38
New Debt Service	$219,726	$18,311	$14.60	$288,421	$24,035	$19.16
New Debt Service Reserve	$21,973	$1,831	$1.46	$28,842	$2,404	$1.92
New O&M Costs	$56,825	$4,735	$3.77	$56,825	$4,735	$3.77
Total	**$654,424**	**$54,535**	**$43.47**	**$729,988**	**$60,832**	**$48.49**

* Assumes 40 year loan with Rural Development

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. Assuming partial funding from the USFS Cooperative Program and a Technical Assistance Grant, the City share for Phase I measures is estimated at $44,600. An additional $23,350 would be anticipated as the City's share of the facility plan and for purchase of a manure spreader.

Projects that increase system capacity are eligible to be considered for SDCs. The projects identified for I/I rehabilitation will increase capacity of the collection system and effectively increase the capacity of the WWTP by removing flow that would use capacity and prevent future connections. While these projects are also being done to improve pipe conditions, a portion of the cost may be attributable to capacity issues. The line size increase for Yachats Park Road and 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 $4,564,550 of the construction costs for these projects could be financed 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 1,254 EDUs, for a forty-year loan, as detailed above, monthly individual user fee increase would be between $19.83 and $24.85 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. The City's collection system is in need of repairs and requires a significant rehabilitation project while 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, 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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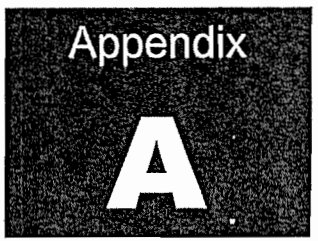
Appendices

Permits



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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

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	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	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.

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. Reporting Procedures

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 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.

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

3. Bypass of Treatment Facilities

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).

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.

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.

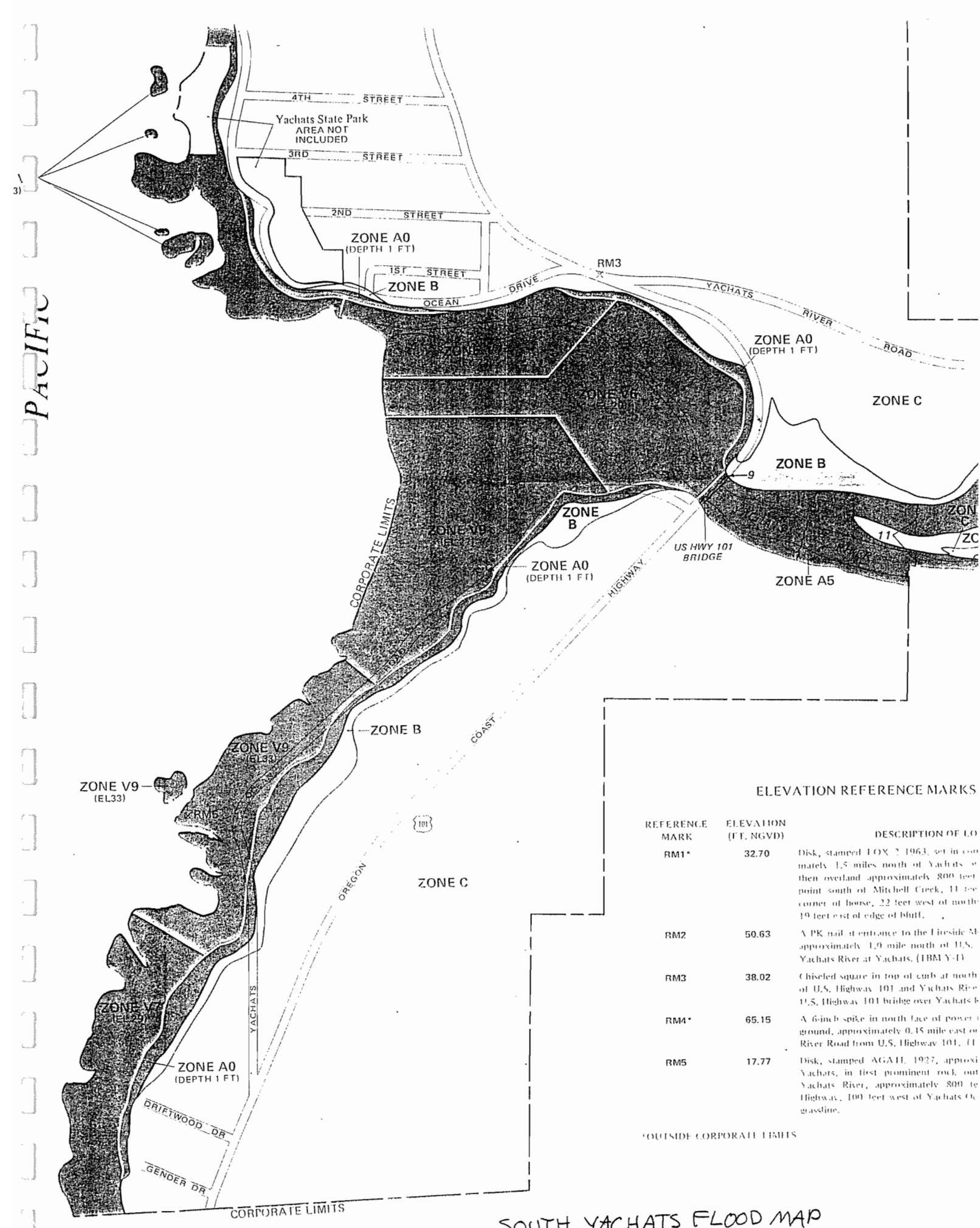
8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

Appendix

B

Figures and Maps

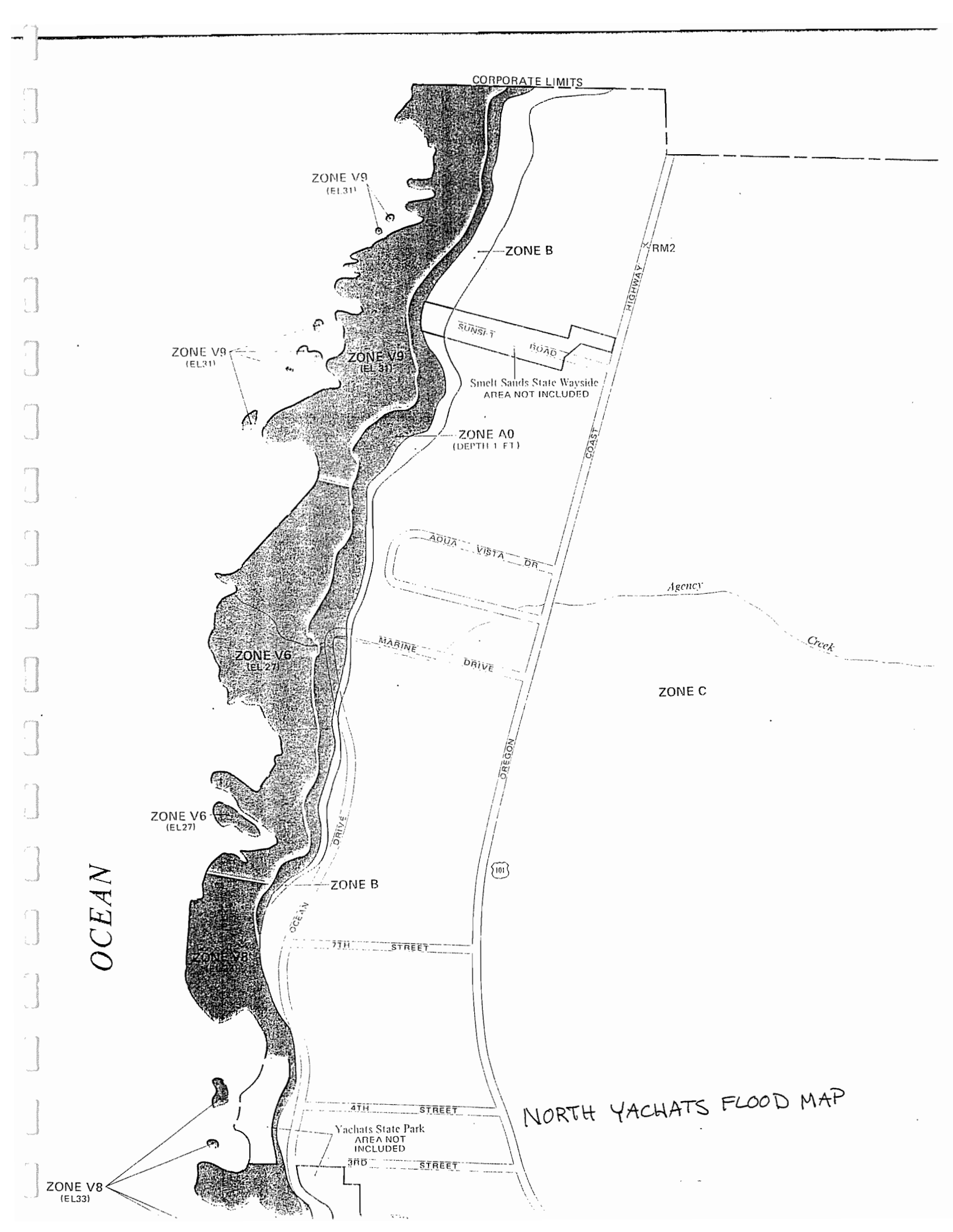


ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT, NGVD)	DESCRIPTION OF LO
RM1*	32.70	Disk, stamped LOX 2 1963, set in con mately 1.5 miles north of Yachats, e then overland approximately 800 feet point south of Mitchell Creek, 11 fee corner of house, 22 feet west of north 19 feet east of edge of bluff.
RM2	50.63	A PK nail at entrance to the Fireside M approximately 1.0 mile north of U.S. Yachats River at Yachats. (IBM Y-1)
RM3	38.02	Chiseled square in top of curb at north of U.S. Highway 101 and Yachats Rive U.S. Highway 101 bridge over Yachats R
RM4*	65.15	A 6-inch spike in north face of power p ground, approximately 0.45 mile east of River Road from U.S. Highway 101. (I
RM5	17.77	Disk, stamped AGATE 1937, approxi Yachats, in first prominent rock out Yachats River, approximately 800 fe Highway, 100 feet west of Yachats Oc grassline.

*OUTSIDE CORPORATE LIMITS

SOUTH YACHATS FLOOD MAP



NORTH YACHATS FLOOD MAP

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

FLOW MAPPING NOTATION

- FLOW DIRECTION
- 12 FLOW MEASUREMENT ON 2/7-8/2002
- MANHOLE (M.H.) BASIN NO. - M.H. NO.
- BASIN BOUNDARY
- LEAKY MANHOLE
- GRAVITY SEWER
- PRESSURE SEWER
- PROBLEM SECTION

PLAN SCALE

200 0 100 200 400

N

MAIN PUMP STATION

OCEAN OUTFALL

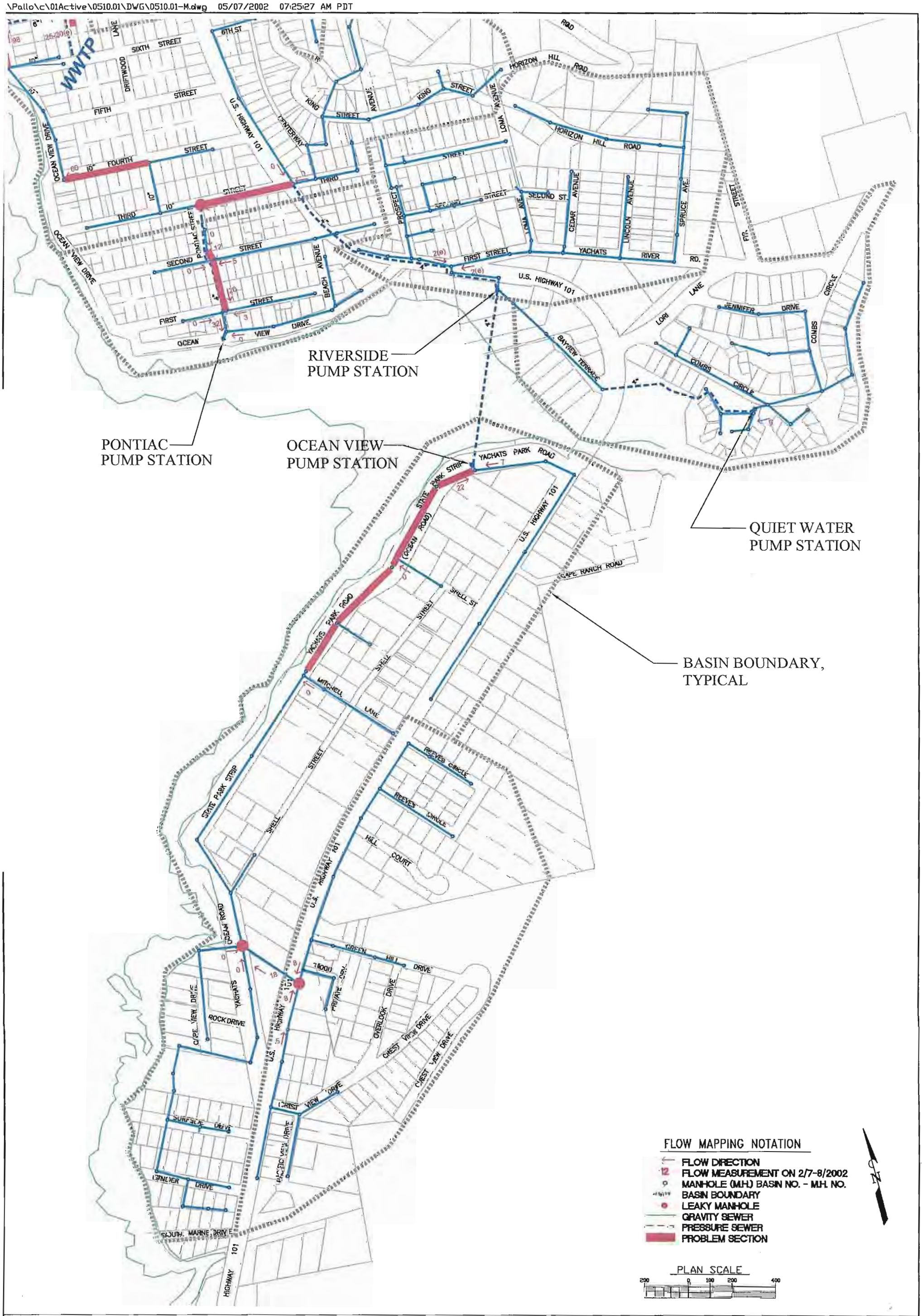
WASTEWATER TREATMENT PLANT

PONTIAC PUMP STATION

RIVERSIDE PUMP STATION

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS
DATE: FEB., 2002	EXISTING SYSTEMS MAP - I / I FLOW MAPPING RESULTS
PROJECT NO.: 0510.03	FIGURE NO. A

\Pallo\c\01Active\0510.01\DWG\0510.01-M.dwg 05/07/2002 07:25:27 AM PDT



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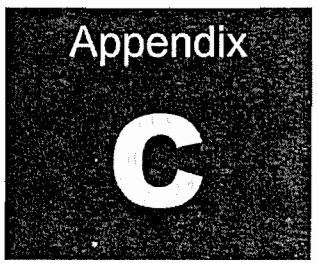
- PRESSURE SEWER
- PROBLEM SECTION

PLAN SCALE

200 0 100 200 400

THE DYER PARTNERSHIP ENGINEERS & PLANNERS	CITY OF YACHATS	FIGURE NO.
DATE: MAY, 2002	EXISTING SYSTEM MAP - I / I FLOW MAPPING RESULTS	B
PROJECT NO.: 0510.03		

Calculations



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

RATES AS OF JUNE 1, 2002

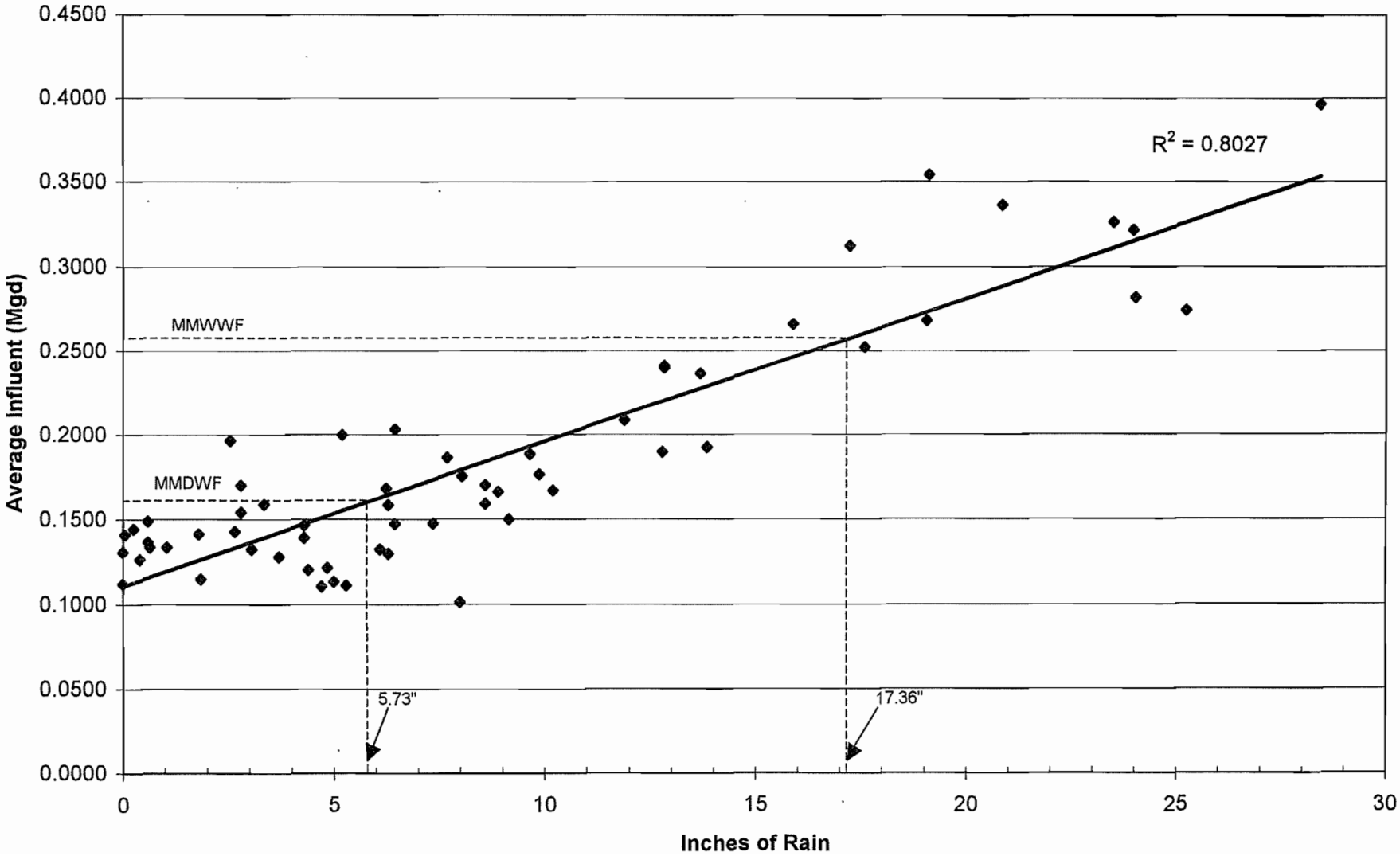
Sewer Service Type	Rates		
		Consumption*	
	Base	Oct.-April	May-Sept.
Residential Rate	$ 28.00	$ 2.00	$ 1.50
Commerical Rate	$ 28.00	$ 2.00	$ 2.00
Flat Rate (Comm/Churh/Fire)	$ 28.00	$ -	$ -
No Charge (City)	$ -	$ -	$ -
Second Meter	$ -	$ 1.50	$ 1.50

*** Per 100 Cubic Ft. of consumption**

Water Service Type	Consumption Rates	
	Base	May-Sept.
Residential Rate	$ 23.00	$ 2.60
Flat Rate (Comm/Churh/Fire)	$ 23.00	$ -
Outside City	$ 34.50	$ 3.90
Commerical Rate	$ 23.00	$ 2.60
Low Income Rate	$ 11.50	$ 2.60
No Charge (City)	$ -	$ -
Multi Family Residence	$ 23.00	$ 2.60
Translent Rental Residence	$ 23.00	$ 2.60
County/State/Federal	$ 23.00	$ 2.60
Large Commercial Meter	$ 23.00	$ 2.60
Large City Meter	$ -	$ -
Large Commercial Second Meter	$ -	$ 2.60

*** Per 100 Cubic Ft. of consumption**

Wet Weather Plant Flow VS. Rain 1997-2001



City of Yachats

Wastewater Collection System Master Plan

Summary of Existing Influent Flows at the Yachats WWTP

Design Flows for Yachats

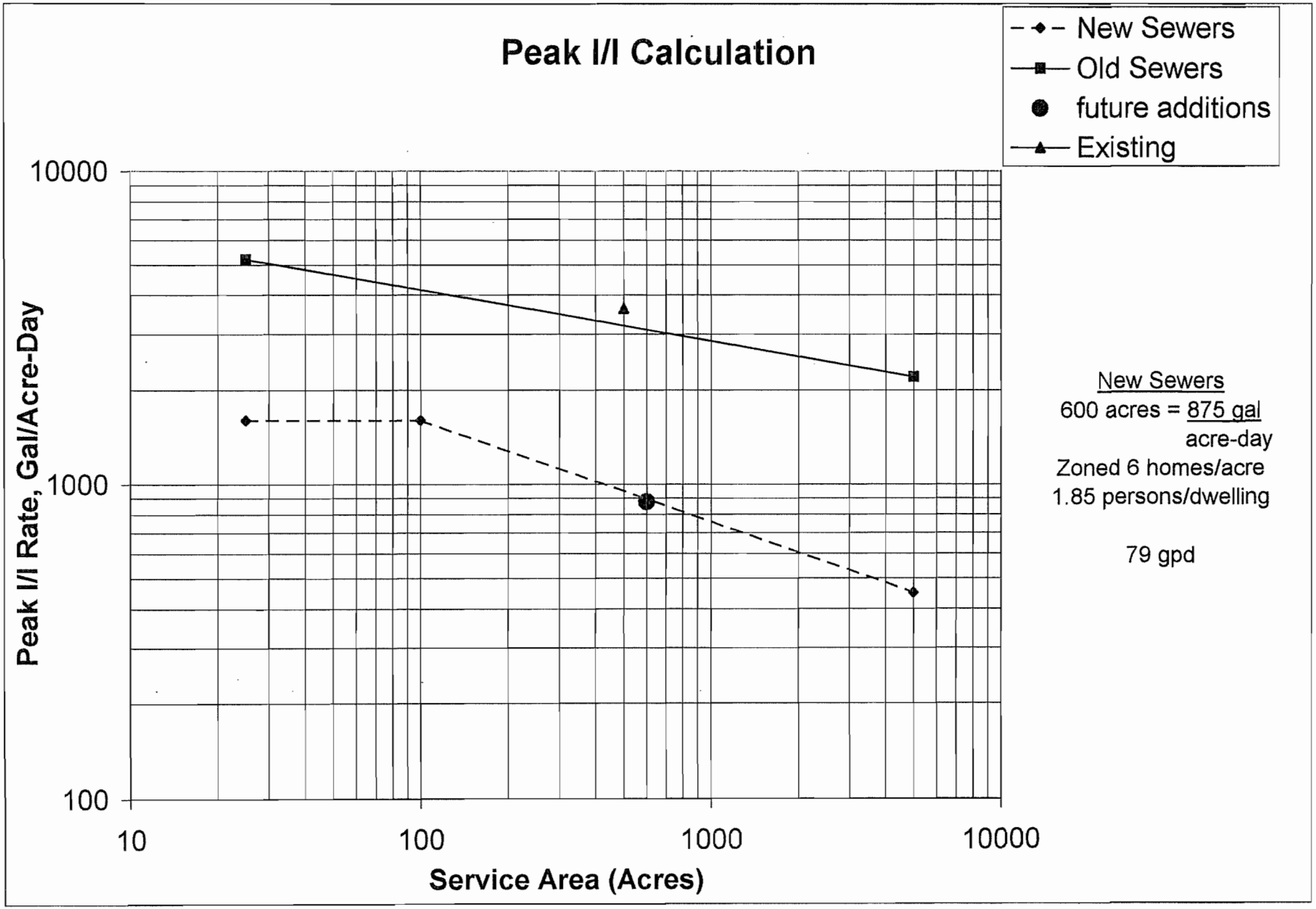
Summary of Existing Influent Flows at the Yachats WWTP

Parameter	MGD	gpcd	Basis
Population - Peak		1890	2000 Equivalent Population
Population - Off-Peak		1,260	2000 Equivalent Population
Dry Flows			
ADWF	0.14	75	Based on 1997-2001, May-Oct Records
Base Sewage (dry)	0.13	68	gpcd Based on 1998 Water Use Records
Base Infiltration (dry)	0.01	7	ADWF - Base Sewage (dry)
MMDWF	0.17	87	Based on 1997-1999, May-Oct Records & 10 yr rain month
Wet Flows			
AWWF	0.23	179	Based on 1997-2001, Nov-April Plant Records
Base Sewage (wet)	0.13	68	gpcd Based on 1998 Water Use Records
MMWWF	0.26	206	Based on 1997-2001, Rainfall vs. Flow, 5 Year Rain Month
Peak Month	0.40	315	gpcd Based on Dec 1998 Data
Peak Week	0.67	533	gpcd Based on week of Dec 29, 1998 Data
Peak Day	1.18	937	gpcd Based on Dec 29, 1998 Data
PIF	2.30	1825	Based on log-log plot of peak events
AWWF I/I	0.08	67	AWWF - Base sewage (wet) - base infiltration
MMWW I/I	0.12	94	MMWWF-Base Sewage (wet) - base infiltration
PI I/I	2.16	1142	PIF-Base Sewage (wet) - base infiltration

Summary of Projected Influent Flows at the Yachats WWTP

Parameter	2005	2010	2015	2020	2025
Population - Peak	2093	2,378	2,703	3,073	3,494
Population - Off-Peak	1391	1574	1781	2017	2285

Flow Parameter	MGD	MGD	MGD	MGD	MGD	Basis
Dry Flows						
ADWF	0.17	0.21	0.26	0.32	0.38	base infiltration (dry) + base sewage (dry)
Base Sewage (dry)	0.14	0.16	0.18	0.21	0.24	exist gpcd x new dry population
Base Infiltration (dry)	0.03	0.05	0.08	0.11	0.14	exist base infiltration + 79gpcd x pop increase
MMDWF	0.18	0.21	0.24	0.27	0.31	exist gpcd x new dry population
Wet Flows						
Base Sewage (wet)	0.09	0.11	0.12	0.14	0.16	exist gpcd x new dry population
AWWF I/I	0.08	0.08	0.08	0.08	0.08	exist AWWF-exist base sewage(wet (constant)-exist base infiltration
AWWF	0.21	0.24	0.28	0.33	0.38	base sewage (wet) + AWW I/I + new base infil
MMWW I/I	0.12	0.12	0.12	0.12	0.12	exist MMWWF-exist base sewage(wet) (constant)
MMWWF	0.24	0.28	0.32	0.36	0.41	base sewage (wet) + MMWW I/I + base infiltration
Peak Month	0.37	0.42	0.48	0.55	0.63	(exist peak month/exist MMWWF)*new MMWWF
Peak Week	0.63	0.72	0.82	0.94	1.07	(exist peak week/exist MMWWF)*new MMWWF
Peak Day	1.10	1.26	1.44	1.64	1.88	(exist peak day/exist MMWWF)*new MMWWF
PIF	2.14	2.45	2.80	3.20	3.66	(exist PIF/exist MMWWF)*new MMWWF
PI I/I	2.02	2.29	2.60	2.96	3.36	PIF-base sewage (wet) - baes infiltration


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

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

Yachats Water Use 2001/2002

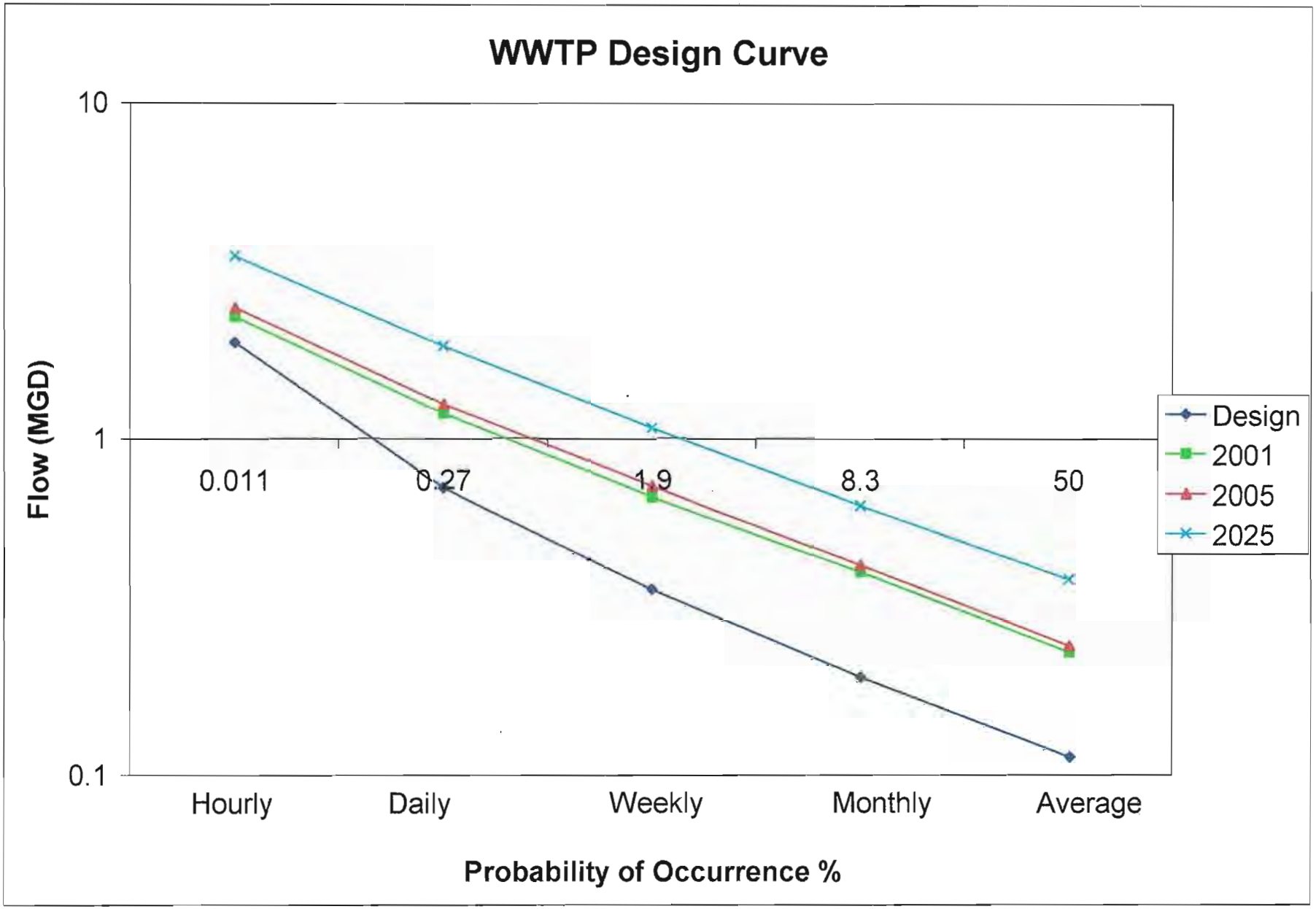
		July	August	September	October	November	December	January	February	March	April	May	June	Winter Avg
City Accounts		107523	31500	31400	*22000*	*44000*	*55000*	58500	40200	30700	38300	40100	55500	41,163
Residential		262593	269304	159053	194042	194755	129994	209856	135382	123024	158200	149015	234520	161,784
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

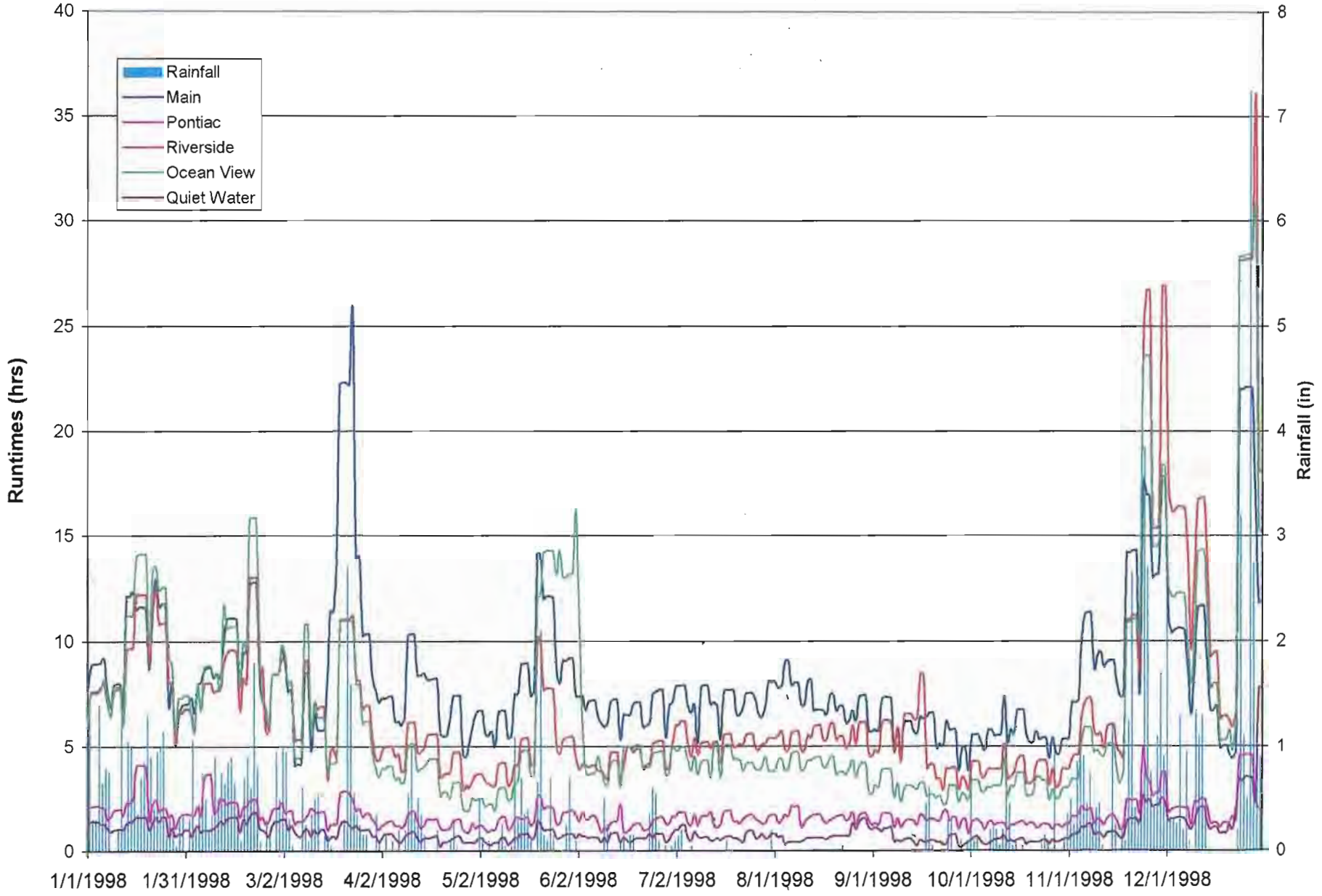
Filter Press Operating Costs		
Gallons of Sludge per year (future)		436,533
% solids		2%
Pounds of dry solids per year		69,845
Pounds of dry solids per week		1,343
Weeks of no disposal site		26
Equipment Capital Cost	$	100,000
Energy use (kW)		0.75
Feed rate (lb/hr)		400
Water use (gpm)		17
Annual Hours 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


WWTP Design Curve
10
1
0.1
Flow (MGD)
0.011
0.27
1.9
8.3
50
Hourly
Daily
Weekly
Monthly
Average
Probability of Occurrence %
Design
2001
2005
2025

The City of Yachats

Pump Run Times Vs. Daily Rainfall



Appendix

D

Cost Estimates

Estimated Cost to Line Piping for I/I Rehabilitation

(Part 1)

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 23,100	$ 23,100
2	Demolition & Site Preparation	LS	All	$ 15,400	$ 15,400
3	By-Pass Pumping	LS	All	$ 12,000	$ 12,000
4	8" Sewerpipe Lining	LF	1,368	$ 32	$ 43,776
5	10" Sewerpipe Lining	LF	1,132	$ 40	$ 45,280
6	Lateral Reinstatement	EA	71	$ 400	$ 28,400
7	Lateral Replacement	LF	1,400	$ 35	$ 49,000

Construction Subtotal		**$ 216,956**
Contingency		$ 20,000
Engineering		$ 35,000
Administration		$ 5,800
Permit Fees		$ 350
Project Total	$ 285,058.65	**$ 278,106**

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	$ 30,000	$ 30,000
2	Demolition & Site Preparation	LS	All	$ 20,000	$ 20,000
3	Temporary controls & Pumping	LS	1	$ 15,000	$ 15,000
4	Decommission Old Pump Station & Wet-Well	EA	1	$ 10,000	$ 10,000
5	New Wet Well	EA	1	$ 15,000	$ 15,000
6	Fencing	EA	1	$ 10,000	$ 10,000
7	Extend adjacent gravity sewers	EA	1	$ 5,000	$ 5,000
8	10 HP submersible Pumps	EA	2	$ 15,000	$ 30,000
9	Piping & Valves	LS	1	$ 18,000	$ 18,000
10	Stucture	SF	200	$ 100	$ 20,000
11	Electrical	LS	1	$ 12,000	$ 12,000
12	Controls & Telemetry	LS	1	$ 20,000	$ 20,000
13	Hoist & Rails	EA	2	$ 2,500	$ 5,000
14	Site Landscaping	LS	1	$ 2,500	$ 2,500
15	Generator	EA	1	$ 40,000	$ 40,000

	Construction Subtotal	**$ 252,500**
	Contingency	$ 38,000
	Engineering	$ 46,000
	Land Acquisition	$ 40,000
	Administration	$ 7,500
	Permit Fees	$ 1,000
$ 414,603	**Project Total**	**$ 385,000**

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	$ 15,000	$ 15,000
4	Decommission Old Pump Station & Wet-Well	EA	1	$ 10,000	$ 10,000
5	New Wet Well	EA	1	$ 15,000	$ 15,000
6	Fencing	EA	1	$ 10,000	$ 10,000
7	Extend adjacent gravity sewers	EA	1	$ 5,000	$ 5,000
8	10 HP submersible Pumps	EA	2	$ 15,000	$ 30,000
9	Piping & Valves	LS	1	$ 18,000	$ 18,000
10	Stucture	SF	200	$ 100	$ 20,000
11	Electrical	LS	1	$ 15,000	$ 15,000
12	Controls & Telemetry	LS	1	$ 20,000	$ 20,000
13	Hoist & Rails	EA	2	$ 2,500	$ 5,000
14	Site Landscaping	LS	1	$ 2,500	$ 2,500

	Construction Subtotal	**$ 207,000**
	Contingency	$ 31,000
	Engineering	$ 38,000
	Land Acquisition	$ 40,000
	Administration	$ 6,210
	Permit Fees	$ 1,000
$ 348,062	**Project Total**	**$ 323,210**

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	$ 29,760	$ 29,760
2	Demolition & Site Preparation	LS	All	$ 29,760	$ 29,760
3	Temporary controls & Pumping	LS	1	$ 5,000	$ 5,000
4	Preconstuction Feasibility Exploration	LS	1	$ 20,000	$ 20,000
5	Tie to Existing Stations	EA	2	$ 2,500	$ 5,000
6	6" Force Main Under River	LF	790	$ 200	$ 158,000
7	Remove Old Force Main	LF	790	$ 10	$ 7,900
8	Site Landscaping	LS	1	$ 2,500	$ 2,500

Construction Subtotal		**$ 257,920**
Contingency		$ 38,688
Engineering		$ 46,426
Legal		$ 20,000
Administration		$ 7,738
Permit Fees		$ 2,000
$ 401,433.81	**Project Total**	**$ 372,771**

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	$ 13,425	$ 13,425
2	Demolition & Site Preparation	LS	All	$ 8,950	$ 8,950
3	Temporary controls & Pumping	LS	1	$ 5,000	$ 5,000
4	Tie to Existing Stations	EA	2	$ 2,500	$ 5,000
5	Existing Manhole Drop & Rehab	EA	1	$ 2,500	$ 2,500
5	6" Force Main Under Bridge	LF	200	$ 200	$ 40,000
6	6" Force Main Direct Bury*	LF	600	$ 50	$ 30,000
7	Asphalt Repair	LF	100	$ 20	$ 2,000
8	Site Landscaping	LS	1	$ 5,000	$ 5,000

Construction Subtotal		**$ 111,875**
Contingency		$ 11,188
Engineering		$ 20,138
Legal		$ 5,000
Administration		$ 3,356
Permit Fees		$ 2,000
$ 165,363.29	**Project Total**	**$ 153,556**

* Assumes gravity flow from MH G-2 to Riverside PS.
Add 645 feet and $50,000 if Forcemain continues to Riverside PS.

New Effluent Meter

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 1,800	$ 1,800
2	Demolition & Site Preparation	LS	All	$ 1,200	$ 1,200
3	0-5 MGD Mag Meter	EA	1	$ 7,000	$ 7,000
4	Piping & Connections	LS	1	$ 2,000	$ 2,000
5	Electrical	LS	1	$ 1,500	$ 1,500
6	Wiring to control panel	LS	1	$ 1,500	$ 1,500

Construction Subtotal	**$ 15,000**
Contingency	$ 2,250
Engineering	$ 3,000
Administration	$ 500
Project Total	**$ 20,750**

New Headworks

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 49,300	$ 49,300
2	Demolition & Site Preparation	LS	All	$ 32,900	$ 32,900
3	Bypass Pumping	LS	All	$ 2,000	$ 2,000
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	$ 500	$ 125,000
7	Piping & Connections	LS	1	$ 25,000	$ 25,000
8	Electrical	LS	1	$ 10,000	$ 10,000
9	Roof, Metal Work & Railings	LS	1	$ 15,000	$ 15,000
10	Relocate & Extend Influent Force Main	LS	350	$ 75	$ 26,250

Construction Subtotal	**$ 410,450**
Contingency	$49,300
Engineering	$73,900
Administration	$8,300
Project Total	**$ 541,950**

UV Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 9,100	$ 9,100
2	Demolition & Site Preparation	LS	All	$ 6,100	$ 6,100
3	UV treatment equip & controls	EA	4	$ 32,000	$ 128,000
4	UV channel	EA	2	$ 10,000	$ 20,000
5	Excavation & Backfill	YD	30	$ 30	$ 900
6	Manhole	EA	1	$ 3,500	$ 3,500
7	Piping & Connections	LS	165	$ 110	$ 18,150
8	Fill Existing Chlorine Channel	YD	133	$ 35	$ 4,655
9	Electrical	LS	1	$ 10,000	$ 10,000
10	Water level control	LS	2	$ 1,500	$ 3,000

Construction Subtotal	**$ 203,405**
Contingency	$30,600.00
Engineering	$36,700.00
Administration	$6,200.00
Project Total	**$ 276,905**

Chlorine Disinfection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 13,700	$ 13,700
2	Demolition & Site Preparation	LS	All	$ 9,100	$ 9,100
3	Chrlorine Treatment Equipment	EA	1	$ 5,000	$ 5,000
4	Chlorine Contact Chamber	EA	1	$ 40,000	$ 40,000
5	Piping & Connections	FT	125	$ 110	$ 13,750
6	Chlorine Piping	FT	100	$ 25	$ 2,500
7	Manhole	LS	1	$ 3,500	$ 3,500
8	Electrical	LS	1	$ 2,000	$ 2,000
9	New Chlorine Room	SF	180	$ 150	$ 27,000
10	Excavation & Backfill	YD	75	$ 30	$ 2,250

Construction Subtotal	**$ 118,800**
Contingency	$17,900.00
Engineering	$21,400.00
Administration	$3,600.00
Project Total	**$ 161,700**

Biosolids Filter Press

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Const. Facilities & Temporary Controls	LS	All	$ 16,350	$ 16,350
2	Demolition & Site Preparation	LS	All	$ 10,900	$ 10,900
3	Manure Spreader	EA	1	$ 3,500	$ 3,500
4	400 lbs/hr Belt Press	EA	1	$ 100,000	$ 100,000
5	Piping & Connections	LS	1	$ 5,000	$ 5,000
6	Electrical	LS	1	$ 2,500	$ 2,500
7	Mounting Slab in Sludge Beds	LS	1	$ 1,500	$ 1,500

Construction Subtotal	**$ 139,750**
Contingency	$16,800.00
Engineering	$25,200.00
Administration	$4,200.00
Project Total	**$ 185,950**

Appendix

E

Biosolids Analysis

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
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

$\frac{50 \times 55 = 859}{3.2}$ lbs/acre/yr $\frac{50X45 = 750}{3.0}$ 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

...of
...ng Water
...te Water
...ustrial Chemicals
• Solid Waste
• Bacteriology

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
Client 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

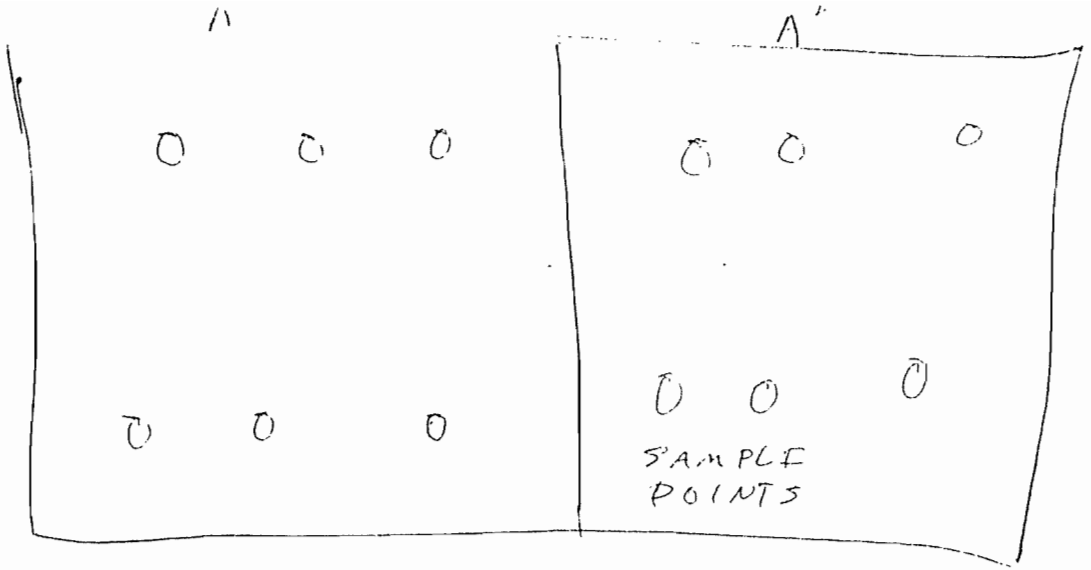
BIOSOLIDS ANALYSIS

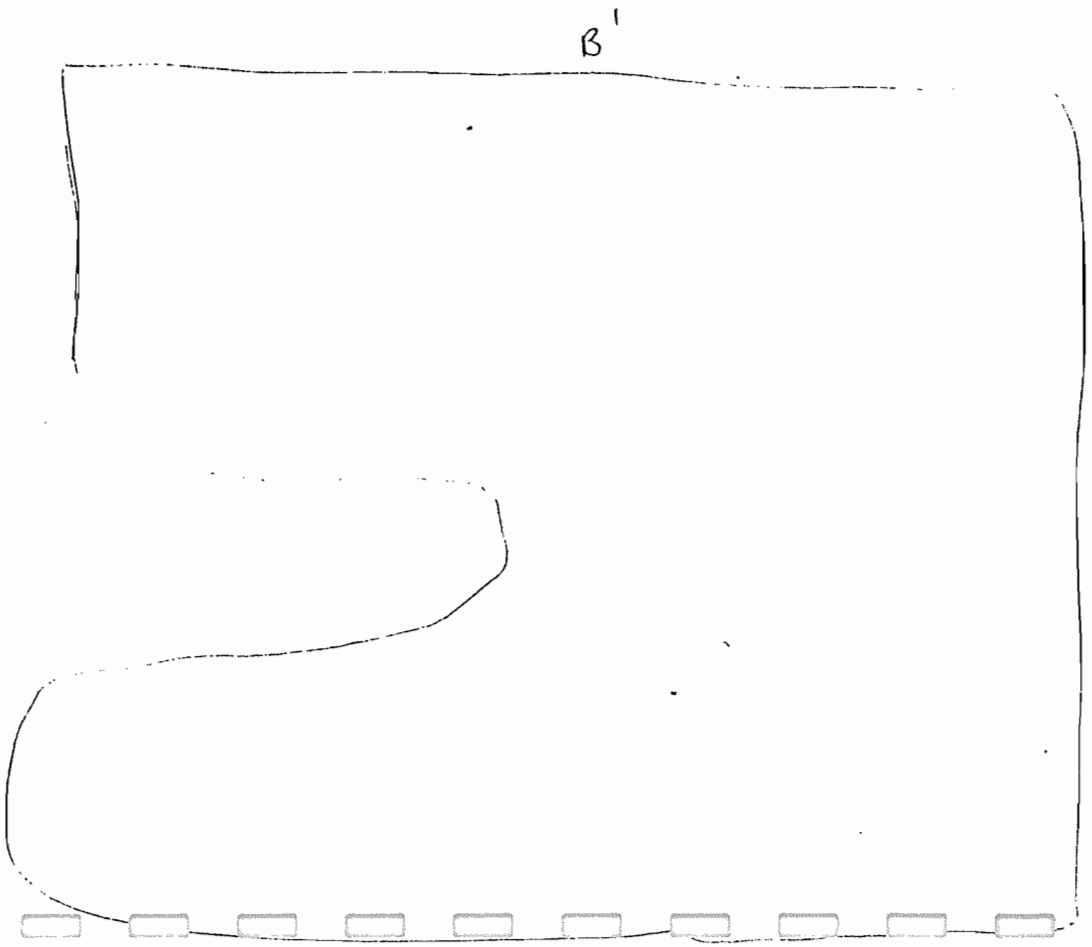
PARAMETER	METHOD	DATE ANALYZED	RESULTS
...rsenic (Total)	EPA 7062	JH/RJ 8/25/99	ND @ 5.0 mg/kg dry weight
...admium (Total)	EPA 213.2/713	JH/RJ 8/16/99	2.7 mg/kg dry weight
Chromium (Total)	EPA 218.2/7191	JH/RJ 8/18/99	13.4 mg/kg dry weight
...opper (Total)	EPA 220.1/7210	JH/JW 8/14/99	423 mg/kg dry weight
Lead (Total)	EPA 239.2/7421	JH/RJ 8/24/99	24.7 mg/kg dry weight
...ercury (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
...ickel (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
...otal 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

COPY MAILED 9/1/99

ND means "not detected"

APPROVED _____ DATE 9/1/99





5A [illegible] acres
5B 28.3 acres
Jim Fleisher 14-11-34

AGRICULTURAL APPLICATION SITE LOG

Site Name Fleschor, Jim Site Acreage 94.36

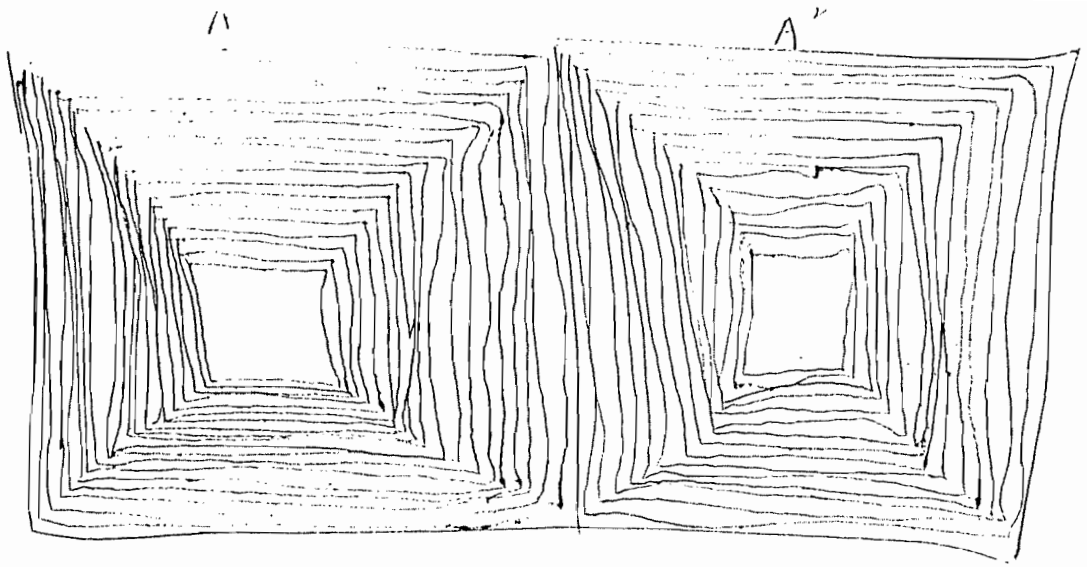
Site Location T 14 ; R 11 ; Sec. 34 WM County Lincoln NPDES/WPCF No. 160312

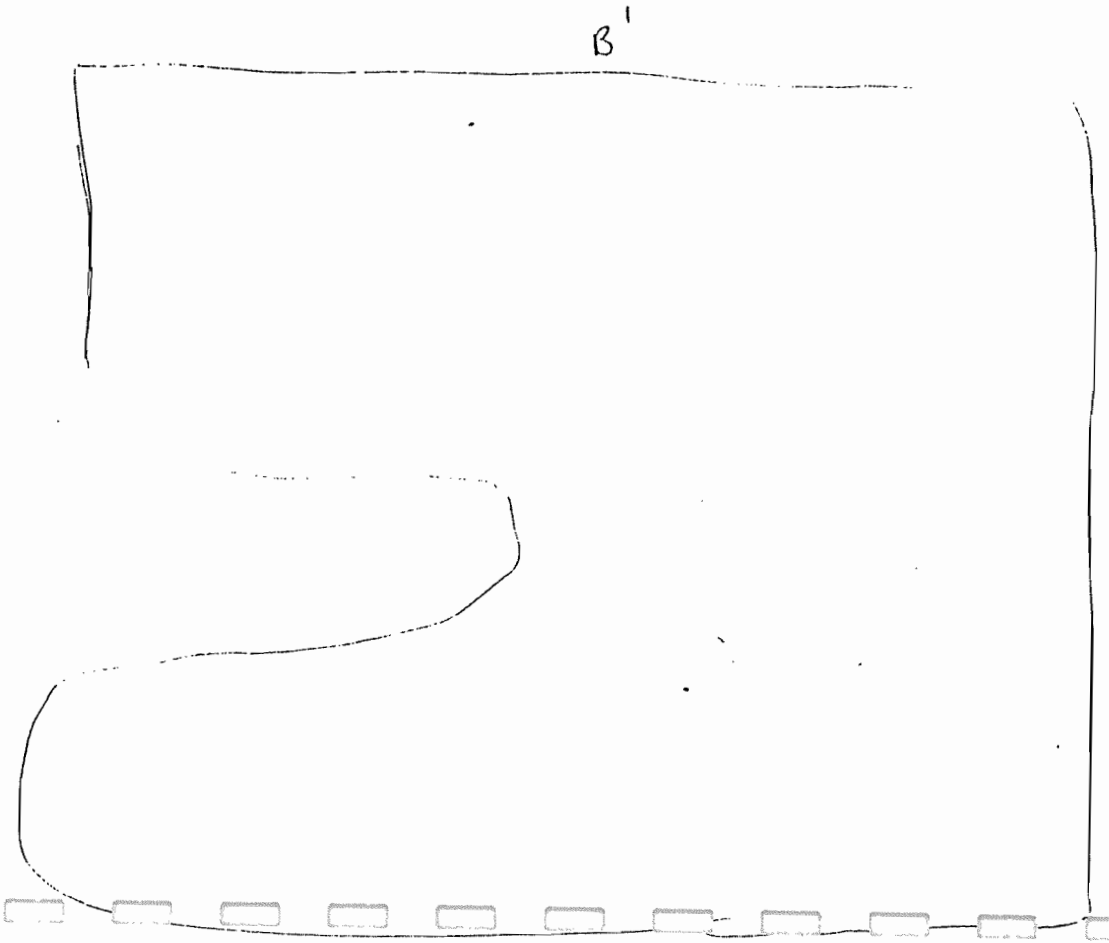
Ultimate Site Loading _____ Dry Tons/Acre (Based on the 8-22-00, ___ sludge chemical analysis with the following metal being the limiting parameter ___ _____).

438 [(Gallons x 0.0125 % Solids x 8.34) / 2000 lbs/ton = Dry Tons] 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	12.1	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	12.5	438	1	12.9	11-16-00	5A2
5A1	438	1	9-7-00	12.2	876	2	12.8	11-17-00	5A2
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	5A1
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	1	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	10-6-00	12.8					
5A2	438	1	10-6-00	12.8					
5A2	438	1	10-7-00	12.1					
5A2	438	1	10-7-00	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





SA1	6-26-00	3000 6/s
SA1	6-27-00	3000 6/s
SA1	6-23-00	3000 6/s
SA1	6-22-00	3000 6/s
SA1	6-28-00	3000 6/s
SA1	6-29-00	3000 6/s
SA1	7-5-00	3000 6/s
SA2	7-12-00	3000 6/s
SA2	7-13-00	3000 6/s
SA2	7-14-00	3000 6/s
SA2	7-18-00	3000 6/s
SA2	7-19-00	3000 6/s
SA2	7-20-00	3000 6/s
SA1	7-24-00	3000 6/s
SA1	7-26-00	3000 6/s
SA1	7-27-00	3000 6/s
SA1	7-28-00	3000 6/s
SA2	8-3-00	3000 6/s
SA1	8-8-00	3000 6/s
SA1	8-9-00	3000 6/s
SA1	8-16-00	3000 6/s
SA1	8-14-00	3000 6/s
SA2	8-17-00	3000 6/s
SA2	8-18-00	3000 6/s
SA2	8-23-00	3000 6/s
SA2	8-24-00	3000 6/s
SA2	8-25-00	3000 6/s
SA2	8-26-00	3000 6/s
SA2	8-28-00	3000 6/s
SA1	9-6-00	3000 6/s
SA1	9-7-00	3000 6/s
SA1	9-8-00	3000 6/s

Calculation of Required Digester Space
Yachats Wastewater Master Plan

Parameter	Current Operation		Basis
Year	2001	2025	
AWWF, MGD	0.23	0.38	
ADWF, MGD	0.14	0.28	
Average Flow, MGD	0.185	0.33	
Ave. Month BOD Loading, ppd	201	364	
Max. Month BOD Loading, ppd	443	803	Design BOD - max. month
Design Month BOD Loading, ppd	206	364	
Effluent BOD, mg/l	6	8	
Sludge Yield	0.75	0.75	Assumed yield
Amount of Sludge Produced, ppd	147.6	256.5	
Solids Fraction	0.005	0.005	
Volume of Sludge Produced, gpd	3539	6151	
% Volatile Solids	75	75	Based on current average
Volatile Solids Loading	110.7	192.4	
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	18000	18000	
SS in Supernatant	0	0	
Average SS in Digester	12600	12600	70% of thickened solids
Material Retained in Digester	0.22	0.19	
Material Leaving as Supernatant	0.78	0.81	
Required Tank Volume, MG	0.0666	0.1025	
Required Tank Volume, gallons	66,558	102,513	
Required Tank Volume, ft3	8898	13705	
Mass of Digester Sludge, lb/d	117	180	
Volume of Digester Sludge, gpd	777	1196	
Separate Calculation of Required Tankage			
Thickened SS, mg/l	18000	18000	
Required Tank Volume, ft3	7884	13705	
Required Tank Volume, gallons	58,976	102,513	
Calculated Gallons/Yr sludge	283,427	436,533	
Actual gallons/Yr sludge	297,000		
Existing Tank Volume	82,811		

Appendix

F

Grease Reduction Information

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.

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

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

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): _____

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.

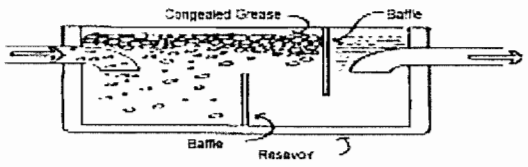
Large amounts of oil and grease in the waste water can cause sewer lines to clog, sewer lift station failures, wastewater treatment plant problems and environmental concerns.

Grease is one waste that the sewer system cannot handle and therefore needs to be kept out of the system.

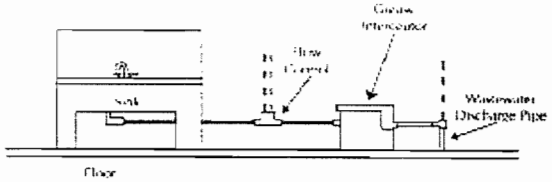
Grease trap (interceptor)

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.

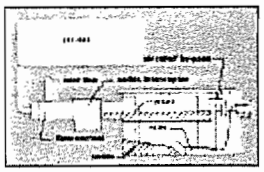
Outside traps should be inspected monthly.

- 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.

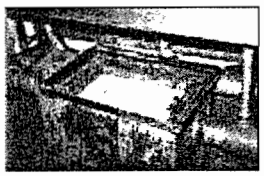
Grease Trap Guidelines

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

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.

FAIRVIEW SEWER & WASTE MANAGEMENT

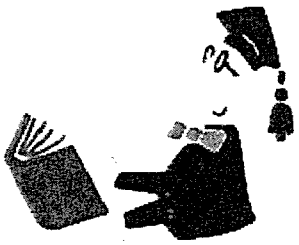
Sewage disposal is provided by a system of sewer pipes and lift stations for certain part of the city. All sewage flows to a series of five total retention lagoon ponds located northeast of the city.

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

Getting To Know Us

Understanding Sewers
- Pipes Beneath Your Feet
- Sewer Backups
- Avoid Sewer Problems
- New Sewer Interceptors
- Upgrading Sewers

Stormwater Savvy (& Drinking Water Too!)

All About Wastewater

Environmental Action

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

About MCSE
Wastewater Bill
Locations
Service Information
Helpful Tips
HOME

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:

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

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.

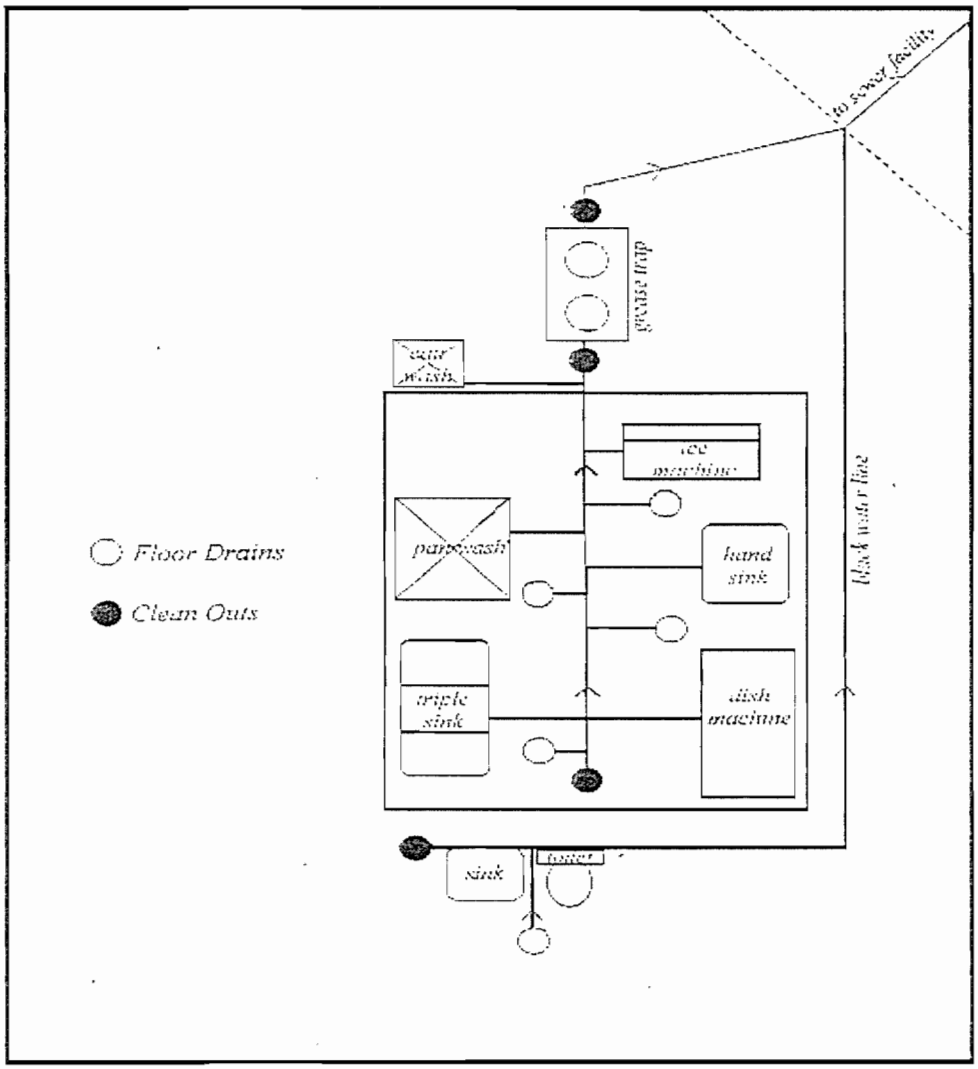
PROPERTIES OF COMMON FATS AND OILS

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.

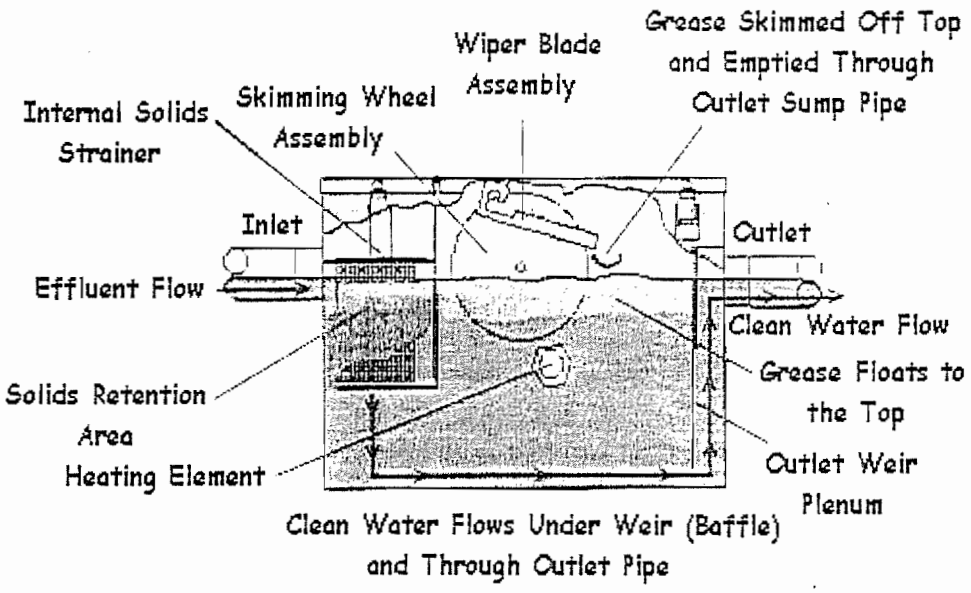
C. TYPICAL GREASE WASTE LINE FLOOR DIAGRAM

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.



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.

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.

Or

Write to us at:

Miami-Dade County - DERM
Grease Discharge Program
33 S.W. 2nd Avenue, Suite 500
Miami, Florida 33130-1540