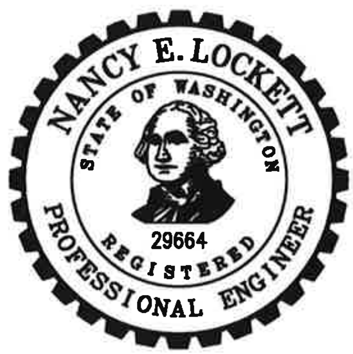
CITY OF ILWACO

PACIFIC COUNTY WASHINGTON

WASTEWATER FACILITY PLAN AMENDMENT



G & O NO. 99540

NOVEMBER 2001

Gray & Osborne, Inc.
CONSULTING ENGINEERS
701 DEXTER AVENUE NORTH SUITE 200
SEATTLE, WASHINGTON 98109 • (206) 284-0860

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CITY OF ILWACO

WASTEWATER FACILITY PLAN AMENDMENT

SECTION 2 – PURPOSE OF PROJECT

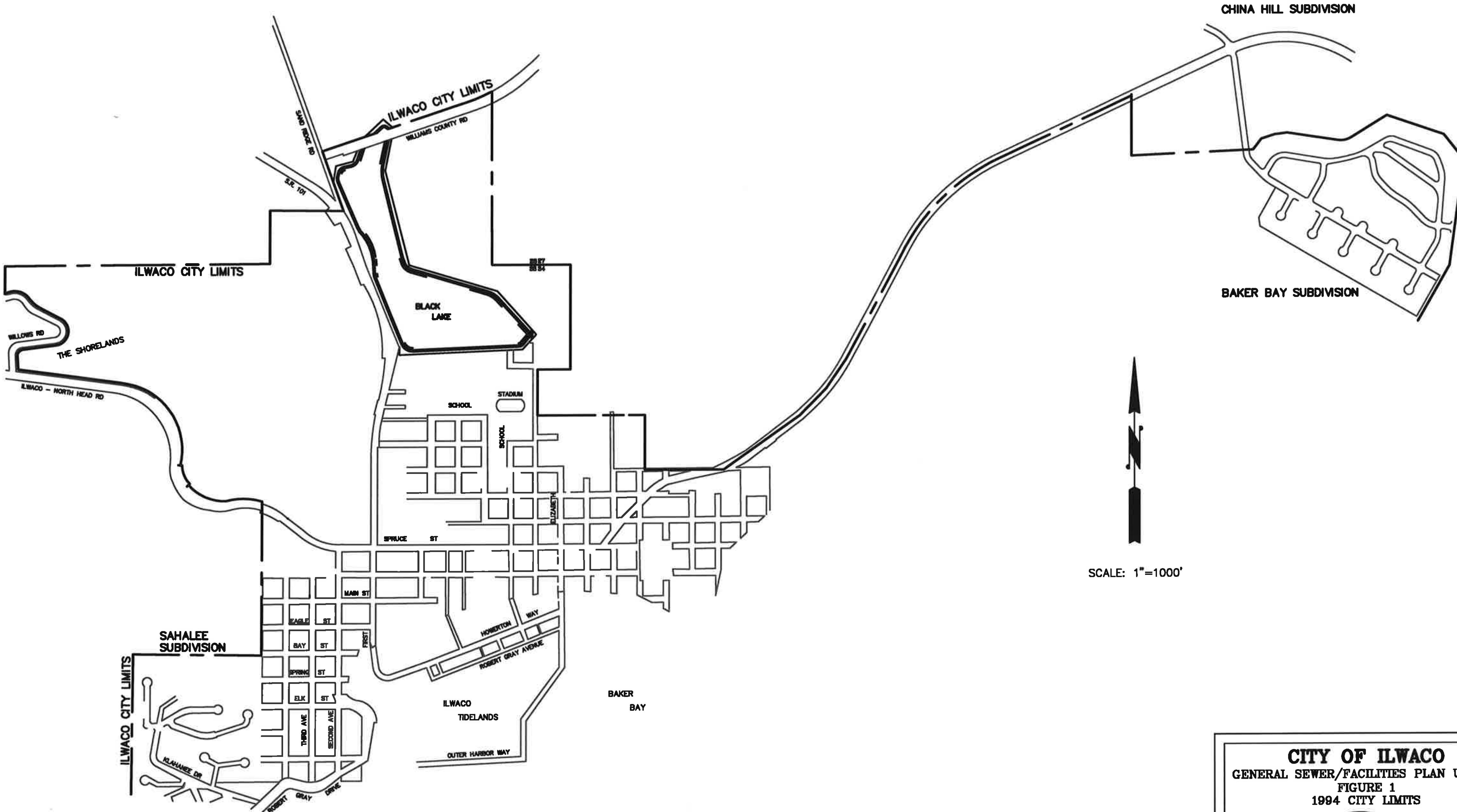
INTRODUCTION

The service area for the City of Ilwaco Wastewater Facility Plan, dated April 1994, included the area within the 1994 City limits and the Seaview Sewer District. The City completed the construction of a sequencing batch reactor (SBR) wastewater treatment plant in 1999. The Facility Plan assumed that the WWTP would be designed for a 20 year planning horizon from the 1993 population of the service area. The population in the service area was estimated to grow by 12.5% during the 20 year planning period. The service area covered by the 1994 Plan is shown in Figures 1 and 2.

The permanent and seasonal population of the study area was developed from census data for the City of Ilwaco, wastewater billing information from Seaview and dwelling occupancy ratio estimates from the Office of Financial Management. The 1990 permanent population of Ilwaco and Seaview was estimated to be 1,619 (Ilwaco - 880 and Seaview Sewer District - 739). The 1994 Plan determined the seasonal and permanent population based on 1990 census data, sewer hook-up data, and occupancy estimates. Seasonal population was estimated to be 60.6% of the permanent population. It was determined that the permanent and seasonal population of the combined City of Ilwaco and Seaview Sewer District in 1993 was 2,670. The estimated permanent and seasonal population in the year 2013, the design year, was 2,992.

The permanent and seasonal population can be equated to ERUs, however, to do this the two populations must be handled separately. The permanent population can be assumed to be equated directly to ERUs by dividing population by the OFM estimate of persons per household. In the 1994 Plan a seasonal multiplier was used to equate seasonal population to full-time population. The 70% multiplier used, meant that the seasonal population contributed 70% of the load expected from a permanent resident. However, the hook-ups (ERUs) for seasonal homes, motels/hotels, RV parks, etc. were in place to provide service to this population. The ERUs attributable to seasonal population can be determined by dividing the seasonal population by the OFM estimate of persons per household and adjusting by the 70% seasonal multiplier. Based on the 1994 Plan population estimates the number of ERUs based on seasonal and permanent population projections increased by 176 during the planning period.

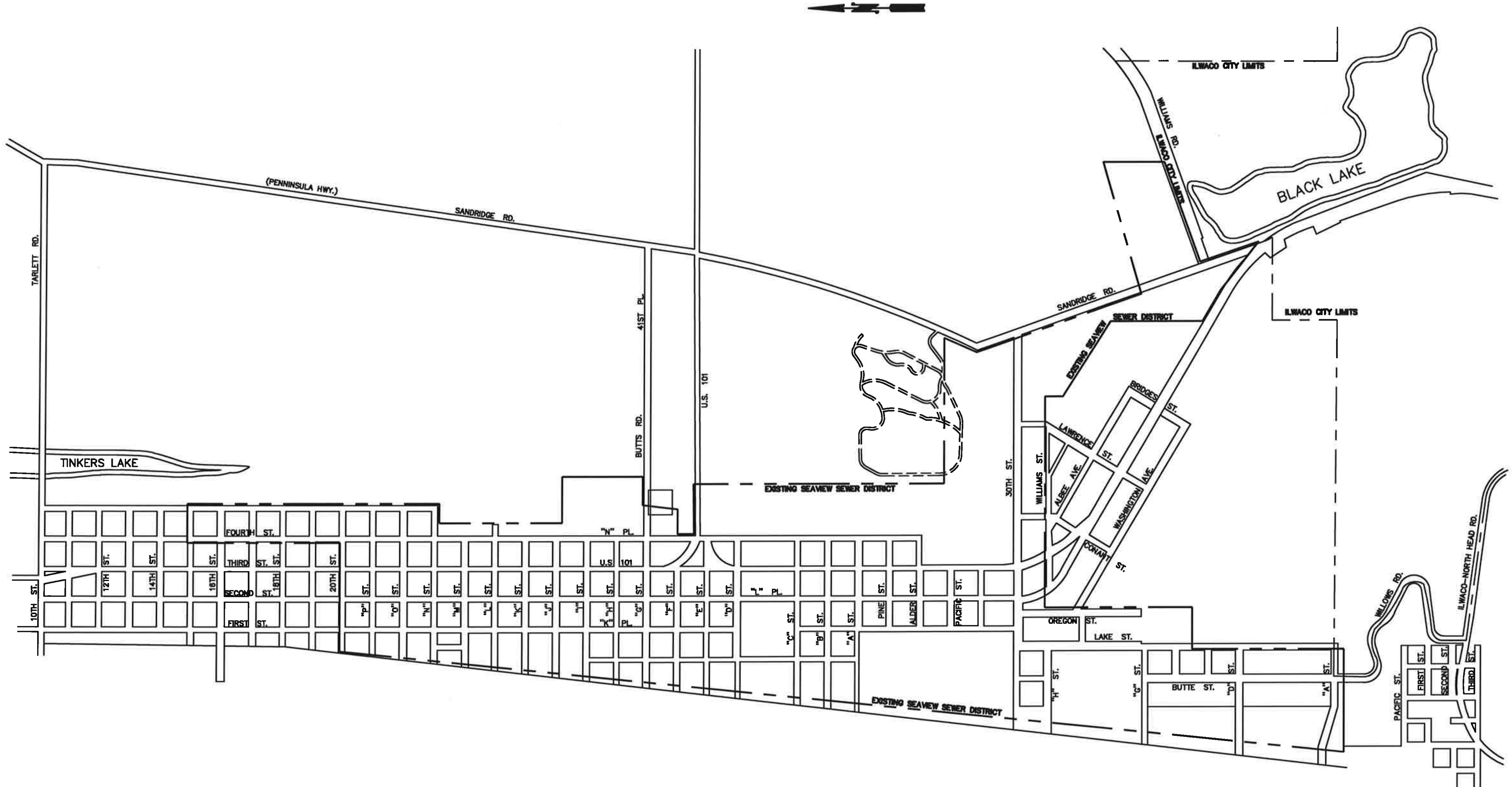
The City of Ilwaco and the Seaview Sewer District reported a total of 272.6 ERUs attributed to commercial uses, i.e., businesses, schools, and hospital (Chapter 11, 1994 Plan). The 1994 Plan flow projections were based on population and assumed the flow



CITY OF ILWACO
GENERAL SEWER/FACILITIES PLAN UPDATE
FIGURE 1
1994 CITY LIMITS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\Figure-1.dwg, 4/30/2018 10:26 AM, PHILIP MARSHALL



CITY OF ILWACO

FIGURE 2

GENERAL SEWER/FACILITY PLAN UPDATE

1994 SEAVIEW SEWER DISTRICT

DISTRICT LIMITS

Gray & Osborne, Inc.

CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\Figure-1.dwg, 4/30/2018 10:26 AM, PHILIP MARSHALL for the commercial ERUs would grow at the same rate as the population. However, if the capacity of the WWTP is to be based on ERUs, the growth of commercial ERUs during the planning period should be taken into account. Assuming the same growth rate as population from 1993 to 2013 (12.5%) the increase in commercial ERUs is estimated to be 34 ERUs. Although the projected increase in flow and loading to the WWTP during the planning period was not based on ERUs, the total increase of ERUs during the planning period can be estimated to be approximately 210, based on the information given above (176 permanent and seasonal ERUs and 34 commercial ERUs). The City has allowed 23 connections within the City since 1994. At this time the City does not know how many connections have been added in Seaview since 1994. However, based on the minimal number of new construction projects within the Seaview Sewer District since 1994, it is assumed the number of new connections in Seaview does not exceed the number in Ilwaco. Therefore, there should be capacity available for approximately 164, or more, connections in the existing WWTP.

The City annexed three parcels totaling approximately 482 acres in 1998. Two properties, the 350 acre Columbia Highlands property and the 98 acre Realvest property are located on the west end of the City. These two properties will be referred to jointly as the west annexation area. The Columbia Highlands and Realvest properties are zoned for residential and commercial use. The build-out development expected at these two properties is approximately 585 residential lots and some commercial properties consisting mainly of hotels and restaurants. The third annexation, zoned for residential development, was a 32 acre parcel to the north of the City. It is expected that this property will be developed on septic systems, as had been approved by Pacific County prior to annexation. All three annexation areas were outside of the sewer service area described in the 1994 Wastewater Facility Plan.

Fort Canby State Park operates a sewage lagoon which treats the wastewater generated from the State Park and the Coast Guard Station at Cape Disappointment. The State Park is evaluating the feasibility of abandoning the sewage lagoon at the park and pumping the wastewater from the State Park and the Coast Guard Station to the City of Ilwaco for treatment and disposal. Providing wastewater treatment to Fort Canby and the Coast Guard station may need to be done on an emergency basis if the existing lagoon at Fort Canby becomes unusable. The Growth Management Act allows the City to extend urban governmental services, such as sewer service, outside of the City's urban growth area "in those limited circumstances shown to be necessary to protect basic public health and safety and the environment and when such services are financially supportable at rural densities and do not permit urban development" (RCW 36.70A.110(4)).

This Plan Amendment has been prepared to address the wastewater conveyance and treatment facilities which will be required to provide wastewater treatment and disposal to the annexation area and the State Park and Coast Guard Station. The revised service area, including the current City limits, the Seaview Sewer District limits, Fort Canby State Park and the Cape Disappointment Coast Guard Station are shown in Figure 3.

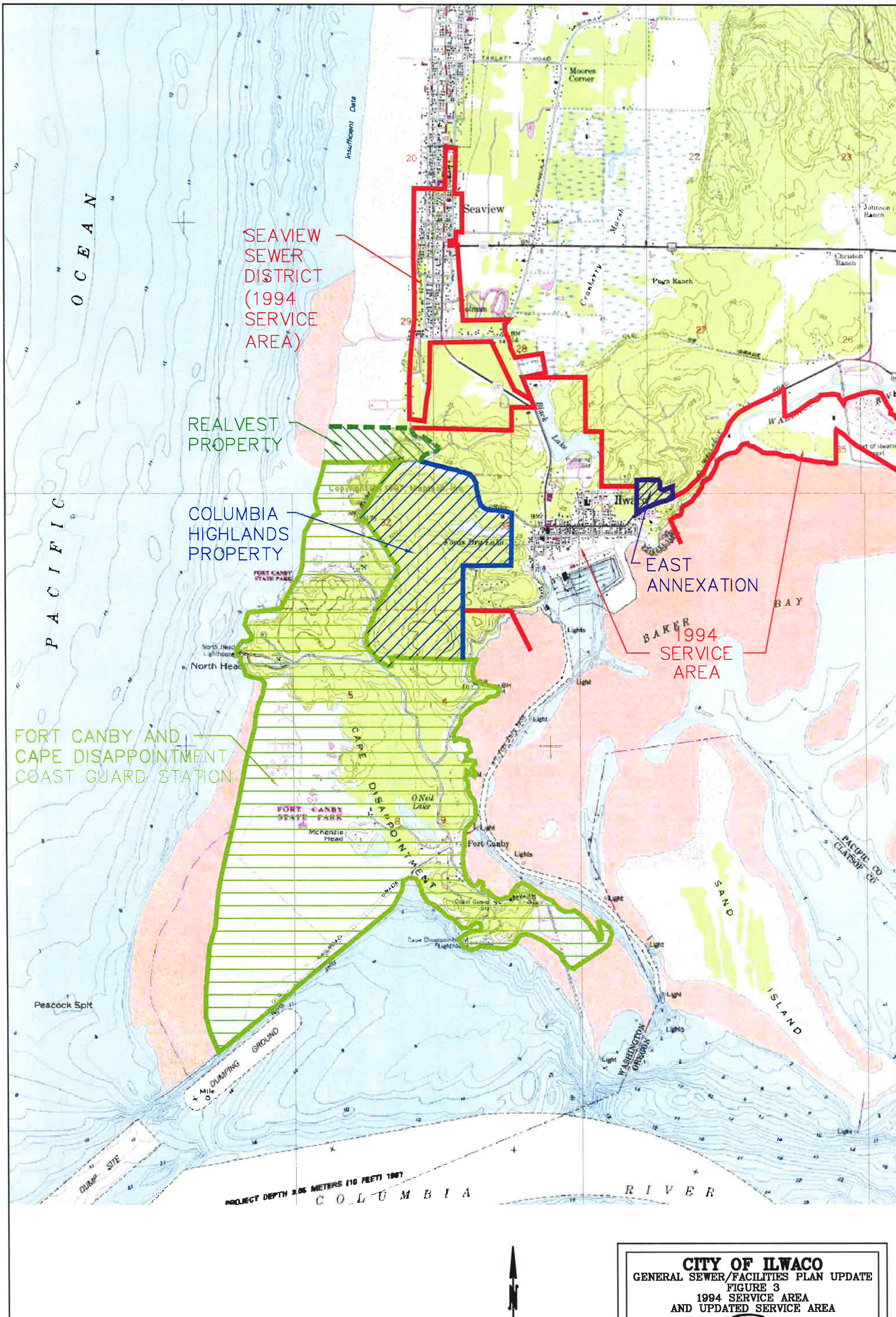
The Plan Amendment will be organized similarly to the Facility Plan. Where modifications to information presented in the Facility Plan are necessary it will be provided.

SERVICE AREA AMENDMENT

Per the City's NPDES permit, the City must submit written notice to the Department of Ecology whenever any new discharge or increase in volume or change in character of an existing discharge into the sewer is proposed which is not part of an approved general sewer plan or approved plans and specifications. The notice must include an evaluation of the system's ability to adequately transport and treat the added flow and/or wasteload.

This Wastewater Facility Plan Amendment will project population and wastewater flow for the annexation area, State Park and Coast Guard Station. The Plan Amendment will evaluate conveyance and treatment capacity requirements needed to meet the projected wastewater flow.

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG3.dwg, 4/30/2018 10:25 AM, PHILIP MARSHALL



CITY OF ILWACO
GENERAL SEWER/FACILITIES PLAN UPDATE
FIGURE 3
1994 SERVICE AREA
AND UPDATED SERVICE AREA

Gray & Osborne, Inc.
CONSULTING ENGINEERS

SECTION 3 – GENERAL DESCRIPTION

The annexation areas are made of three properties, approximately 350 acres owned the MSW partnership which is called the Columbia Highlands, approximately 98 acres owned by Realvest Corporation and approximately 32 acres to the northeast of the downtown area. The annexation areas are shown in Figure 3. The west annexation area is immediately west of the previous City limits. The west annexation area elevation extends from sea level at the western most portion of the annexation area to approximately 350 ft.

The west annexation area is zoned for residential and commercial use. Current projections for land use include approximately 585 single family dwellings and condominium units, 112 hotel units and 50 transient cabins, restaurants, golf club house and small retail shops. Approximately 8 residential units are expected to develop on the northeast annexation property. These residences will be served by on-site septic systems. Wastewater production estimates for this level of development are presented in Chapter 4.

Fort Canby State Park and US Coast Guard Station are located at the southern region of Cape Disappointment, approximately 3 miles south of the Ilwaco wastewater treatment plant. The State Park attracts approximately 1 million visitors annually. The Coast Guard Station is a military facility with approximately 125 employees, a limited amount of residential housing and a minimal number of visitors.

SECTION 4 – POPULATION AND LAND USE

An estimate of the population of the service area was developed in the 1994 Facility Plan using an estimate of the permanent population and seasonal population. This Plan Amendment will simply develop estimates of population growth for the next 20 years based on ERU connections to the wastewater system.

The estimated number of permanent and seasonal population served by the treatment plant in the year 2013 per the 1994 Facility Plan was 2,992. The estimated growth for the facilities planned in the 1994 Facility Plan was 12.5% for the years 1993 - 2013. The per capita flow and organic load estimates used in the 1994 Plan included an allowance for the commercial uses in the City of Ilwaco and Seaview Sewer District. Therefore, an analysis of the ERUs remaining in the WWTP should also include the commercial ERUs, which are carried along with the population estimates. A breakdown of the residential, hotel/motel, RV Park commercial, schools and hospital ERUs is given in Chapter 11 of the 1994 Plan The 1994 Plan identified 272.6 commercial based ERUs, i.e., business, schools, churches, hospital, in the combined City of Ilwaco and Seaview Sewer District and a total number of ERUs tributary to the WWTP in 1994 of 1,347.6. If it is assumed that commercial growth will occur at the same rate as population growth, an additional 12.5% commercial ERUs should be allotted for growth in commercial ERUs.

The estimated increase in permanent and seasonal population based ERUs from 1993 to 2013 was approximately 168 and the increase in commercial ERUs is approximately 34, or a total minimum capacity for new ERUs of 210.

As discussed in the Facility Plan the OFM predicted rate of growth (OFM Washington State County Population Projections, January 1992), forecasted the percentage increase in population in Pacific County in five year increments for the period 1990 to 2010. The Facility Plan assumed the increase in population from 2010 to 2020 would be at the same rate as the population increase from 2005 to 2010. The OFM projected rate of population increase is shown in the following table (Table 4-3 of the Facility Plan). The 1997 City of Ilwaco Comprehensive Plan, that was written prior to the three recent annexations, assumed the growth rate for the City of Ilwaco to be approximately 2 % per year for the next 20 years. The growth in the west annexation areas is accounted for separately in this plan. However, this plan will also account for growth in the pre-annexation City limits. The growth rate for the pre-annexation areas of the City is assumed to be 1%, a point midway between the OFM projected growth rates and the Comprehensive Plan growth rate. Assuming 1% growth in the pre-annexation areas and the expected population of the west annexation areas, the composite growth rate for the City from 2000 to 2020 is 8.5% per year.

TABLE 4-1

Projected Rate of Population Increase
(Office of Financial Management)

Period	Percent Increase (%/year)
1990-1995	4.46 (0.89)
1995-2000	2.16 (0.43)
2000-2005	2.88 (0.58)
2005-2010	2.96 (0.59)
2010-2015	2.96 (0.59)
2015-2020	2.96 (0.59)

The 1994 Plan contained population projections for the existing service area that did not include the annexation areas. The annexation areas are currently largely undeveloped and existing development in these areas is served by on-site septic systems. The population estimates developed for this plan assume that the developments in the annexation areas will be built out in 10 years. The residential population of the City of Ilwaco will be adjusted to the preliminary information available from the 2000 census, which indicates that the City of Ilwaco population is 950. Washington State Parks and Recreation commission has stated that Fort Canby is fully utilized and the Commission projects no increase in user population in the future (Personal communication, Andy Gerst, P.E., September 1, 2000). The U.S. Coast Guard does not anticipate an increase in the employee or resident population at the Coast Guard Station.

Revised population estimates through the year 2020 are shown in Table 4-2. If development of the annexation areas occurs as projected the population of the City of Ilwaco will triple in the next 20 years.

TABLE 4-2

Service Area Population Projections

Year	City of Ilwaco[(1)]	Seaview Sewer District[(2)]	Coast Guard[(3)]	State Park[(4)]
2000	950	789	125	3,243
2005	1,700	828	125	3,243
2010	2,452	870	125	3,243
2015	2,504	914	125	3,243
2020	2,559	960	125	3,243

(1) 2000 census data, 1% per year growth in pre-annexation City limits and build-out in west annexation areas in 10 years.

(2) Based on estimated 1990 estimated permanent population of Seaview Sewer District and projected growth of 1% per year.

(3) Average number of employees and permanent residents. Does not represent an equivalent residential population.

(4) Average number of daily visitors. Does not represent an equivalent residential population.

SECTION 5 – WASTEWATER CHARACTERISTICS

The design criteria for new development in the annexation areas will be based on the criteria presented in Department of Ecology *Criteria for Sewage Works Design*, 1999. These sources should not contribute excessively to the overall infiltration and inflow experienced in the older sections of the City of Ilwaco. The design criteria assigned to the projected new development in the annexation areas is described in Table 5-1.

TABLE 5-1

Design Criteria

Item	Criteria
Average Day Flow/Person	100 gpd (DOE Criteria for Sewage Works Design
Maximum Month/Average Day Flow	1.6 (Water use records and I/I allowance)
Average Day BOD Load	0.2 lb/person/day
Average Day TSS Load	0.2 lb/person/day
Number of Persons/Household	2.36 (OFM, 1991) – Unincorporated Pacific County

The estimated flow and loading from the various land uses for the proposed developments in the Columbia Highlands, and Realvest annexation areas and Fort Canby and the Coast Guard Station are included in Table 5-2. The land use estimates for the Columbia Highlands and Realvest properties were provided by the two landowners. The flow and load estimates for Fort Canby and the Coast Guard Station are taken from the Fort Canby Water and Sewer Feasibility Study, 2001. These estimates were developed based on water use records since reliable metered wastewater use is not available.

In addition to the proposed developments in the recently annexed areas, two developments in the City of Ilwaco are assumed to be built within the next two years. The Kaino development proposes to build 23 residential units. The Williams development proposed to build 8 residential units. The flow contributed by these developments is considered part of the 20-year growth projections for the City.

TABLE 5-2

Estimated Wastewater Flow and Loading for the Annexation Areas

Land Use Component	Flow	BOD_5	TSS
Residential(1)			
500 Units (Columbia Highlands)	118,000 gpd	236 lb/d	236 lb/d
85 Units (Realvest)	20,060 gpd	40 lb/d	40 lb/d
Commercial			
100 Hotel Units (Columbia Highlands)(2)	13,000 gpd	26 lb/d	26 lb/d
Restaurant (Columbia Highlands)(3)	4,000 gpd	16 lb/d	16 lb/d
Proshop and others (Columbia Highlands)(4)	5,000 gpd	10.5 lb/d	10.5 lb/d
12 Hotel Units (Realvest)(2)	1,560 gpd	2.4 lb/d	2.4 lb/d
Cabins (50 units)(Realvest)(5)	11,800 gpd	23.6 lb/d	23.6 lb/d
Fort Canby State Park	16,100 gpd	32 lb/d	32 lb/d
Coast Guard Station	7,400 gpd	15 lb/d	15 lb/d
Average Annual	196,920 gpd	401.5 lb/d	401.5 lb/d
Maximum Month Average Day Flow(6)	327,692 gpd	683 lb/d(8)	683 lb/d(8)
Peak Hourly Flow(7)	738,004 gpd (513 gpm)		

(1) Assume 100 gpcd, 0.2 lb/d/capita BOD & TSS, 2.36 persons per household
(2) Assume 130 gpd/room, 0.26 lb/d/room BOD & TSS
(3) Assume 80 seats, 50 gpd/seat, 0.2 lb/d/seat BOD & TSS
(4) Assume 85% of water use projected by MSW for pro shop and others (Rich Marshall, 5/11/99 and 2/22/01), 250 mg/l BOD & TSS
(5) Assume similar flow and loading as residential unit.
(6) Assumes an ratio of maximum month to average month of 1.6 for annexation areas and 2.2 for Fort Canby and 2.0 for the Coast Guard Station. (Draft Fort Canby Water and Sewer Feasibility Study, 2001)
(7) Assumes a ratio of peak hour flow to average day flow of 3.7 for annexation areas and 4.1 for Fort Canby and the Coast Guard Station..
(8) Assumes 250 mg/l BOD & TSS

Current projections for land use in the west annexation areas include 585 single family dwellings and condominium units, 112 hotel units and 50 transient cabins, restaurants, golf club house and small retail shops. The estimate of wastewater production for this level of development was based on wastewater flow and loading criteria presented in the Department of Ecology *Criteria for Sewage Works Design,* 1999. The DOE recommended flow includes a minimum allowance for I/I. Assuming build-out by the year 2010 the average annual wastewater flow is estimated to be approximately 173,500 gallons/day. The annual average BOD_5 and TSS waste load generated by the west annexation areas is estimated to be approximately 354.5 lb/day BOD_5 and 354.5 lb/day TSS.

The maximum month flow is the average daily flow during the highest flow month of the year. The maximum month to average month ratio is estimated to be 1.6. This ratio was estimated based on the average month/maximum month water use data for the City of Ilwaco. Using this ratio the estimated maximum month flow for the west annexation areas is approximately 277,600 gallons per day and the maximum month BOD_5 and TSS waste load is approximately 579 lb/d, assuming 250 mg/l BOD_5.

The peak hourly flow is the peak sustained flow rate occurring for a one-hour period. The peak hour flow rates are used for design of collection and interceptor sewers, pumping station, flow meters, and physical unit operations such as grit chambers and sedimentation tanks. The peak hourly flow can be estimated by using a peaking factor. The DOE Criteria for Sewage Works Design recommends a peaking factor of approximately 3.7 for basins with populations corresponding to the build-out population of the annexation area. The estimated peak hour flow for the annexation area is approximately 641,950 gallons.

Fort Canby State Park and US Coast Guard Station are located at the southern region of Cape Disappointment, approximately 2 miles south of the Ilwaco wastewater treatment plant. The State Park attracts over 1 million visitors annually and the Coast Guard Station is a military facility with approximately 125 employees, a limited number of permanent residents and a minimal number of visitors. The Fort Canby Water and Sewer Feasibility Study estimated the joint average annual wastewater flow projections for 2020 based on population projections provided by State Parks and the Coast Guard and water use records as approximately 23,500 gallons/day. The average annual BOD_5 and TSS waste load generated jointly by the State Park and the Coast Guard is estimated to be 47 lb/day BOD_5 and 47 lb/day TSS. The Fort Canby Water and Sewer Feasibility Study determined that the ratio of maximum month to average annual water use was 2.2 for the Fort Canby and 2.0 for the Coast Guard. This maximum month to average annual ratio was applied to estimated wastewater flow and organic loading from each of the facilities. The estimated maximum month wastewater flow from the combined facilities is estimated to be 50,000 gpd and the maximum month BOD_5 and TSS load is estimated to be 100 lb/day.

The estimated average annual flow for the two proposed developments in the City of Ilwaco, the Kaino (23 residential units) and Williams (8 residential units) developments, is 7,320 gpd, estimated maximum month average day is 11,710 gpd, estimated peak hour flow is 27,090 gallons and the maximum BOD_5 and TSS load is estimated to be 14.6 lb/d.

The total estimate of flow and organic load for the west annexation areas, the two proposed in-City developments and Fort Canby and the Coast Guard Station is approximately 204,240 gallons/day and 416.2 lb/d BOD_5 on an annual average basis and approximately 339,404 gallons/day and 707 lb/d BOD_5 on a maximum month average day basis.

The City of Ilwaco sewer rate ordinance lists equivalent residential unit (ERU) factors for determining the proportional equivalent of various buildings or service connections. Table 5-3 lists the equivalent residential unit factors from the ordinance.

TABLE 5-3

Equivalent Residential Unit Factors

Connection	Residential Equivalent Unit Factor
Single Family Residential	1
Multi-Family Residential Per Unit	1
Hotels & Motels	
Administrative Unit	1
Each Unit Rented as a Transient Unit	0.5
Each Space Rented as a Residential Unit	1
Trailer/RV Parks	
Administrative Unit	1
Each Additional Transient Space	0.5
Each Space Rented as a Residential Space	1
Mobile Home Park	
Administrative Unit	1
Each Mobile Home Space	1
Business- Other those listed above. A connection charge determined by multiplying the total number of equivalent water meter factors for the water service, which contributes to sewer system loadings.	

Since the water meter sizes for the potential businesses in the annexation areas have not been proposed, this report will assume that the number of equivalent residential units which are estimated for future business will be equal to the design criteria for flow for a single family unit, i.e., 2.36 persons/residence and 100 gallons per capita, or 236 gallons. The number of equivalent residential units for a commercial source is determined by dividing the average annual wastewater flow for that source by 236 gallons.

Table 5-4 lists the proposed developments in the west annexation area, the estimated average annual flow and the estimated number of equivalent residential units attributable to each proposed development.

TABLE 5-4

Estimated Average Annual Flow and Equivalent Residential Units for Annexation Areas

Annexation Area	Proposed Development	Average Annual Flow	Equivalent Residential Units
Columbia Highlands	Residential (500 units)(1)	118,000 gpd	500
	Hotel (100 units)(1)	13,000 gpd	51
	Restaurant(3)	4,000 gpd	17
	Proshop and others(3)	5,000 gpd	21
	Total	**140,000 gpd**	**589**
Realvest	Residential (85 units)(1)	20,060 gpd	85
	Hotel (12 units)(1)	1,560 gpd	7
	Cabins (50 units)(3)	11,800 gpd	50
	Total	**33,420 gpd**	**142**
TOTAL ERUs			**731**

(1) Assume 100 gpcd, 0.2 lb/d/capita BOD & TSS, 2.36 persons per household
(2) Assume 130 gpd/room, 0.26 lb/d/room BOD & TSS
(3) Assume 80 seats, 50 gpd/seat, 0.2 lb/d/seat BOD & TSS

The number of ERUs attributable to the Fort Canby and the Coast Guard Station was determined similarly to the commercial flows for the annexation areas. The average annual wastewater flow was divided by 236 gallons, the amount of wastewater expected to be generated per day by a residential unit based on DOE criteria for flow and OFM estimates of the number of residents per unit in the Ilwaco area. The number of ERU attributable to Fort Canby and the Coast Guard was estimated to be 98.

The design flow (maximum month) for the City's WWTP is 700,000 gallons per day. The projected maximum month wastewater flow from the annexation area discussed in this Facilities Plan Amendment (277,500 gallons/day) represents approximately a 40% increase over the current maximum month design capacity of the WWTP. The permitted maximum month BOD_5 load to the WWTP is 630 lb/day. The maximum month wastewater organic load for the year 2020 for the annexation area is estimated to be approximately 579 lb/day, which represents and increase of 92% over the current permitted organic load to the WWTP. Wastewater flow and loading from Fort Canby State Park and the Coast Guard Station would increase the maximum month wastewater flow to the WWTP by approximately 7% and the maximum month BOD_5 and TSS wasteload by approximately 15%.

The current City of Ilwaco WWTP came on-line in November, 1998. The average annual flow from November 1998 to February 2001 is 0.297 million gallons and the average day flow during wet weather (November through March) was 0.394 million gallons. Based on the WWTP records the ratio of average wet weather day to average day is 1.3. The WWTP was in the start-up mode during a winter of exceptionally high rainfall.

The winter of 1998-1999 experienced rainfall that exceeded the average rainfall for the Long Beach Peninsula (based on 32 years of record) by 55%. The historic average amount of rainfall for November through March for the Long Beach Peninsula is 61.32 inches, however, the rainfall for November 1998 through March 1999 was 94.82 inches. The flow records for this period are not the most appropriate for analysis of the capacity remaining in the WWTP. The rainfall for November 1999 through March 2000 was 71.30 inches or approximately 16% over the historic average rainfall for these months. The analysis of the remaining capacity in the WWTP will be based on the flow information from November 1999 through March 2000.

The maximum month average day flow recorded during this period was 0.556 million gallons in December 1999. This maximum month flow will be used to estimate the year 2020 flow for the 1994 City limits and Seaview Sewer District. The estimate will be conservative since rainfall in December 1999 exceeded the historical average for this month by 25%.. The maximum month BOD load in dry weather was 630 lb/d in August, 1999. The average annual flow has been multiplied by the OFM projected growth for 2000 to 2020 to estimate the flow and BOD load for the pre-annexation City of Ilwaco and Seaview Sewer District limits in the year 2020.

The 1994 Plan established a method for projecting future wastewater flow and load based on design criteria of per capita wastewater flow and load extrapolated from treatment plant records. This Plan update will base projected flow and loads on revised per capita flow and loading criteria based on treatment plant records established for the new wastewater treatment plant. The per capita design criteria include an allowance for commercial, school, hospital and other non-residential uses. These criteria will be used for projecting future growth for the population projections for the pre-annexation city limits. The design criteria are listed below.

- Average day flow – 163 gallons per day per capita
- Average day BOD5 load – 0.26 lb per day per capita
- Average day TSS load – 0.19 lb per day per capita
- Maximum month average day flow ratio – 2.0
- Maximum month average day BOD5 ratio – 1.7
- Maximum month average day TSS ratio – 2.2

A summary of the projected flow and organic load for the WWTP in the year 2020 is found in Table 5-5.

TABLE 5-5

Projected 2020 Wastewater Flow and Load

Source	City of Ilwaco and Seaview Sewer District (1994 boundaries)	Annexation Areas	State Park and Coast Guard	Total
Average Annual Flow	340,018 gallons[(1)]	173,500 gallons	23,500 gallons	501,320 gallons
Average Annual BOD_5	542 lb/day	355 lb/day	47 lb/day	944 lb/day
Average Annual TSS	400 lb/day	355 lb/day	47 lb/day	802 lb/day
Maximum Month Average Day Flow	680,036 gallons	277,600 gallons	50,000 gallons	1,007,636 gallons
Maximum Month Average Day BOD_5	921 lb/day	579 lb/day	92 lb/day	1,592 lb/day
Maximum Month Average Day TSS	881 lb/day	579 lb/day	92 lb/day	1,552 lb/day

(1) Assumes 1% growth per year from 2000 to 2020 within the 1994 City Limits and the Seaview Sewer District.

SECTION 6 – EXISTING FACILITIES

CITY OF ILWACO COLLECTION SYSTEM

The Infiltration and Inflow Study prepared as a part of the 1994 Wastewater Facility Plan investigated the condition of the existing City of Ilwaco collection system, the climatological and physical factors which affect I/I in the collection system, quantified the flows of wastewater during periods of dry and wet weather conditions and discussed alternatives for handling the I/I generated in the City. The analysis determined that correction of I/I should focus initially on three areas of the collection system. These areas were identified as Quaker Street, Lake Street, and First Street. The City completed repair and replacement of approximately 10,000 feet of sanitary sewer in these three area in 1998. The two sanitary sewer overflows, which were identified during the field investigations for the 1994 Facilities Plan, were eliminated during the construction. The sanitary sewer base maps are shown in Figures 4 and 5. The areas of the collection system, which were replaced in the 1998 sewer system rehabilitation project, are indicated on Figure 4.

The Infiltration and Inflow Study investigated the condition of the pump stations within the City sanitary sewer system. The field investigation conducted for the I/I Study determined that the Myrtle Street lift station was in deteriorated condition and that the upstream manholes were constantly surcharged due to the poor design of the pump station. The I/I Study recommended that since the interceptor in Lake Street was to be replaced from the intersection of First and Lake Street to Eliza Street due to the deteriorated condition and leaking joints that the interceptor be laid such that the need for the Mrytle Street lift station was eliminated.

None of the pump stations in the City met the DOE general requirements for sewage pump stations contained in the Criteria for Sewage Works Design (1985). The I/I Study recommended that all of the pump stations in the City be upgraded to meet the DOE minimum criteria. New pumps and electrical system were installed in the Baker Bay No. 1 and No. 2 and the Sahalee pump stations. The Port pump station contained a single pump. This station was abandoned and replaced with a duplex grinder pump station equipped with a new small diameter force main to the main treatment plant pump station. Auxiliary power is provided to the four pump stations via a trailer mounted portable generator.

The City of Ilwaco has initiated a comprehensive annual program to identify sources of I/I in the publicly owned system as well as the privately owned sewer system. The City completed smoke testing in 1999, 2000 and 2001. During each of these tests, residential side sewers, yard drains and trailer court sewer hook-up stubs were identified as potential sources of I/I. The City sent notices to the owners of the properties requesting that the I/I sources be removed. In addition, a sewer main to the Cook's Hill area and the Cedar

Street clay tile sanitary sewer of the downtown area has been identified as being a potential I/I source. The City is planning on replacing the Cook's Hill and Cedar Street sewers, approximately 1,500 feet of sewer main, in 2001.

The City preformed closed-circuit televison inspection of the majority of the sanitary sewer system in 1998 and 1999.

The City discovered a potentially significant source of infiltration/inflow in the fall of 2000. A large hole was found in a side sewer located directly underneath a main drainage ditch. The City has repaired the damaged pipe.

CITY OF ILWACO WASTEWATER TREATMENT PLANT

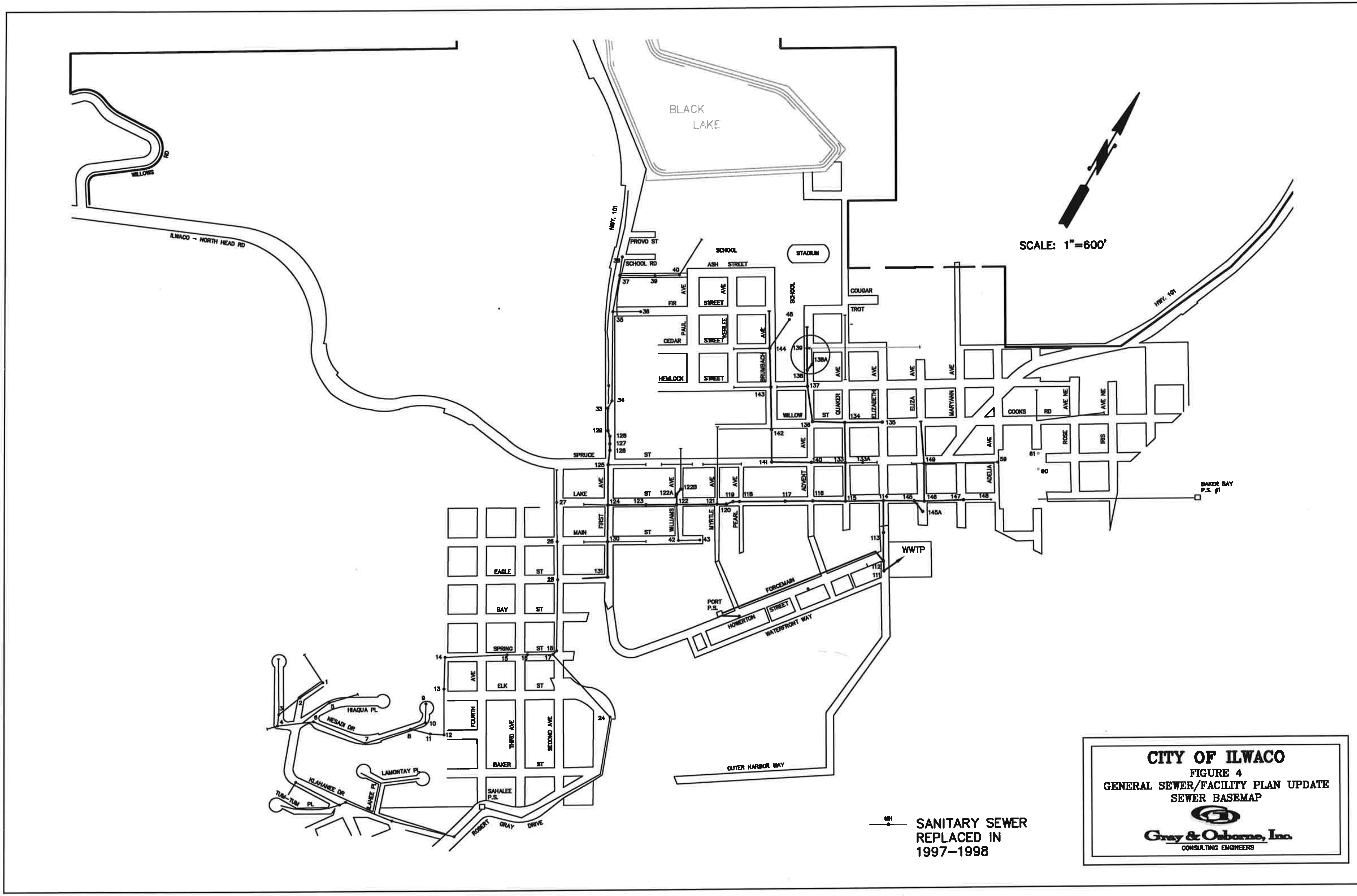
The current NPDES permit for the WWTP (No. WA0023159) lists the following design criteria.

- Average flow for the maximum month: 0.70 MGD
- Annual average flow: 0.33 MGD
- BOD_5 loading for maximum month: 630 lb/day
- TSS loading for maximum month: 630 lb/day

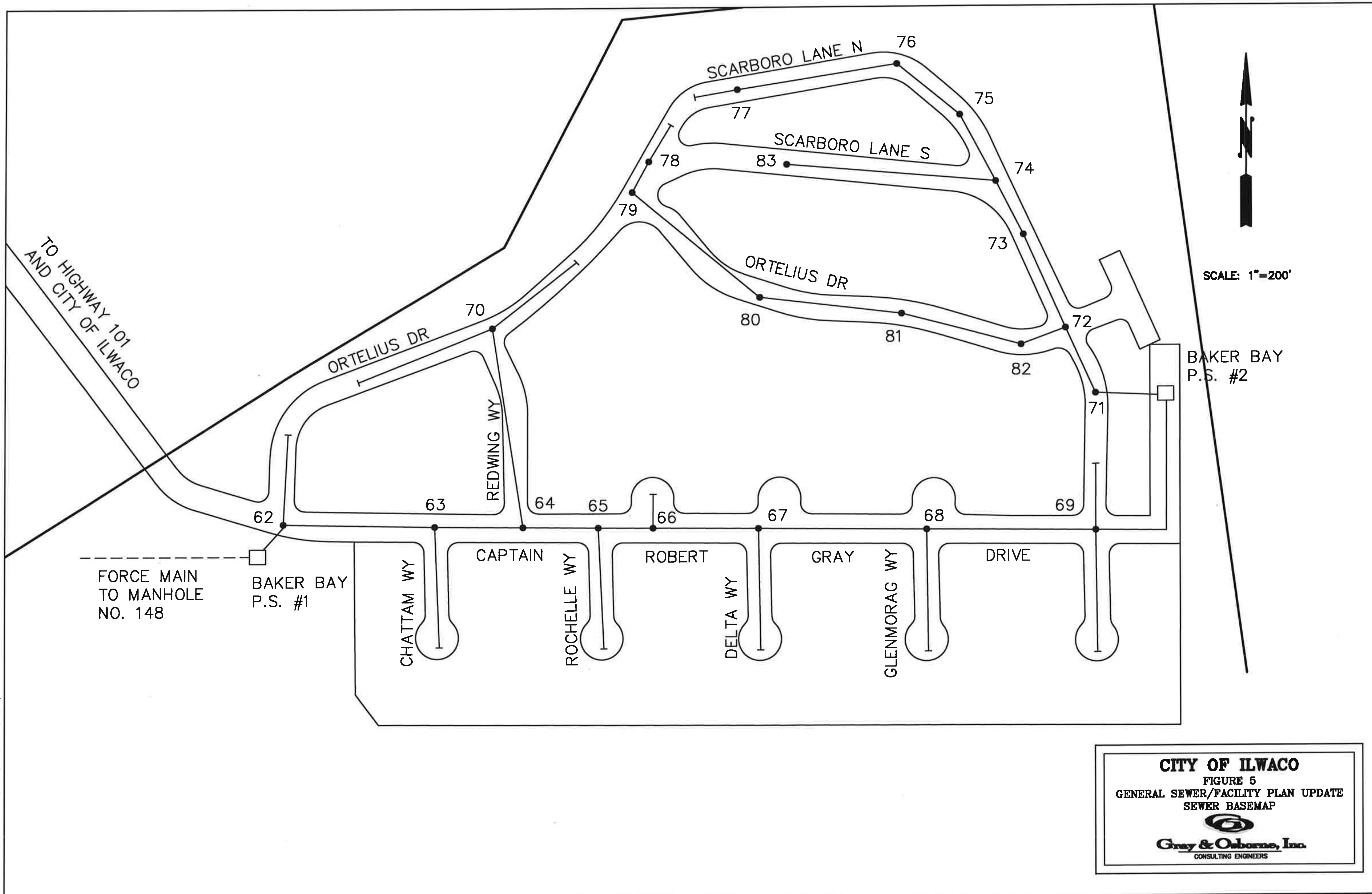
The permit states that when the actual flow or wasteload reaches 85 percent of any one of the design criteria for three consecutive months, or when the projected increases would reach design capacity within five years, whichever occurs first, the Permittee must submit to the Department a plan and a schedule for continuing to maintain capacity at the facility sufficient to achieve the effluent limitations and other conditions of the permit.

The City of Ilwaco completed an upgrade to the WWTP, including construction of a new influent pump station, in 1998. The WWTP has been upgraded to provide an economically and environmentally adequate secondary treatment of wastewater for the City. The treatment plant receives predominantly domestic wastewater from a population of about 1,600 people in the area. The level of treatment provided assures that the plant effluent is acceptable for discharge to Baker Bay and conforms to effluent limitations in the NPDES waste discharge permit. The WWTP layout is shown in Figure 6. The WWTP consistently produces effluent, which meets or exceeds the permitted discharge limits for BOD_5 and TSS.

The permitted capacity of the WWTP is 700,000 gpd maximum month average day. The 1994 Plan indicated the design capacity of the facility was 510,000 gallons/day. The increased capacity of the WWTP as permitted was a result of the design of the SBR basins. The volume of the existing SBR basins is the same as described in the WWFP, 353,500 gallons, with surface dimensions of 42 feet wide by 75 feet long. The existing decant depth varies from the decant depth contained in the 1994 Plan. The decant depth in the 1994 Plan was 4.5 feet. The facility described in the 1994 Plan used a portion of



CITY OF ILWACO
FIGURE 4
GENERAL SEWER/FACILITY PLAN UPDATE
SEWER BASEMAP
Gray & Osborne, Inc.
CONSULTING ENGINEERS



CITY OF ILWACO
FIGURE 5
GENERAL SEWER/FACILITY PLAN UPDATE
SEWER BASEMAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

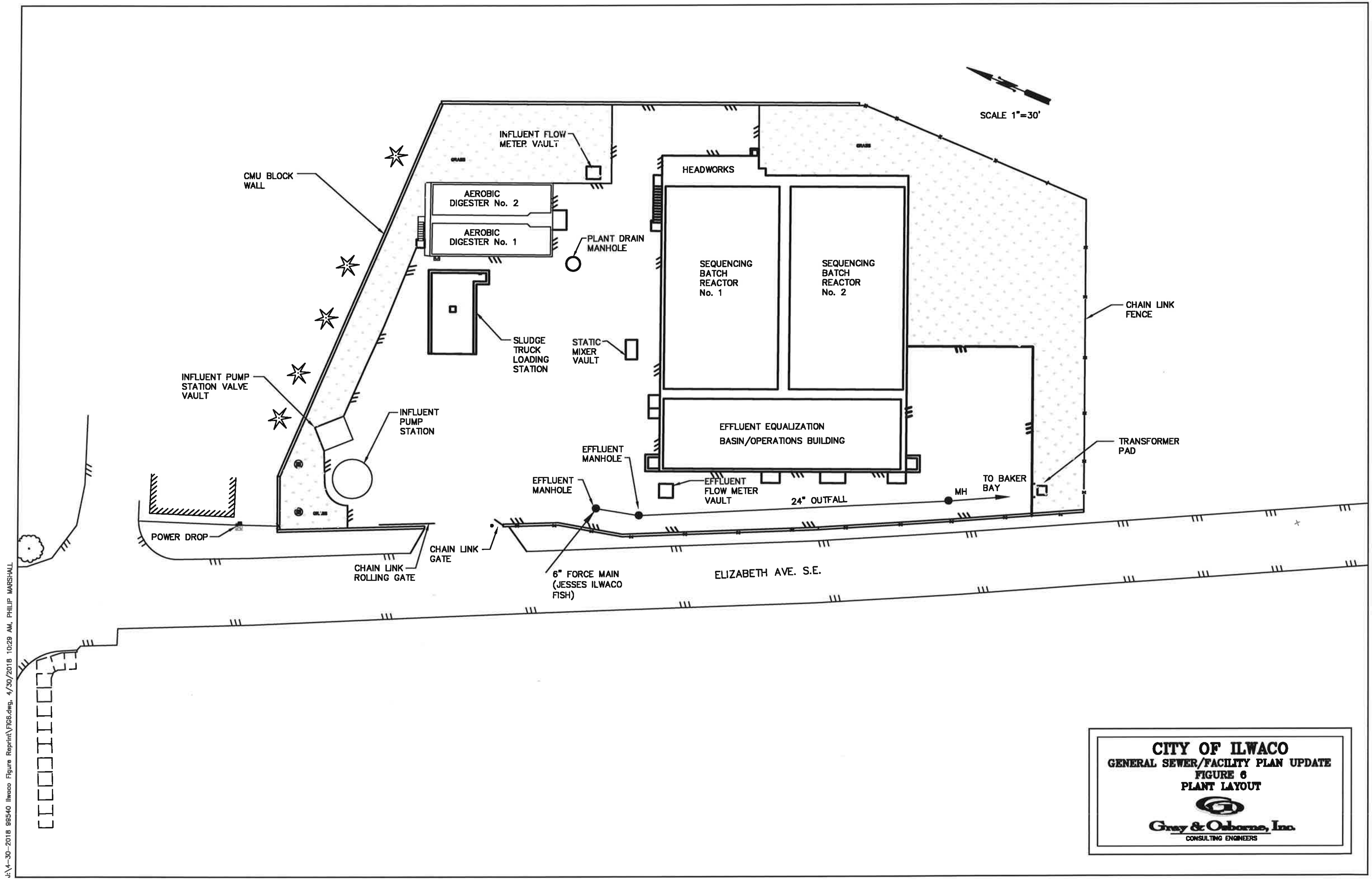
J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG5.dwg, 4/30/2018 10:28 AM, PHILIP MARSHALL

the existing chlorine contact tank for the new UV disinfection system. The shallow decant depth was set by the hydraulics through the old chlorine contact tank. A meeting was held during the design phase with the City and adjacent property owners who requested that the SBR structure be designed with as low a profile as possible to minimize the visual impact of the WWTP. The City wanted to mitigate the impact of the WWTP on the surrounding property owners to the greatest extent possible. It was determined that installing an in-line UV system with an equalization basin between the SBR and the UV system was the most efficient design and would permit the top of the SBR tanks to be lowered by approximately 4 feet. The working volume of the SBRs was no longer controlled by the elevation of the old chlorine contact tank, therefore the decant depth was able to be set at a more optimum depth of 7.5 feet. The working volume of an SBR is set by the volume available between the maximum water surface elevation and the decant depth, therefore decreasing the decant depth provided additional capacity in the SBR.

The City of Ilwaco Wastewater Treatment Facility uses sequencing batch reactors, an activated sludge treatment process, to achieve secondary treatment of the wastewater. A capacity analysis has been prepared and the design criteria have been verified. Normal operation of the SBR is summarized below:

Raw domestic wastewater is conveyed to the treatment plant through a 14-inch force main by the Influent Pump Station. Prior to entering the headworks the wastewater flows through a 14-inch magnetic flow meter for flow measurement. The wastewater enters the headworks and passes through an automated mechanically cleaned bar screen that removes all material that exceeds ¼-inch in all directions (rags, plastics, stringy materials, etc.). The screened wastewater flows to a two-stage aerated grit and scum removal basin where sand and other heavy solid particles settle. Grit-laden effluent concentrated in the grit and other heavy solid particles settle. Grit-laden slurry settled out in the grit removal basin is conveyed to a grit pump by a shaftless screw conveyor, and pumped to a grit screw classifier equipped with a hydraulic grit cyclone for further concentration, cleaning, and dewatering. Grit is dropped into a dumpster for collection and disposal. Overflow from the grit classifier returns by gravity to the grit and scum removal basin. Floating scum from the grit and scum removal basin is removed by a manually-operated weir and wasted to an aerobic digester. After leaving the headworks, raw water enters one of two sequencing batch reactors (SBR). Raw wastewater normally flows into only one of the two SBRs at any given time. In the SBR, the raw wastewater is contacted and mixed with air and a microbial mass (mixed liquor). This mixed liquor is mixed and aerated using a jet aeration system, and solids settle during a quiescent period.

Clarified liquid is decanted off the surface (supernatant) and passes to the flow equalization basin of the effluent pump station, from where it is conveyed to the UV disinfection system. Treated and disinfected effluent is metered through a magnetic flow meter and discharged into the outfall into Baker Bay.



CITY OF ILWACO
GENERAL SEWER/FACILITY PLAN UPDATE
FIGURE 6
PLANT LAYOUT

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Settled solids (waste activated sludge) are withdrawn from the bottom of the SBR. The waste activated sludge (WAS) taken from the SBR is pumped through a static mixer and thickening screw press to an aerobic digester. There the sludge is aerated allowing the microorganisms to metabolize their own cellular mass. This digestion process results in a more stable sludge mass at a reduced volume. Digested sludge is drawn off the bottom of the digester to the truck loading station, and loaded into a tank truck for land application.

Figure 7 shows the plant hydraulic profile and Figure 8 a process schematic.

The design criteria for the overall treatment process are summarized in Table 6-1.

TABLE 6-1

City of Ilwaco WWTP Design Criteria

Design Criteria	
Maximum Monthly Average (Design Flow)	0.70 MGD
Peak Hour	2.0 MGD
Influent Pump Station Discharge per pump	1500 GPM
Organic Loadings	
Influent 5-Day Biochemical Oxygen Demand (BOD_5)	630 lbs/day(1)
Influent Total Suspended Solids (TSS)	630 lbs/day(1)
Total Kjeldahl Nitrogen (TKN)	128 lbs/day(1)
Effluent Limitations	
Monthly Average 5-Day BOD_5	30 mg/L (95 lbs/day)
Monthly Average Total Suspended Solids	30 mg/L (95 lbs/day)
Monthly Average Fecal Coliform Bacteria	200/100 ml
pH Value	6.0-9.0

(1) Organic treatment capacity has been increased with the installation of new belts and sheaves on the SBR blowers in July 2001.

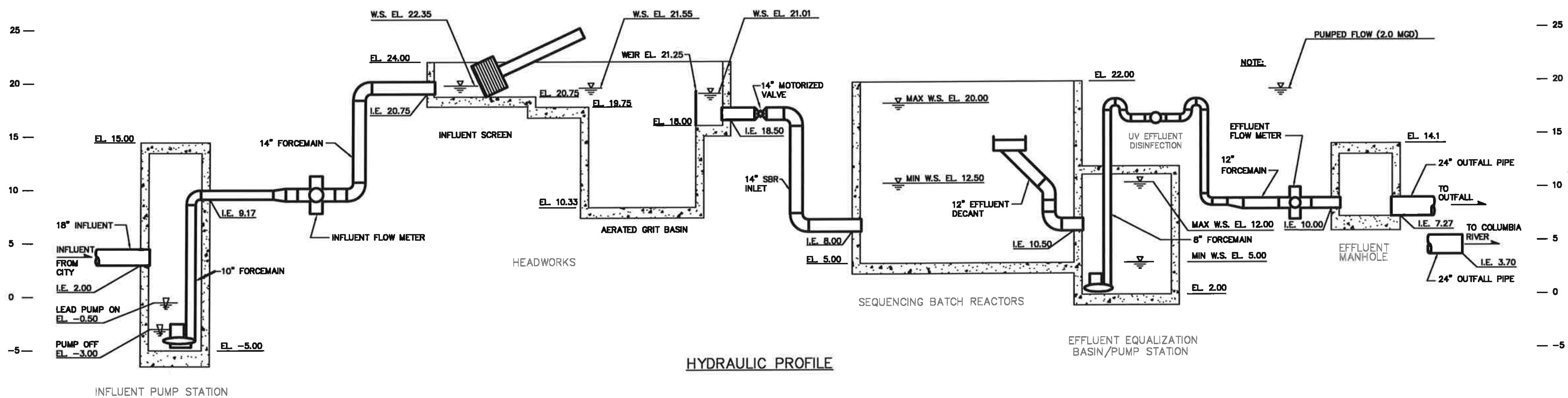
The Ilwaco WWTP was designed for growth over a twenty-year period to the year 2013. The monthly average and yearly average flow and wasteload to the plant for the period from November, 1998 to February, 2001 is listed in Table 6-2. The WWTP was in the start-up mode during a winter of exceptionally high rainfall. The winter of 1998-1999 experienced rainfall, which exceeded the average rainfall for the Long Beach Peninsula (based on 32 years of record) by 55%. The historic average amount of rainfall for November through March for the Long Beach Peninsula is 61.32 inches, however, the rainfall for November 1998 through March 1999 was 94.82 inches. The rainfall for November 1999 through March 2000 was 71.30 inches or approximately 16% over the historic average rainfall for these months The average flow over the period of record from November 1998 to February 2001 is 0.297 million gallons.

During peak summer tourist season in Ilwaco and Seaview and during periods of high rainfall, the monthly average organic load experienced at the treatment plant exceeded 85% of the design capacity of 630 lb/day for 7 months; February 1999, March 1999, August 1999, July 2000, August 2000, November 2000, July 2001, August 2001 and September 2001. The average monthly influent BOD_5 load over the two year period of record is 440 lb/day.

TABLE 6-2

Monthly and Annual Average WWTP Flow and Load Data

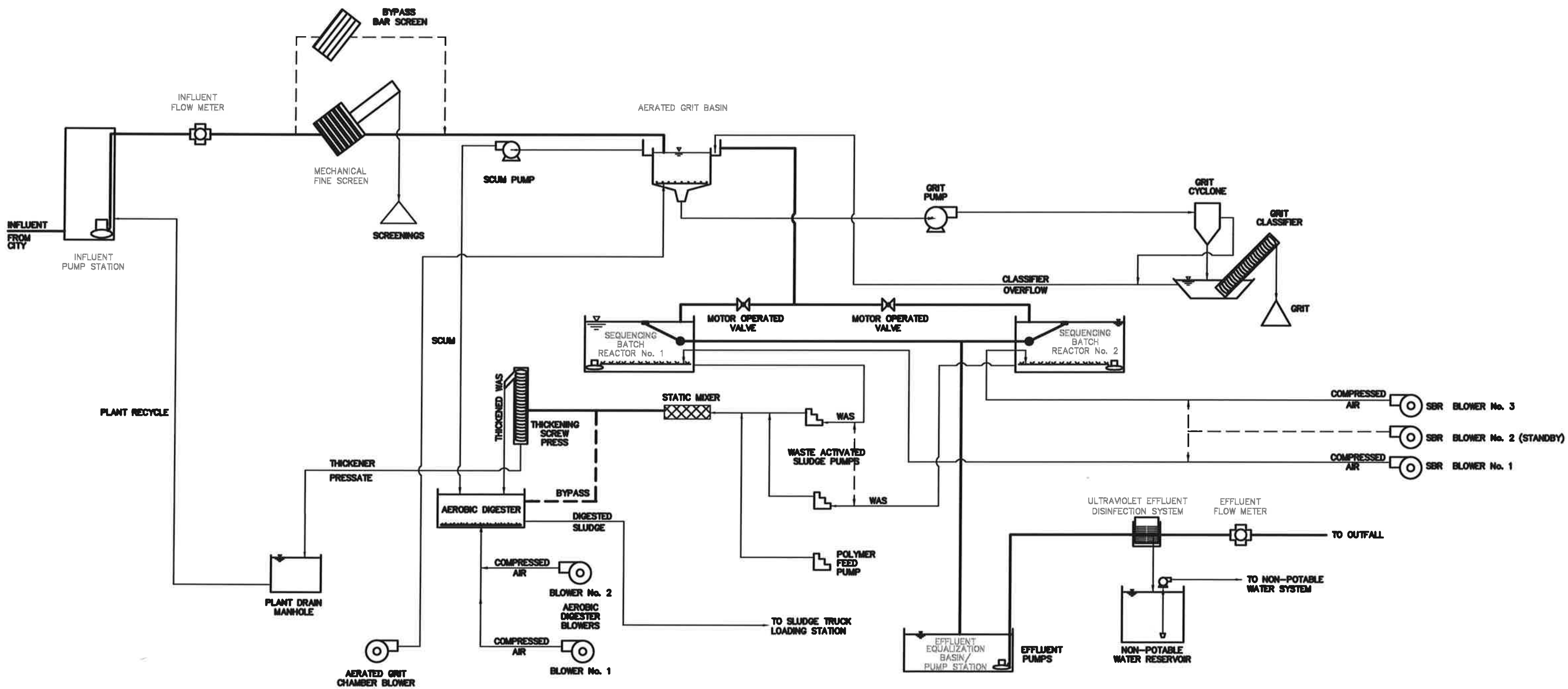
Month	Average Flow (MGD)	Average Influent BOD (lb/day) (1)	Average Influent TSS (lb/day) (1)
November, 1998	0.194	326	227
November, 1998	0.499	306	197
December, 1998	0.679	314	226
January, 1999	0.488	463	485
February, 1999	0.688	884	733
March, 1999	0.409	539	411
April, 1999	0.231	459	321
May, 1999	0.204	380	258
June, 1999	0.197	310	204
July, 1999	0.252	493	320
August, 1999	0.202	630	470
September, 1999	0.176	441	290
November, 1999	0.162	410	272
November, 1999	0.429	421	495
December, 1999	0.556	439	419
January, 2000	0.313	232	186
February, 2000	0.277	447	257
March, 2000	0.289	364	269
April, 2000	0.201	348	344
May, 2000	0.214	383	313
June, 2000	0.243	524	492



CITY OF ILWACO
GENERAL SEWER/FACILITY PLAN UPDATE
FIGURE 7
HYDRAULIC PROFILE

Gray & Osborne, Inc.
CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG7.dwg, 4/30/2018 10:30 AM, PHILIP MARSHALL



CITY OF ILWACO
GENERAL SEWER/FACILITY PLAN UPDATE
FIGURE 8
PROCESS SCHEMATIC

Gray & Osborne, Inc.
CONSULTING ENGINEERS

J:\4-30-2018 98540 Ilwaco Figure Reprint\FIG8.dwg, 4/30/2018 10:31 AM, PHILIP MARSHALL

TABLE 6-2 – (Continued)

Monthly and Annual Average WWTP Flow and Load Data

Month	Average Flow (MGD)	Average Influent BOD (lb/day) (1)	Average Influent TSS (lb/day) (1)
July, 2000	0.208	579	369
August, 2000	0.222	599	392
September, 2000	0.208	478	344
November, 2000	0.185	434	238
November, 2000	0.192	555	315
December, 2000	0.236	372	257
January, 2001	0.250	327	254
February, 2001	0.219	376	262
March, 2001	0.208	389	266
April, 2001	0.337	347	246
May, 2001	0.213	404	360
June, 2001	0.168	396	241
July, 2001	0.182	642	315
August, 2001	0.213	769	636
September, 2001	0.181	584	492
Average	0.288	440	328

(1) Average of sampled days per month

The wastewater flow and load contributed to the WWTP by the existing connections in the City of Ilwaco and the Seaview Sewer District for the period since the plant has been on line has averaged 288,000 gallons average annual flow, average wet weather month flow (November through March) 382,000 gallons/day and BOD_5 average annual load of 440 lb/day.

Table 6-3 presents a summary of the major components of the wastewater (liquid) treatment process along with a description of their function and relationship to other process units.

TABLE 6-3

Major Process Components

Components	Function/Relationship To Other Units
Influent Pump Station	The influent pump station receives flows from the City and pumps wastewater to the WWTP headworks.
Mechanical Bar Screen	A rotary fine screen is located at the headworks structure and removes any plastics, rags, and stringy material entering the treatment plant. The screenings are periodically removed from the screen, dewatered, and conveyed to a dumpster by a rotating shaftless screw.
Aerated Grit Basin/Scum Removal	Grit-laden slurry settled out in the aerated grit removal basin is conveyed to a grit pump by a shaftless screw conveyor, and pumped to a hydraulic cyclone and grit screw classifier for further concentration, cleaning, and dewatering of the solids. Grit drops into a dumpster for collection and disposal. Overflow from the grit classifier returns by gravity to the aerated grit basin discharge trough. Floating scum from the grit and scum removal basin is removed by a manually-operated weir and is pumped directly to the aerobic digester.
Sequencing Batch Reactors	Two sequencing batch reactors (SBRs) alternate in receiving and treating influent from the grit basin. The two SBRs function both as batch aeration basins, where the biological reactions necessary for waste assimilation and stabilization take place, and as batch clarifiers, where settling and removal of suspended solids occur. Both treatment and clarification are provided in the batch reactors, eliminating the need for separate secondary clarification.

TABLE 6-3 – (continued)

Major Process Components

Components	Function/Relationship To Other Units
Flow Equalization Basin	The equalization basin equalizes the flow from the two SBRs by providing intermediate storage volume between the SBRs and the UV disinfection system. In combination with the effluent pumps, the equalization basin effectively reduces the peak maximum flow to the UV disinfection units. The equalization basin also provides the necessary head for rapid decant of the SBRs, while maintaining a low plant profile.
Effluent Pump Station	Two non-clog submersible pumps located in the effluent pump station pump the treated SBR effluent from the equalization basin through the UV disinfection units to the discharge manhole.
UV Disinfection System	Two in-vessel ultraviolet (UV) disinfection units apply UV light to the effluent with sufficient UV strength and detention time for adequate disinfection. The wastewater then flows through discharge piping to the outfall.
Plant Water Systems	The plant water systems include a non-potable water system for hydrants and process equipment, and a potable water system, which supplies potable water for specific pumping facilities in the operations building. A portion of the non-potable system is supplied by City water, and a portion is supplied by disinfected effluent from the plant.
Emergency Generator	The 175 kW diesel engine generator provides power supply to critical equipment in case of failure of the primary power source.

TABLE 6-3 (continued)

Major Process Components

Components	Function/Relationship To Other Units
Flow Meters	Two flow meters located in the influent and effluent piping furnish instantaneous flow data to the plant control system. A third flow meter monitors flow of waste activated sludge from the SBRs to the aerobic digesters.

Influent Pump Station

The Influent Pump Station receives flow from the City of Ilwaco sewer collection system, including the Port of Ilwaco and the Seaview Sewer District, and from miscellaneous drains at the Ilwaco WWTP. Flow from the pump station is directed to the Ilwaco WWTP headworks. The pump station is equipped with two submersible pumps – each rated for a flow of 1500 gpm (2.16 MGD). Each pump discharge line is equipped with a check valve and a plug valve, located in a vault adjacent to the pump station. Flows pass through a common 14-inch 170 foot force main along the north fence line and then along the east side of the aerobic digesters to the headworks. Influent flows are monitored by a 14-inch magnetic flow meter in the force main. Each pump is capable of independently pumping the current design maximum hour peak flow of 2.0 MGD. The second pump can provide 100% backup, in accordance with Department of Ecology requirements. The wet well is designed to provide adequate volume to prevent over-cycling of pumps and, together with the electrical panel, is sized to accommodate a third pump in the future. The pump station design data are presented in Table 6 –4

TABLE 6-4

Influent Pump Station Equipment Data

Item	Criteria
Quantity	2
Manufacturer	ABS
Model	AFP2021 M170/6(EX)-8"
Pump Type	Non-Clog Submersible
Capacity per Pump @ TDH	1500 gpm 2328.5 ft.
Motor Horsepower per Pump	23 hp
Motor RPM	1150
Drive	Constant – speed
Wet Well Diameter	12 ft.
Wet Well Volume/Vertical Foot	845 gal/ft.

Rotary Fine Screen

The rotary fine screen is installed in the open channel at the upstream end of the headworks. The purpose of the fine screen is to remove gars, plastics and other fibrous materials that tend to clog and collect in downstream equipment, and then compact, dewater, and discharge these materials to a common screenings/grit dumpster for collection and disposal. The rotary fine screen consists of a screen basket, shaftless screw assembly, transport tube, press zone assembly, discharge section, drive system, pivot stand, and controls. A bypass channel with a manually cleaned bar screen is provided. The pump station design data are presented in Table 6-5.

TABLE 6-5

Rotary Fine Screen Equipment Data

Item	Criteria
Manufacturer	**Hycor**
Model	HLS400
Quantity	1
Design Capacity	2.7 MGD
Perforation Size	¼-inch
Screen Diameter	15.55 – inch
Material	Stainless Steel
Motor Horsepower	1 hp

Grit Removal System

The high capacity grit removal system at the WWTP continuously removes and settles grit from the influent flow. The influent flow is directed in to the main grit removal basin located downstream of the rotary fine screen. The basin is divided into aerated and non-aerated zones by a vertical baffle plate. The flow enters the aerated zone where a coarse bubble air diffuser provides air to suspend organics, while allowing heavier grit particles to settle to the bottom of the basin. The wastewater next passes under the baffle wall and into the non-aerated zone, where it passes up through 25 inclined settling plates that increase the settling efficiency of the grit particles. The wastewater then flows over a weir into the effluent trough, and out through a discharge chute to the SBRs, by gravity.

Settle grit is transported horizontally in the trough to the grit pump intake by a shaftless screw grit conveyor and is then pumped to a hydraulic cyclone/grit classifier positioned over the aerated grit basin. The grit screw is driven by a helical speed reducer and directly coupled motor located outside the basin. Two recessed impeller grit pumps are provided, with one serving as backup.

The grit cyclone is a static device that uses vortex action to separate denser inert material (grit) from the water and the less dense suspended organic particles. Pumped grit slurry enters the inclined cone-shaped tank of the cyclone unit through the side, effluent discharges through the top of the unit to the grit basin discharge trough, while the settled grit collects at the bottom of the cone and drops into the grit classifier. The grit classifier is an inclined screw conveyor that transports and dewaters the grit before discharging to a grit receptacle located at grade. The aerated grit system design data are included in Table 6-6.

TABLE 6-6

Aerated Grit System Design Data

Item	Criteria
Aerated Grit Removal Basin	
Quantity	1
Component Manufacturer	WesTech Engineering, Inc.
Basin Length	12' – 6"
Basin Width	9' – 0"
Sidewater Depth	10' – 3"
Detention Time @ Max Month Flow	14 minutes
Air Requirement	50 scfm
Conveyor, Type	Shaftless Screw
Motor	0.75 hp
Grit Pump	
Quantity	2
Manufacturer	WEMCO Pump
Type	Recessed impeller centrifugal
Capacity per pump @ TDH	75 gpm @ 35 ft TDH
Motor	5 hp
Hydraulic Cyclone	
Quantity	1
Manufacturer	WEMCO Pump
Model	600C WEMCLONE
Size	10 inch
Capacity	220 gpm
Grit Classifier	
Quantity	1
Manufacturer	WEMCO Pump
Size	12 inch
Motor	0.5 hp
Aerated Grit Blower	
Quantity	1
Type	Rotary Lobe
Manufacturer	Gardner Denver Machinery
Model	Sutorbilt Legend 2L
Capacity @ psig	50 scfm @4.2 psig
Motor	1.9 hp

TABLE 6-6 – (continued)

Aerated Grit System Design Data

Item	Criteria
Scum Pump	
Quantity	1
Type	Centrifugal
Manufacturer	Cornell Pump
Model	3NLT VM
Capacity @ TDH	180 gpm @ 21.7 ft
Motor	2 hp

Sequencing Batch Reactor Process

The SBR process utilizes the following major components:

- SBR Tanks: Two SBR tanks provide the reactor volume for the SBR treatment processes to take place.
- SBR Blowers: Three SBR blowers, provide air to the SBR tanks through the jet aeration manifold system for the biological wastewater treatment process.
- Jet Aeration System: The jet pump and aeration manifold injects air and recycled mixed liquor into the SBR tanks to supply oxygen and to mix the contents.
- Effluent Decanters: One decanter in each tank withdraws the clarified supernatant after the settle step of the SBR operation cycle.
- WAS Pumps: The wastewater activated sludge pumps in the WAS pumping room in the Operations Building remove excess activated sludge and discharge to the aerobic digesters.
- Monitoring/Control Computer: The PLC System automatically controls the SBR process by regulating the operation of the inlet valves, blowers, jet pumps, decanters, and wastewater activated sludge pumps.

The 1994 Plan indicated the maximum month capacity of the SBRs was 510,000 gallons/day. The maximum month average day permitted capacity of the SBRs is 700,000 gallons/day. The increased capacity of the WWTP as permitted was a result of the design of the SBR basins. The volume of the existing SBR basins is the same as described in the WWFP, 353,500 gallons, with surface dimensions of 42 feet wide by 75 feet long. The existing decant depth varies from the decant depth contained in the 1994 Plan. The decant depth in the 1994 was 4.5 feet. The facility described in the 1994 Plan used a portion of the existing chlorine contact tank for the new UV disinfection system. The shallow decant depth was set by the hydraulics through the old chlorine contact tank. A meeting was held during the design phase with the City and adjacent property owners who requested that the SBR structure be designed with as low a profile as possible to minimize the visual impact of the WWTP. The City wanted to mitigate the impact of the WWTP on the surrounding property owners to the greatest extent possible. It was determined that installing an in-line UV system with an equalization basin between the SBR and the UV system was the most efficient design and would permit the top of the SBR tanks to be lowered by approximately 4 feet. The working volume of the SBRs was no longer controlled by the elevation of the old chlorine contact tank, therefore the decant depth was able to be set a more optimum depth of 7.5 feet. The working volume of an SBR is set by the volume available between the maximum water surface elevation and the decant depth, therefore decreasing the decant depth provided additional capacity in the SBR.

The SBR equipment design data is contained in Table 6-7.

TABLE 6-7

SBR Equipment Design Data

Item	Criteria
Sequencing Batch Reactor (SBR)	
Volume per basin	353,500 gallons
Cycle rate per basin	2.53 cycles/day
MLSS, average	2500 mg/L
F:M Ratio	0.043 lb/lb
Effective Solids Retention Time	24.5 d
Solids Wasted	365 lb/g @ 0.8% total solids
Actual Oxygen Required	
Selector Zone	
Quantity, per SBR	2 each
Baffle, Material	Marine Plywood
Volume, per zone	19,000 gallons

TABLE 6-7 – (continued)

SBR Equipment Design Data

Item	Criteria
Aeration System Equipment	
SBR Blowers	
Quantity	3
Type	Rotary Lobe
Manufacturer	Gardner Denver Machinery
Model	Sutorbilt Legend 6M
Capacity	500 scfm @7.2 psig(1)
Jet Aeration Pumps	
Quantity	2
Manufacturer	Flygt
Model	CP3170
Pump Type	Submersible
Capacity per Pump	2930 gpm @18.9 ft. TDH
Number of Jets per Basin	16
Jet Gassing Rate	30 scfm per jet
Horsepower	25
Aeration Manifold and Backflush System	
Quantity	2
Manufacturer	Aqua-Aerobics
Type	Jet aeration
Material	Fiberglass
Decant System	
Quantity per tank	1
Manufacturer	Aqua-Aerobics
Type	Floating
Decant Rate per Unit:	Varies with head; approx. 2900 gpm avg.
Effluent Basin	
Quantity	1
Volume	98,200 gallons
Effluent Discharge Pumps	
Quantity	2
Type	Submersible
Manufacturer	Fairbanks Morse
Model	8"D5434SMV
Capacity per Pump @ TDH	1400 gpm @ 28.0 ft.
Motor Horsepower	20

(1) New belts and sheaves installed July 2001

Effluent Disinfection System

Prior to discharge to the effluent pipe and outfall, the treated wastewater undergoes UV disinfection to inactivate potentially harmful (pathogenic) microorganisms in the treatment plant effluent. The UV effluent disinfection system consists of two identical parallel in-vessel type UV disinfection chambers located in the effluent disinfection room at the operation s building above the equalization basin. The effluent disinfection system design data are listed in Table 6-8.

TABLE 6-8

Effluent Disinfection System Equipment Data

Item	Criteria
Quantity	2
Type	Ultra-violet
Manufacturer	Aquionics
Model	HXJSA-6 In-Line UV
Configuration	In-vessel
Lamp type	Medium pressure, high intensity
UV transmittance @ 253.7 nm	65%
Disinfection Standard	200 fc per 100 ml

Biosolids Handling

After settling in the SBRs, excess sludge from the SBR is pumped to the aerobic digesters by the WAS pumps located in the operations building. The sludge is pumped through a static mixer, where polymer is blended in with the sludge to increase thickening efficiency. The sludge/polymer blend continues on to the auger screw press where it is thickened before entering the digesters. Sludge filtrate drains from the thickening unit to the plant drain pump station and is pumped to the headworks. The screw press may be bypassed through manual operation of valves located below the press to adjust the solids concentration in the digester. The digested sludge is discharged into the sludge haul truck and disposed of the biosolids disposal site.

The major components of the Solids Handling System along with their function and relationship to the other process units are listed in Table 6-9.

TABLE 6-9

Solids Handling System Components

Components	Functional Relationship to Other Units
Waste Activated Sludge (WAS) Pumps	Two progressing cavity pumps transfer waste activated sludge from the SBR tanks to the aerobic digesters.
Digester Blowers	The blowers provide air and mixing to the digesters for stabilization of sludge.
Polymer System	The polymer system mixes and ages dry or liquid polymer to assist in sludge thickening. The polymer system can discharge diluted polymer into the WAS either near the WAS room or at the static mixer. The polymer increases the efficiency of the thickening process.
Sludge Screw Press	The sludge screw press receives sludge from the WAS pumps and thickens the sludge before it enters the digesters.
Aerobic Digesters	The digesters receive waste activated sludge from the SBRs for aerobic digestion. The aerobic digestion process stabilizes the sludge so that odor problems and pathogens are reduced or eliminated and so that the sludge can be properly disposed of or utilized. Further thickening can be accomplished by settling and removal of the clear supernatant (decanting).
Truck Loading Station	Aerobically digested biosolids are transferred from the digesters to a tank truck for land application offsite.

Equipment data on the specific equipment used in the solids handling process are listed in Table 6-10.

TABLE 6-10

Solids Handling Equipment Data

Item	Criteria
Digester Tankage	
Number of Basins	2
Dimensions of each tank	42' L x 12' W
Sidewater Depth	Approx. 9'
Volume/tank	35,000 gallons
WAS Pumps	
Quantity	2
Type	Progressing Cavity
Manufacturer	Seepex
Model	10-6LBN
Capacity	35 gpm @ 30 psi
Polymer Feed Unit	
Quantity	1
System Manufacturer	Fluid Dynamics, Inc.
Concentrate Pump Type	Diaphragm
Polymer Input Capacity	0.01 to 2.5 gph
Dilute Solution Output Capacity	30 to 300 gph
Metering Pump	LMI B721-86
Neat Polymer Output	0.01-2.5 gph
In-line Static Mixer	
Model	Koflo Series 365
Mixer Diameter	3"
Polymer Inlet Diameter	1"
Screw Press	
Quantity	1
Type	Vertical auger
Manufacturer	Somat
Model	PB-9T
Motor Horsepower	5
Item	**Criteria**
Digester Blowers	
Quantity	2
Type	Rotary Lobe
Manufacturer	Gardner Denver Machinery
Model	Sutorbilt Legend Model 4L

TABLE 6-10 – (continued)

Solids Handling Equipment Data

Capacity/Blower	250 scfm(1)
Motor Horsepower	10(1)
Item	**Criteria**
Fine Bubble Diffusers	
Quantity/Tank	87
Air Flow/Diffuser	3 scfm @ 4.4 psig

(1) New belts, sheaves and motors installed July 2001

SECTION 7 - MARINE DISPOSAL ALTERNATIVES

The City of Ilwaco prepared an Outfall Predesign Report, dated January, 1998. At that time the Department of Ecology had directed the City to relocate their wastewater treatment plant outfall to the "A" Jetty near the mouth of the Columbia River. The Department of Ecology, Pacific County, the City of Long Beach and the Port of Ilwaco expressed interest in the possibility of constructing the "A" Jetty outfall to serve as a regional facility to provide a location for discharge of treated effluent for the Long Beach peninsula.

Supplemental outfall water quality modeling was performed for the "A" Jetty outfall by Beak Consultants in April 1996. The results of the outfall modeling led the Department of Ecology to acknowledge, in a letter written November 8, 1996, that although Ecology does not concur with all the assumptions used by Beak to model the discharge, the location for the discharges is the best option for a regional outfall for wastewater disposal. Ecology's own modeling results indicated that a discharge that includes wastewater from Jessie's Ilwaco Fish Company has the potential to exceed water quality standard for dissolved oxygen and fecal coliform bacteria. Ecology would require Ilwaco to perform a mixing zone study one to two years after construction the outfall. The study would evaluate compliance with the water quality standards at the boundaries of the authorized mixing zones and verify a computer model for subsequent evaluations.

The Predesign Report assumed that each participant, except for the Port of Ilwaco, would deliver treated wastewater effluent meeting 30 mg/l biological oxygen demand (BOD_5) and 30 mg/l total suspended solids (TSS) and 2.0 mg/l dissolved oxygen would be delivered at the effluent pump station. It was assumed that the Port of Ilwaco would deliver effluent meeting the requirements of the NPDES permit issued to Jesse's Ilwaco Fish Company. The NPDES permit for Jesse's Ilwaco Fish Company contains effluent limitations for TSS and oil and grease. The Beak outfall study indicated that the dissolved oxygen content at the outfall would need to be within the range of 1.0 mg/l to 6.0 mg/l, depending on flow, in order to meet water quality criteria at the point of discharge. The level of dissolved oxygen augmentation required at the outfall would be determined from field studies after the outfall was operational.

The Predesign Report included the design criteria used to prepare the preliminary design and sizing of a pump station and a combination force main and gravity/pressure main between Ilwaco and the "A" Jetty at Cape Disappointment. The pump station and force main were sized for two flow scenarios and two pipeline alignments.

The first flow scenario assumed that the City of Ilwaco would be the only participant in the outfall. The pump station and force main were sized to serve the City of Ilwaco for 50 years. The second scenario assumed that the City of Ilwaco, Port of Ilwaco, City of Long Beach and Pacific County would participate in the outfall. The effluent pump station and force main were sized for this scenario to accommodate the projected flows from the City of Ilwaco for 50 years and the Port of Ilwaco, City of Long Beach and Pacific County for 20 years.

The first alignment investigated followed the eastern leg of SR 100, and then the Coast Guard-Cape Disappointment Road, to "A" Jetty. The second alignment followed the western leg of SR 100 to the Coast Guard Cape Disappointment Road to "A" Jetty. Initial discussions between the City of Ilwaco and Fort Canby Sate Park, the Public Utility District, and the U.S. Coast Guard indicated interest in evaluating use of the utility corridor for a reliable water line to service the State Park and the Coast Guard Station, a small diameter force main to convey sanitary flow to the Ilwaco wastewater treatment plant, buried electrical service, and a pedestrian/bicycle/equestrian trail.

Cost estimates for the outfall sized for Ilwaco only and for the regional alternative were developed. The estimated cost of the Ilwaco only scenario was approximately $6,000,000. The estimated cost of the regional alternative scenario was approximately $9,300,000. The report was submitted to the Department of Ecology for review. The Department of Ecology indicated via the NPDES permits for both Ilwaco and Long Beach that the cities were going to be allowed to continue discharge at the current locations. The outfall at "A" Jetty was not pursued further.

This Plan Amendment assumes that the outfall will remain at the existing location and that a mixing zone analysis is not required. This assumption will need to be approved by the Department of Ecology.

SECTION 9 – CONVEYANCE AND TREATMENT ALTERNATIVES

CONVEYANCE ALTERNATIVES

New conveyance facilities will be needed to convey the wastewater from the future development of the annexation areas and Fort Canby and the Coast Guard. The wastewater conveyance needs for Fort Canby and the Coast Guard will be discussed first. The potential overlap of the facilities needed to convey wastewater from Fort Canby and the Coast Guard and future development in the annexation areas will probably be minimal due to the topography of the new area to be served. Figures 9 and 10 show the proposed wastewater conveyance facilities for Fort Canby and the Coast Guard.

If wastewater from Fort Canby and the Coast Guard is transferred to the City of Ilwaco for treatment and disposal two lift stations within Fort Canby and approximately 20,000 lf of 6-inch I.D. force main would be required. The main pump station would be located adjacent to the existing park Lift Station No. 1 in the Waikiki Beach area of Fort Canby. Pumped wastewater from the Coast Guard Station would be discharged into the main lift station. Wastewater generated in the Lake O'Neil campground, main park entrance, Lewis & Clark Interpretive Center and the Waikiki Beach day use area would flow by gravity to the main lift station. Wastewater from the west campground area would be pumped from a renovated Lift Station No. 2, located at the west campground area, to the main lift station. State Parks is contemplating two alternative force main alignments from Fort Canby to the City of Ilwaco.

In the first alternative a 6-inch I.D. force main from the new main lift station would proceed east on the Fort Canby entrance road to SR 100, then north paralleling the west leg of SR 100 to approximately the North Head Road. The Alternative 1 alignment is shown in Figure 9. A second lift station would be located in the North Head area. Flows from the existing buildings at North Head and future campgrounds in the North Head area, Beard's Hollow area or Beard's Hollow overlook (Phase II campground) would be conveyed to the North Head lift station and commingled with the wastewater from the main lift station. From the North Head lift station a force main would proceed east and follow the Lighthouse Keepers Road approximately 1,600 LF and ten would turn northeast through private property easements and the City of Ilwaco utility easements to a point of connection with the existing City sewer system in the vicinity of 2nd Avenue and Spring Street. The total length of this alignment, including approximately 5,500 LF from North Head to the proposed Phase II campground, is approximately 20,000 LF. The alignment includes a gravity pressure main section from approximately the high point of the alignment on MSW property, elevation approximately 290 ft., to the terminus of the route. The static head (elevation difference between the wet well of the main lift station and the high point of the alignment) of this alignment is approximately 310 ft.

The second alternative alignment includes the installation of a new 6-inch I.D. force main from a new main lift station located in the Waikiki Beach area following the alignment of the west leg of SR 100. The Alternative 2 alignment is shown in Figure 10. The total length of this alignment is approximately 21,000 LF and includes a force main section and a gravity pressure main section. The force main section extends from the main pump station in the Waikiki Beach area to a point on the west leg of SR 100 at approximately Willow Road. The gravity pressure main continues from this point into the City of Ilwaco. The static had of this alignment is approximately 175 ft.

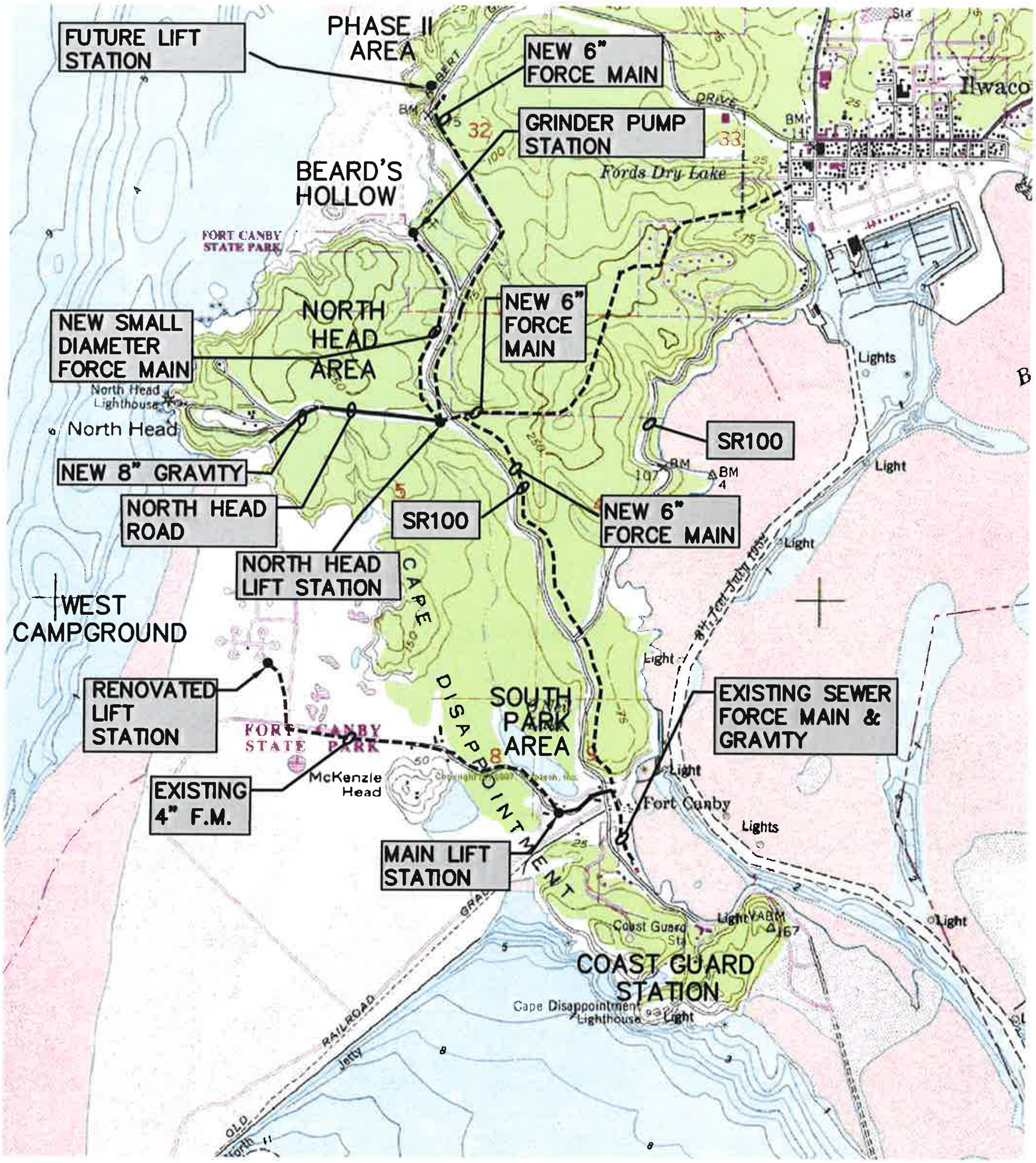
The Fort Canby and Coast Guard Station wastewater design and transmission facilities design criteria are shown in Table 9-1.

TABLE –9-1

Fort Canby and Coast Guard Wastewater and Transmission Facility Design Criteria

Parameter	Criteria
Average Day Flow (gpm)	17
Maximum Month Average Day Flow (gpm)	37
Peak Hourly Flow (gpm)	269
Main Pump Station	
Capacity	300 gpm
TDH	225 ft.
Horsepower (Submersible)	40 Hp
Main Pump Station Force Main (6-in. I.D.)	7,200 lf.
North Head Pump Station (Alternative 1)	
Capacity	300 gpm
TDH	180 ft.
Horsepower (Submersible)	40 Hp
North Head Pump Station Force Main (6-in. I.D.)	6,900 lf.
North Head Pump Station (Alternative 2)	
Capacity	300 gpm
TDH	130 ft.
Horsepower (Submersible)	20 Hp
North Head Pump Station Force Main (6-in. I.D.)	14,000 lf.

The estimated costs of the sanitary sewer improvements to convey wastewater from Fort Canby and the Coast Guard Station to Ilwaco is approximately $2,300,000 including 7.9% sales tax, 20% construction contingency and 25% engineering and administration fees. It is assumed that the cost of the facilities required to transfer wastewater from Fort



GRAVITY SEWER

FORCE MAIN

LIFT STATION

N

SCALE: 1"=2000'

CITY OF ILWACO

FIGURE 9

GENERAL SEWER/FACILITY PLAN UPDATE

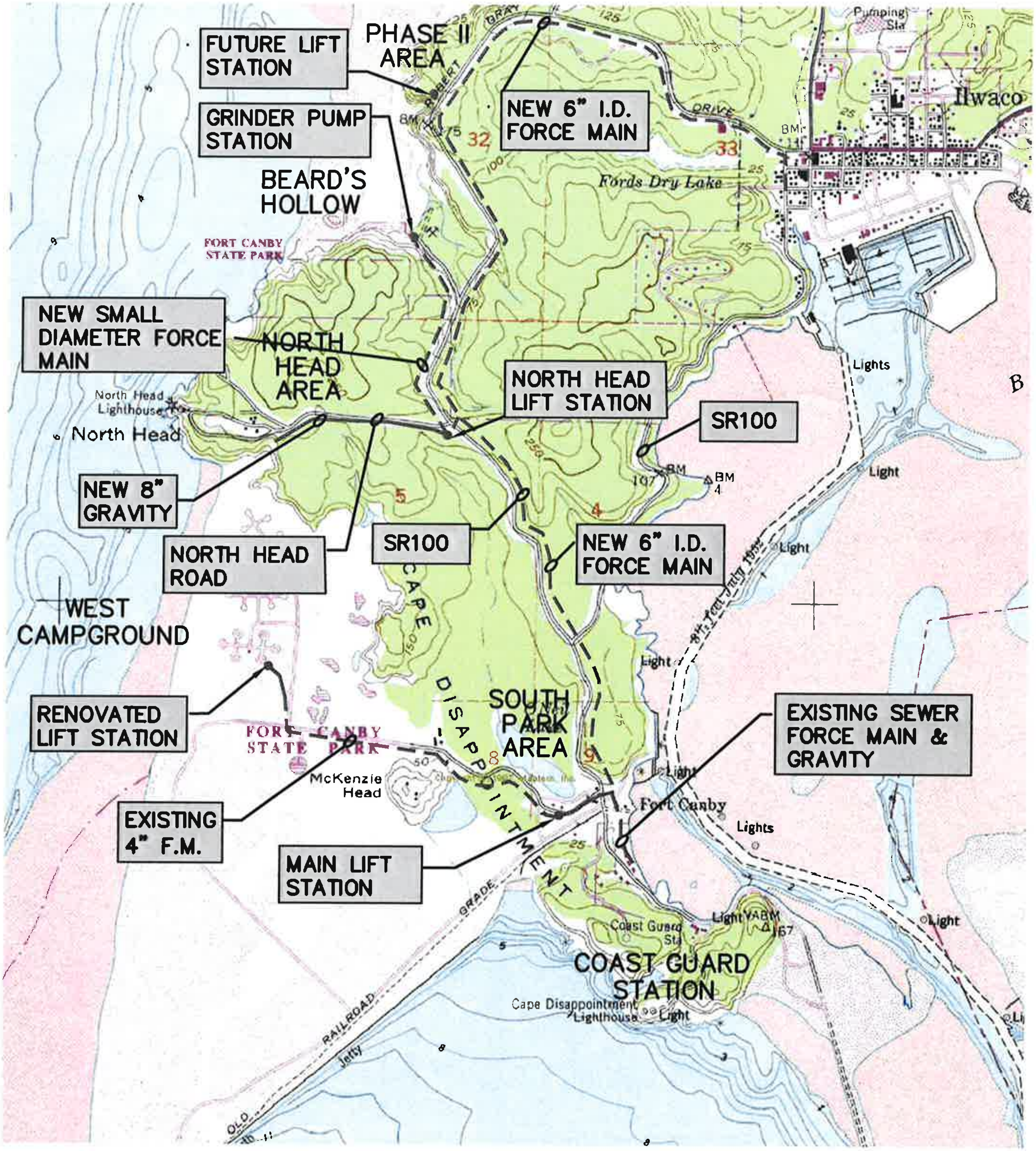
PROPOSED SEWER FACILITIES – ALT. 1

FORT CANBY AND COAST GUARD STATION

Gray & Osborne, Inc.

CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG9.dwg, 4/30/2018 10:58 AM, PHILIP MARSHALL



GRAVITY SEWER

FORCE MAIN

LIFT STATION

SCALE: 1"=2000'

CITY OF ILWACO

FIGURE 10

GENERAL SEWER/FACILITY PLAN UPDATE

PROPOSED SEWER FACILITIES – ALT. 2

FORT CANBY AND COAST GUARD STATION

Gray & Osborne, Inc.

CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG10.dwg, 4/30/2018 11:00 AM, PHILIP MARSHALL

Canby and the Coast Guard Station to the City of Ilwaco will be borne by the Washington State Parks and Recreation Commission and the U.S. Coast Guard.

Wastewater transmission facilities for the future development in the annexation areas will most likely be a combination of gravity and pumped systems due to the extreme topography changes of the areas. At this time the City has not received formal plat layouts for the MSW or Realvest properties showing the developer's plans for sanitary sewer service to the areas expected to be developed. The layout of the sanitary sewers, within the west annexation area developments, will be determined by the developers. All costs of providing sanitary sewers within the property, connection to the City sewer system and upsizing of the City sewer system, if necessary, will be borne by the developers. The City will review the sanitary sewers proposed by the developers of the west annexation properties for conformance with City standards. Dependent on the location of development in the MSW property an opportunity may exist to transfer some wastewater through the 6-inch I.D. force main that will be installed by Washington State Parks.

Based on information provided in a March 1999 Ilwaco Site Concept Plan (Appendix A) this plan Amendment will assume that the point of connection for the sanitary sewer improvements for the MSW property to the existing City sanitary sewers in the vicinity of the main entrance road to the development at approximately Second Ave. and Spring St. It is assumed that the wastewater from the Realvest property would be conveyed along an alignment parallel to Hwy 101 to a point of connection with the existing sanitary sewer at approximately Second Ave. and Spruce St.

The existing sanitary sewer lines in the downtown core are not sized to convey the estimated wastewater flow at full build-out from the annexation area and Fort Canby and the Coast Guard to the wastewater treatment plant. Approximately 2,200 LF of new 12-inch diameter sanitary sewer would be required from 2nd Street to the WWTP. It is anticipated that this sewer would be routed to the WWTP on an alignment that would approximate the extension of Eagle Street east to Elizabeth Street or may be combined with the upgrade of an existing sanitary sewer such as along Howerton Way. Figure 11 shows the two potential routes a new sewer main from Spring Street to the WWTP could follow. The estimated cost of a new 2,200 lf. 12-inch I.D. sewer main, including 7.9% sales tax, 20% construction contingencies and 25% engineering and administrative costs is approximately $550,000.

The Port of Ilwaco is planning on replacing the 40+ year old sanitary sewer in Howerton Way. This sewer was built in the late 1950s to serve the business along the Port waterfront. The wastewater from the east and west ends of Howerton Way is currently directed to a lift station located at approximately Mrytle Ave. and Howerton Way. Originally the pumped discharge was directed to the north and was discharged into the Lake Street Interceptor. The original Port Lift Station was replaced by the City of Ilwaco during the sanitary sewer repair and replacement project in 1997 since the Port Lift

Station did not meet DOE criteria for lift stations. The optimum solution for conveyance of wastewater from the Port area to the WWTP is to convey the wastewater by gravity to the WWTP. The Port of Ilwaco has been offered funding by the Community Economic Revitalization Board to replace the existing sanitary sewer with an 1800 lf. gravity sewer from the west end of Howerton Way to a point of connection with the Elizabeth Street Interceptor immediately upstream from the WWTP. It is assumed a 10-inch diameter sanitary sewer would be installed to minimize the depth of the sewer. The estimated cost of this project is $280,000 including 7.9% sales tax, 10% construction contingency and 20% engineering and administration.

The Port of Ilwaco has discussed the possibility of combining this sanitary sewer upgrade with the cross-town 12-inch sanitary sewer for the west annexation areas discussed above. A 12-inch sanitary sewer would be required for both purposes. However, the depth of sanitary sewer along Howerton Way would be approximately 5 feet deeper than that required for the Port along.

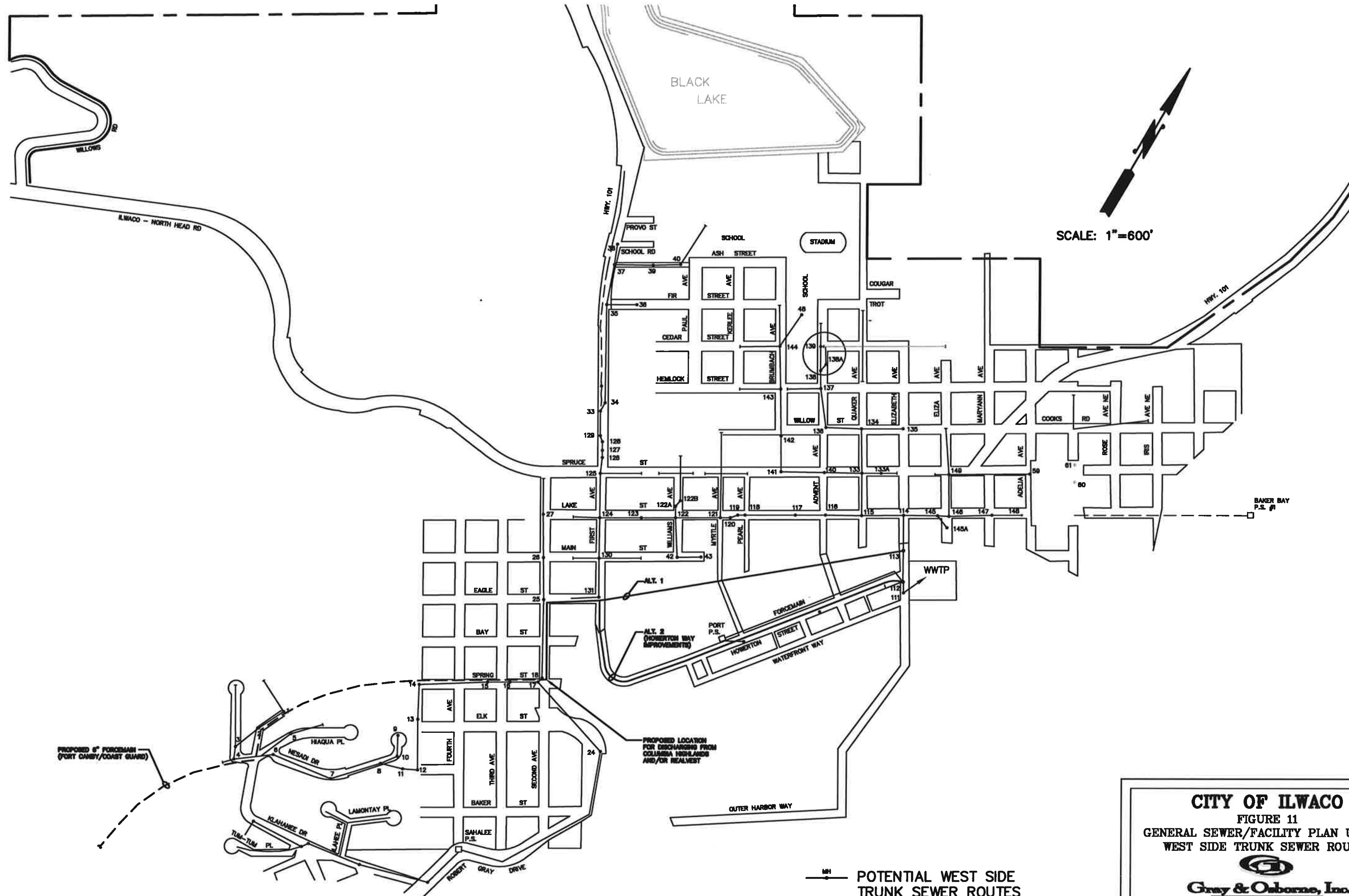
Infiltration/Inflow Projects

The I/I projects identified in the 1994 Infiltration/Inflow Study included the replacement of the main sewers and laterals in the Quaker Street area which included Brumback, Cedar, Advent and Quaker Streets, the Lake Street area and the First Street area. The main sewers in these areas were replaced. Some of the lateral sewers were not replaced due to funding constraints. Figure 12 shows the laterals that have not been replaced.

The City may elect to replace the indicated laterals as finances allow. The priority of the lateral replacement, based on potential for I/I are as follows:

- Cook's Hill – Willow to Lake (through City Park)
- Cedar Street – Advent to Willow
- Mrytle Street – Lake Street to north of Spruce Street
- Main Street – south of Lake Street
- Williams Avenue – south of Lake Street.

The City is anticipating replacing the Cook's Hill sanitary sewer in the fall of 2001. The project will involve replacement of approximately 700 lf of badly deteriorated 8-inch, 6-inch and 4-inch sanitary sewer main from Willows Street through an unopened right-of-way to the City Park to a point of connection with the gravity sewer in Lake Street. This sewer was identified in flow monitoring and closed circuit television inspection as contributing infiltration and inflow. The pipe is so badly deteriorated in places that raw sewage is evident on the ground. The sewer will be rerouted from the existing point of



CITY OF ILWACO

FIGURE 11
GENERAL SEWER/FACILITY PLAN UPDATE
WEST SIDE TRUNK SEWER ROUTES

Gray & Osborne, Inc.
CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG11.dwg, 4/30/2018 10:33 AM, PHILIP MARSHALL

connection on Spruce Street and Maryanne Ave. to a point of connection on Lake Street. The existing sewer, which is routed under the City's tennis court, will be abandoned. The estimated cost of this project is $100,000. The City is anticipating using the remaining USDA Rural Development grant from the 1997/1998 Sanitary Sewer/Wastewater Treatment Plant improvements to fund this project.

The City is anticipating replacing the 4-inch diameter clay tile sanitary sewer in Cedar Street between Advent Avenue and Elizabeth Avenue in the fall of 2001. The project will involve the replacement of approximately 700 lf of badly deteriorated sanitary sewer. The new sewer will connect to the sanitary sewer in Advent Avenue. The estimated cost of this project is $100,000. The City is anticipating using the remaining USDA Rural Development grant from the 1997/1998 Sanitary Sewer/Wastewater Treatment Plant improvements to fund this project.

The City has contracted with Evergreen Rural Water Association to perform smoke testing of the sanitary sewer system in August 2001. This service is provided at no cost to the City.

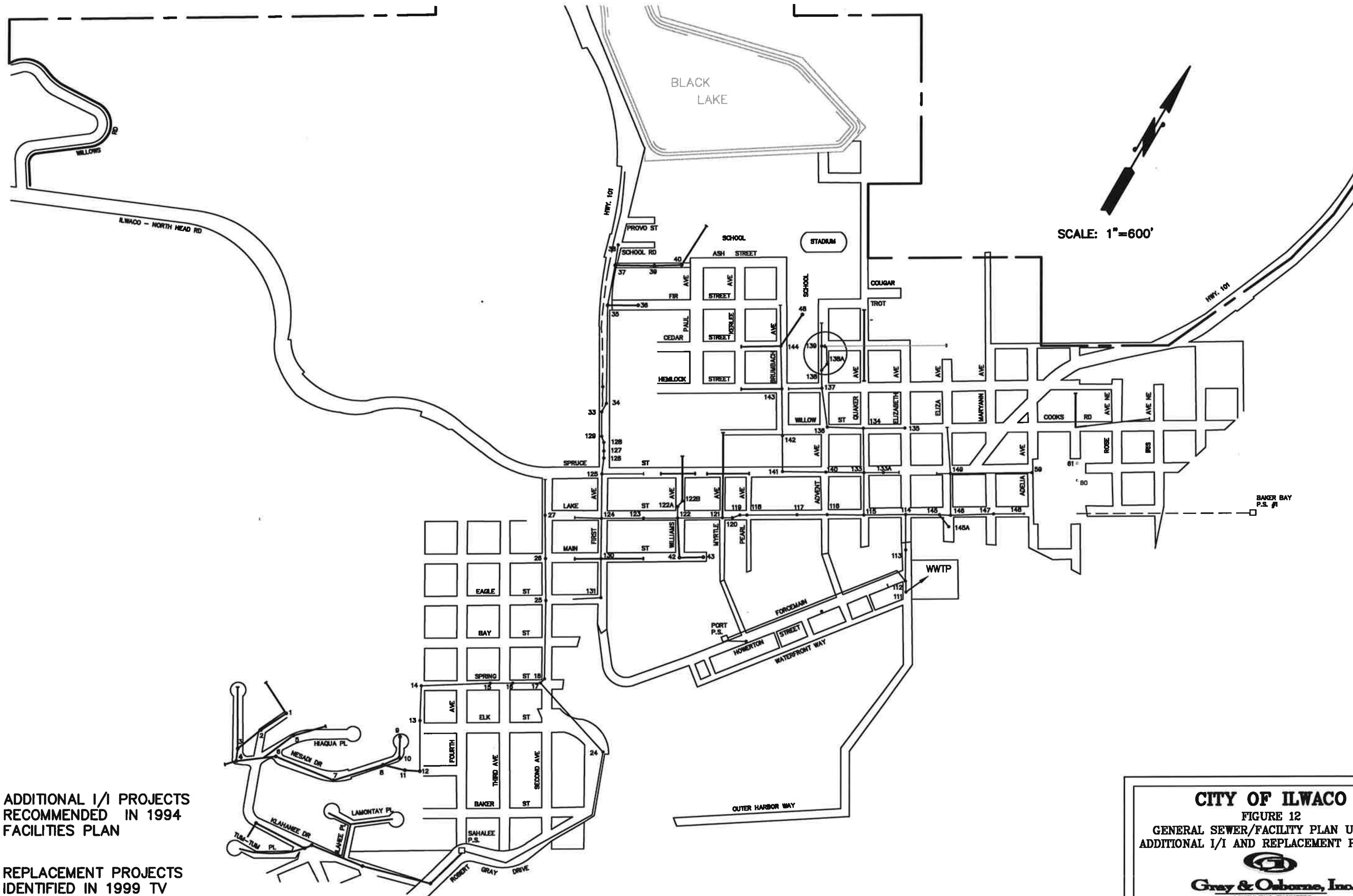
It is recommended the City enter into a flow monitoring program in the winter of 2001/2002 to monitor the effectiveness of the I/I improvements performed to date and prioritize projects for upcoming I/I repair and rehabilitation. It is recommended that the City use equipment capable of measuring flow under surcharged conditions. The anticipated cost of a flow monitoring program is $10,000. This project could be funded by an existing Public Works Trust Fund Loan the City has secured for I/I investigations.

Future I/I repair and rehabilitation projects include the repair of the Main Street and Williams Avenue sanitary sewer. The I/I contribution of these laterals should be assessed in the upcoming flow monitoring program to determine the cost effectiveness of repairing or replacing these sewers.

TREATMENT ALTERNATIVES

The most feasible and cost effective alternative to provide wastewater treatment to wastewater from the proposed development of the annexation areas and Fort Canby and the Coast Guard Station is to implement an expansion of the City of Ilwaco wastewater treatment plant. At a minimum, based on the growth projected within the 1994 City limits, Seaview Sewer District, Fort Canby, the Coast Guard Station and the proposed development in the west annexation areas, the design capacity of the WWTP in 2020 is estimated to be approximately 1,000,000 gallons/day and 1600 lb/d BOD_5 on a maximum month average day basis.

To meet these needs a third SBR tank and appurtenances and additional aerobic digester capacity will be required. It is assumed the third SBR is the same size and depth as the existing SBRs (42' W x 75'L x 15' SWD) and design capacity of the third basin is



MH ADDITIONAL I/I PROJECTS RECOMMENDED IN 1994 FACILITIES PLAN

MH REPLACEMENT PROJECTS IDENTIFIED IN 1999 TV INSPECTION

CITY OF ILWACO

FIGURE 12

GENERAL SEWER/FACILITY PLAN UPDATE

ADDITIONAL I/I AND REPLACEMENT PROJECTS

Gray & Osborne, Inc.

CONSULTING ENGINEERS

J:\4-30-2018 99540 Ilwaco Figure Reprint\FIG12.dwg, 4/30/2018 10:34 AM, PHILIP MARSHALL

350,000 gallons. Based on the per capita flow and BOD and TSS load criteria used in Section 5 the capacity of the third basin would be adequate for approximately 925 ERUs. Figure 12 shows a proposed layout of the additional treatment units at the wastewater treatment plant. The improvements that would be required at the WWTP include the following:

- Influent pump station - install third pump
- Headworks - additional piping and motor actuated valve to direct flow to third SBR unit
- Sequencing Batch Reactor unit - approximately 75' x 42' tank, including jet aeration system (blowers, jet pump, piping), and decanter and connection to existing equalization basin.
- Blower Building - containing SBR blowers, digester blowers, electrical for new facilities.
- Aerobic Digester - approximately 26' x 44' tank, including air diffusion piping, sludge thickening system and connection to the existing truck filling facility.

At the City's request the WWTP was designed for a future increase in capacity, to the extent possible. For example, the placement of the two SBR units on the site provides room for a third SBR unit to the south of the existing units and allows the use of the existing headworks, effluent equalization basin and UV system for the third SBR unit.

It is anticipated that if the City were to seek funding for the construction of the WWTP improvements, the new facilities could be on-line in 2003. The City is seeking ways to be able to provide capacity on an interim basis to those developments, which may be ready to hook-up to the sewer system prior to 2003. The City has identified the potential of 250 to 300 ERUs that may come on-line prior to 2003. The City has implemented interim measures at the WWTP to increase capacity prior to new facilities coming on-line, are discussed below.

BOD Capacity

The BOD capacity of the WWTP is controlled by the ability to deliver oxygen to the contents of the SBRs and by the capacity of the aerobic digester. The capacity of the blowers and consequently the biological capacity of the treatment system could be increased by increasing the speed of the blowers. During design the blowers were sized to provide the design airflow at a blower speed of less than 1,600 rpm to keep noise to a minimum. The operating speed of the blowers at their current design point is 1,444 rpm. The existing blowers could be sped up by replacing the current set of belts and sheaves with a new set of belts and sheaves. Discussions with the blower manufacturer indicate that these blowers could be run at a speed of 1,750 rpm without overloading the existing motor. Under the current operating regime of 1-hour anoxic fill, the biological capacity of the SBRs would be 890 lb/day at 1750 rpm, an increase of 260 lbs/day over the design capacity. If 300 ERUs were to come on-line by 2003, the increase in organic load would be approximately 140 lbs/day. This increase in capacity, which would be adequate, on, an interim basis, to provide sufficient capacity for these proposed ERUs.

Alternatively, treatment capacity can be increased by eliminating the one-hour anoxic period of the cycle and aerating the entire fill period. The City does not currently have an effluent nitrogen limit, so this would not affect compliance of the WWTP and would increase the aeration capacity of the WWTP. If the entire fill period of each cycle is aerated the facility should be capable of accepting up to 1,000 lb/d of BOD.

Increasing biological treatment capacity of the WWTP also requires the ability to treat the biosolids produced during the process. The current aerobic digester is adequately sized to provide treatment for Class B biosolids for the design flow of the WWTP. The design of the WWTP assumed that the concentration of the waste activated sludge into the aerobic digester was 3% solids and the digested biosolids concentration of 4% solids. The operator is currently discharging the waste activated sludge at a higher solids concentration thereby increasing the hydraulic capacity of the aerobic digester. The hydraulic and solids retention capacity of the aerobic digester would be adequate on an interim basis to accommodate an increase of BOD capacity discussed above. However, an increase in the treatment plant capacity on an interim basis would require the installation of new blowers to meet the oxygen requirements of the digester.

Flow Requirements

The new WWTP has been on-line since November 1998. The WWTP was in the start-up mode during a winter of exceptionally high rainfall. The winter of 1998-1999 experienced rainfall, which exceeded the average rainfall for the Long Beach Peninsula (based on 32 years of record) by 55%. The historic average amount of rainfall for November through March for the Long Beach Peninsula is 61.32 inches, however, the rainfall for November 1998 through March 1999 was 94.82 inches. The flow records for this period are not the most appropriate for analysis of the capacity remaining in the WWTP. The rainfall for November 1999 through March 2000 was 71.30 inches or approximately 16% over the historic average rainfall for these months. The analysis of the remaining capacity in the WWTP will be based on the flow information from November 1999 through March 2000. The maximum month average day flow recorded during this period was 0.556 million gallons in December 1999. Rainfall in December exceeded the historical average for this month by 25%.

The maximum month average day design flow for the WWTP is 700,000 gallons/day. The December 1999 average day flow was 144,000 gallons less than the WWTP design capacity. Assuming 300 ERUs may come on-line through the year 2003, it appears there would be enough hydraulic capacity on a maximum month basis to handle the projected maximum month flow from these ERUs of approximately 113,500 gallons/day.

SVI Control

The plant has consistently met the weekly and monthly TSS effluent limitations since December, 1999, including the monthly requirement of 85% minimum removal. The sludge volume index (SVI) is used as an indication of the settling characteristics of a mixed liquor suspended solids (MLSS) and varies with the characteristics of the sludge and MLSS concentration in the aeration basin. A spreadsheet analysis comparing the maximum allowable SVI for a given influent BOD load, solids retention time (SRT), decant depth and MLSS concentration at the Ilwaco WWTP has been prepared. Table 9-2 summarizes this analysis. The decant depth provided in the SBR control program is based on the design regimes for the different flow ranges. For example, for the flow regime from 0.5 MGD to 0.8 MGD, the decant depth is 10.75 feet SWD. It is assumed that the basin fills to 15.0 feet SWD during each cycle. To present the most conservative case, we have also included an analysis of the situation when the basins are full (15.0 ft. SWD) prior to decant and the basins are decanted to the maximum decant depth of 7.5 ft. SWD (50% decant volume). This decant level would normally only be required at the highest flow regime (flows in excess of 1.5 MGD), but the operator can override the SBR program to set the decant depth at the constant value of 50% regardless of influent flow.

TABLE 9-2

SVI Analysis

Flow (MGD)	Influent BOD (lb/d)	ERUs over Design Number	SRT (days)	MLSS (mg/L)	% Decant Depth of Total Volume(1)	Maximum Allowable SVI
Design Flow with SRT Constant(2)						
0.70	630	0	24.5	3020	71.7 %	237
0.736	677	50	24.5	3238	71.7 %	221
0.776	724	100	24.5	3455	63.6%	207
0.814	772	150	24.5	3428	63.6%	185
0.852	819	200	24.5	3631	63.6%	174
0.888	866	250	24.5	3834	63.6%	165
0.926	913	300	24.5	4037	63.6%	157
0.964	960	350	24.5	4240	63.6%	149
Design Flow with MLSS Constant (2500 mg/L)						
0.70	630	0	20.3	2500	71.7 %	287
0.736	677	50	18.9	2500	71.7 %	287
0.776	724	100	17.7	2500	71.7 %	287
0.814	772	150	17.9	2500	63.6%	253
0.852	819	200	16.9	2500	63.6%	253
0.888	866	250	16.0	2500	63.6%	253
0.926	913	300	15.2	2500	63.6%	253
0.964	960	350	14.4	2500	63.6%	253
Design Flow with MLSS Constant (3000 mg/L)						
0.70	630	0	24.3	3000	71.7 %	239
0.736	677	50	22.7	3000	71.7 %	239
0.776	724	100	21.3	3000	71.7 %	239
0.814	772	150	21.4	3000	63.6%	211
0.852	819	200	20.2	3000	63.6%	211
0.888	866	250	19.2	3000	63.6%	211
0.926	913	300	18.2	3000	63.6%	211
0.964	960	350	17.3	3000	63.6%	211

TABLE 9-2 – (continued)

SVI Analysis

Flow (MGD)	Influent BOD (lb/d)	ERUs over Design Number	SRT (days)	MLSS (mg/L)	% Decant Depth of Total Volume(1)	Maximum Allowable SVI
Design Flow with MLSS Constant (2500 mg/L) and 50% Decant Depth						
0.70	630	0	20.3	2500	50.0%	200
0.736	677	50	18.9	2500	50.0%	200
0.776	724	100	17.7	2500	50.0%	200
0.814	772	150	17.9	2500	50.0%	200
0.852	819	200	16.9	2500	50.0%	200
0.888	866	250	16.0	2500	50.0%	200
0.926	913	300	15.2	2500	50.0%	200
0.964	960	350	14.4	2500	50.0%	200
Design Flow with MLSS Constant (3000 mg/L) and 50% Decant Depth						
0.70	630	0	24.3	3000	50.0%	167
0.736	677	50	22.7	3000	50.0%	167
0.776	724	100	21.3	3000	50.0%	167
0.814	772	150	21.4	3000	50.0%	167
0.852	819	200	20.2	3000	50.0%	167
0.888	866	250	19.2	3000	50.0%	167
0.926	913	300	18.2	3000	50.0%	167
0.964	**960**	**350**	**17.3**	**3000**	**50.0%**	**167**

(1) Decant Side Water Depth (ft)/Fill Side Water Depth
(2) Original Design SRT = 24.5 days

The two variables, which affect the maximum allowable SVI, are MLSS concentration and SRT. SVI affects ability to decant successfully to a particular depth without entraining solids form the sludge blanket. Good operating practices recommend that the operator attempt to maintain the MLSS concentration and SRT at target values that achieve good settling sludge (low SVI) and adequate treatment. The Ilwaco WWTP design was predicated on maintaining a MLSS concentration of 2500 mg/L, however, a MLSS of 3000 mg/L is acceptable also. At this MLSS concentration, the maximum allowable SVI for the most extreme case (longest decant level), 50% decant volume, is 200. The WWTP operates in approximately this range of SVI.

The maximum allowable SVI is a result of the management of MLSS and SRT with increasing flow and organic load. As can be seen from the analysis present above, if the operator controls MLSS concentration and SRT with increasing flow and organic loads, the maximum allowable SVI will remain about constant for a given decant volume. The SRT will decrease with increased influent flow and organic load. Assuming an increase in 350 ERUs over the design basis and the most extreme decant scenario analyzed, 50% decant depth, MLSS of 3000 mg/L, influent design flow of 0.964 MGD and organic load of 960 lb/d BOD_5, the required SRT would be 17.3 days. This would be an adequate SRT to achieve the level of BOD reduction required by the City's NPDES permit since, at this time, only BOD removal is required. It is recommended that an SRT of 24.5 days be used when nitrogen removal becomes necessary.

In summary, SVI control, in conjunction with MLSS concentration and SRT control, is important to minimize solids washout. From the analysis presented that an SVI of approximately 200 to 290 should be adequate to assure the sludge blanket is below the decanter provided the WWTP is operated at a constant MLSS concentration in the range of 2500 – 3000 mg/L and the decant regimes based on flow are followed. If the operator chooses to override the present decant depths for the various flow regimes, and operates the WWTP at a constant decant depth of 50% of the basin volume, the SVI should be maintained in the 170 to 200 range. Based on the historic records the average SVI experienced at the WWTP is 189.

By controlling the MLSS concentration and SRT, the WWTP can be operated successfully under any of the loading scenarios presented above . The SVI required for minimizing effluent TSS should be maintained and solids washout will be avoided.

High Flow Management

Ecology has expressed concern over the ability to automatically operate the WWTP under high flow conditions. As currently configured the control software for the Ilwaco WWTP will allow the two SBRs to lock each other into the FILL step under extreme high flow conditions, or extreme changes in flow. This situation occurred during the winter of 1998/1999 when the plant was already operational. The situation can be described as follows. Beginning arbitrarily with SBR #1, if SBR #1 triggers the high alarm float and/or the high alarm analog level, SBR #2 is forced into FILL, allowing SBR #1 to go to REACT and eventually to SETTLE and DECANT. Under conditions of extreme high flow or extremely rapid and dramatic increase in flow, it is possible for SBR #2 to then trigger the high alarm, forcing SBR #1 back into FILL. At that point, both SBRs are locked into FILL until manually decanted. Lock up could also occur if one influent valve failed to open following a high level alarm in the opposite SBR. Operators are alarmed on high level in the SBRs.

The intent of the original design of the WWTP was that the operator will respond to the high flow alarm and correct the problem, and manually decant as necessary to prepare the plant for return to normal automatic operation. A 6-inch overflow in each SBR is designed to pass a portion of the influent flow to the equalization basin to extend the time available for the operator to respond. Each of the 6-inch overflow lines will pass the equivalent to the average maximum month design flow without overtopping the basin, or about 0.7 MGD. However, an operator will still need to respond quickly to a high alarm condition.

During construction a change order was proposed to the City, which would modify the control, software to allow the PLC to perform a number of the initial steps necessary to minimize the possibility of overflow, in the event a high flow event should occur when an operator is off-duty. The proposed revisions would immediately disable the jet pumps and blowers to allow the solids to begin settling. Although flows would continue to enter the SBRs, the selector baffle walls at the head of each tank will reduce the mixing effect substantially and allow settling to begin. After an adjustable time period, the SBRs will decant until the equalization basin is full. While not the preferred method of treatment, decanting while filling is a normal emergency response when performed in conjunction with disinfection. The decanters will then close for an adjustable time period to allow the effluent pumps to lower the equalization basin level, and decant again. When the SBRs reach a preset level, the PLC will attempt to reinstitute normal treatment cycles. All of these steps could be done manually by the operator.

Revisions to the software will not eliminate the need for the operator to respond to a high level alarm. The operator will still need to determine the cause of the alarm, and to diagnose and correct any underlying mechanical problems. Furthermore, the emergency routine will not handle certain unusual scenarios, such as an influent valve that will not open in combination with a decanter failure in the opposite SBR, or simultaneous failure of both decant systems. However, under the circumstances of sudden high flows and/or a stuck influent valve, the proposed revisions would have:

- Reduced the possibility of overflow if the operator is delayed,
- Reduced the potential for loss of solids by initiating primary treatment (no aeration and minimal mixing) immediately, and
- Reduced the amount of time the operator will be required to spend at the WWTP to tend the plant back to normal operations.

The change order was not approved during the construction phase of the project. This change could be made at this time.

SCHEDULE

A schedule for implementation and an estimate of the increased capacity available in the WWTP if additional SBR aeration capacity, infiltration/inflow reduction, SVI control and high flow management software are implemented. An estimated time schedule for implementation, benefit and potential additional ERU capacity, in addition to the design capacity, represented by each of these items is contained in Table 9-3.

TABLE 9-3

Implementation Schedule

Item	Schedule	Benefit	Additional ERUs
SBR Aeration Capacity – Increase speed of existing blowers. Increased organic load to the SBRs would require increased aeration capacity (new blowers) to aerobic digester.	Completed July 2001	Increase capacity of SBRs to treat organic load up to approximately 890 lb/d.	Approximately 350 ERUs in addition to the design ERUs.
SVI Control	Immediately	The most important operating parameter is to maintain MLSS in the 2500 to 3000 mg/L range. To maintain SVI to support decant of 50% of the basin volume the SVI should be in the 170-200 range.	Up to 350 ERUs, on an interim basis, in addition to the design capacity.
High Flow Management Software	Anticipated completion November 2001.	This item enhances operation of the WWTP and does not necessarily provide additional ERU capacity.	Not Applicable

TABLE 9-3 – (continued)

Implementation Schedule

Item	Schedule	Benefit	Additional ERUs
Infiltration/Inflow Reduction 1) Cook's Hill Sewer 2) Cedar Street Sewer 3) Mrytle Street I/I repair 4) Smoke Testing 5) Flow Monitoring	1 &2) Fall 2001 (remainder of USDA RD Grant/Loan 1977 program). 3) Fall 2001 4)Summer 2001 5) Winter 2001/2002	1&2) Repair of old and leaking sanitary sewer identified by the 1994 I/I study and TV inspection. 3) Identification of storm/sanitary connection in collection system 4) Identification of additional side sewer repairs on private property 5) Evaluation of the location and quantity of potential I/I sources following the completion of the sanitary sewer rehabilitation projects.	Additional removal of I/I would be a benefit to the operation of the WWTP. The analysis presented in the March 28, 2001 letter indicates that there appears to be sufficient capacity available on an interim basis to accept flow (maximum month basis) from an additional 320 ERUs over the design capacity.

The estimated cost of instituting the items which would be necessary for allowing interim capacity in the WWTP; increase the output of the SBR blowers by replacing the sheaves ($650); increase the aeration capacity of the aerobic digester by installing larger capacity blowers ($1,700); and installation of the high flow management software ($5,000) is estimated to be $7,350.

WWTP IMPROVEMENT DESIGN CRITERIA

To meet these needs a third SBR tank and appurtenances and additional aerobic digester capacity will be required. It is assumed the third SBR is the same size and depth as the existing SBRs (42'W x 75'L x 15'SWD) and design capacity of the third basin is 350,000 gallons. Based on the per capita flow and BOD and TSS load criteria used in Section 5 the capacity of the third basin would be adequate for approximately 925 ERUs. Figure 13 shows a proposed layout of the additional treatment units at the wastewater treatment plant.

- Influent pump station - install third pump
- Headworks - additional piping and motor actuated valve to direct flow to third SBR unit
- Sequencing Batch Unit - approximately 75' x 42' tank, including jet aeration system (blowers, jet pump, piping), and decanter and connection to existing equalization basin.
- Blower Building - containing SBR blowers, digester blowers, electrical for new facilities
- Aerobic Digester - approximately 26' x 44' tank, including air diffusion piping, sludge thickening system and connection to existing truck filling facility

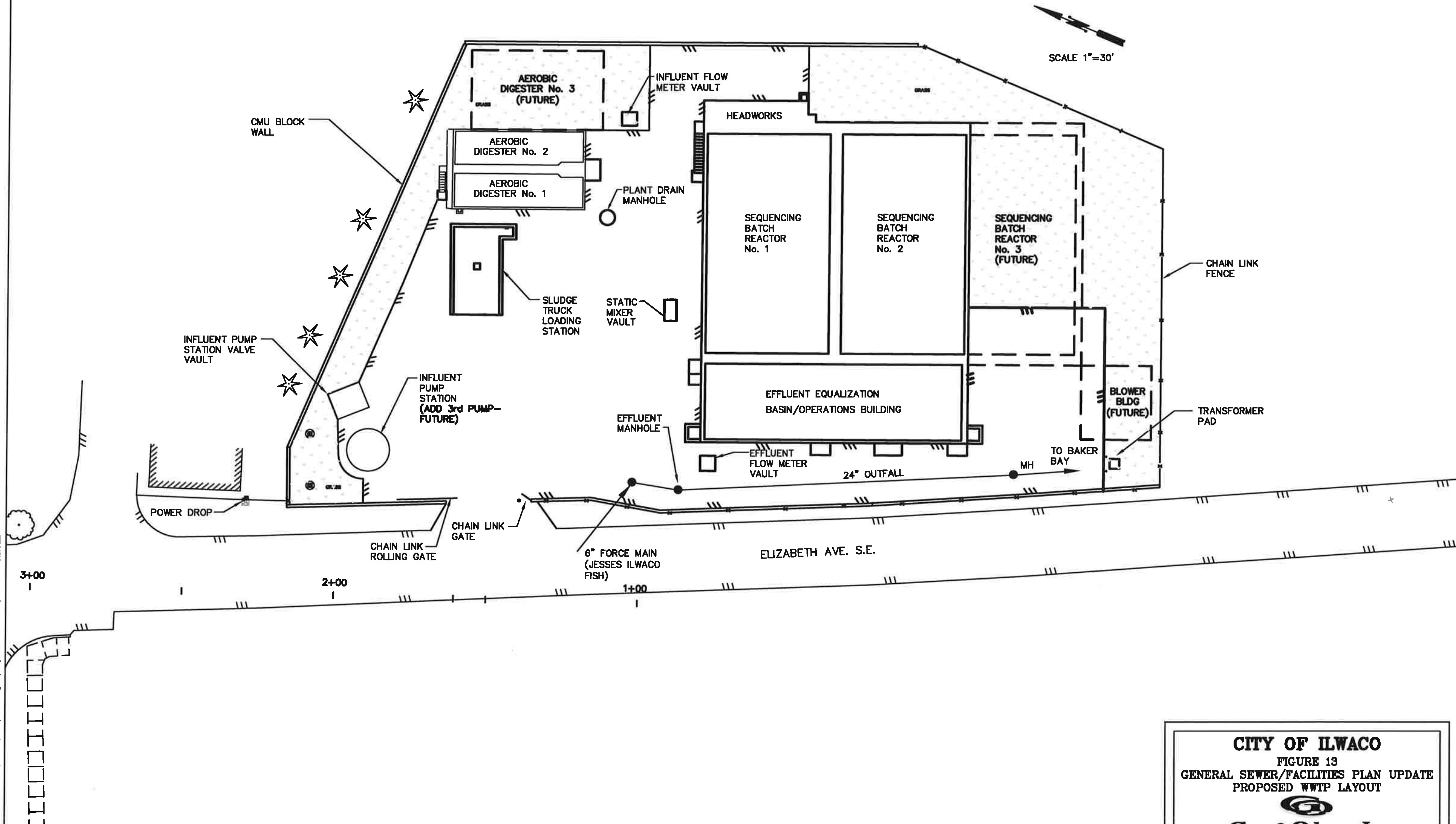
The third SBR basin would be integrated into the overall management of the WWTP similarly to the existing two units. At any one time one of the basins would be filling, another would be in react and the third would be in react/decant/idle mode. The existing headworks is adequately sized to handle the peak flow from two (2) influent pumps (3 MGD) with no improvements required in the headworks. However, a third influent pump, similar to the existing pumps, will be added to the influent lift station to comply with the DOE criteria to provide a redundant pump. To accommodate a third SBR and an extension of the 14-inch diameter headworks discharge pipe, that directs flow to the SBRs, a third motorized influent value would be installed.

Only one tank would be decanting at any time. Since the UV system is sized for the decant rate from one SBR tank the existing UV system would be able to provide service to three SBR tanks. The hydraulic profile of the WWTP would not change as the result of the addition of a third SBR tank.

Additional aerobic digester capacity will be required to provide adequate treatment for the increased influent organic load. In order to provide 40 –60 days biosolids SRT and 20-30 days storage an additional 70,000 gallon aerobic digester is required. The total aerobic digester capacity would be 140,000 gallons.

An equipment building will be constructed to house the aeration blowers and motor control center for the third SBR. In addition, the building will house two blowers for the additional aerobic digester. The building will be approximately 20 X 20 square feet.

The preliminary design criteria for the third SBR unit and appurtenances are shown in Table 9-4.



CITY OF ILWACO

FIGURE 13

GENERAL SEWER/FACILITIES PLAN UPDATE

PROPOSED WWTP LAYOUT

Gray & Osborne, Inc.

CONSULTING ENGINEERS

J:\4-30-2018 98540 Ilwaco Figure Reprint\FIG13.dwg, 4/30/2018 10:36 AM, PHILIP MARSHALL

TABLE 9-4

Preliminary Design Criteria Third SBR Unit

Component	Criteria
Design Flow, gpd (3rd Unit only)	350,000
BOD Load, lb/day(1)	550(1)
Influent Lift Station	
Number of Pumps	1
Capacity, gpm	1500
TDH, ft.	28.5
Motor HP	23.5
Sequencing Batch Reactor	
Quantity	1
Tankage Volume, gallons	350,000
Estimated MLSS, mg/l	2500
Sludge Retention Time, days	24.5
Solids Wasted, lb/d(1)	350
Dimensions	75'Lx42'W
Side Water Depth, ft.	15
Decant Depth, ft(2)	4.25 – 7.5
Aerators	
Quantity	2
Capacity, SCFM(1)	600
Motor, HP, each	30
Jet Aeration Pump	
Quantity	1
Type	Submersible
HP	25
Waste Sludge Pump	
Quantity	1
Capacity, gpm	35
TDH, ft	20
HP	1-1/2
2nd Aerobic Digester	
Quantity	1
Volume, gallons	80,000
Dimensions	42'Lx24'W
SWD, ft	10.5
Actual Oxygen Required, lb/d	260

(1) Assumes the solid load and wasting rate is equally distributed to all three SBR basins.
(2) Decant depth is controlled by influent flow rate. Varies from 4.25 ft. to 7.5 ft.

The estimated cost of the WWTP upgrade, including third influent pump, third SBR, second aerobic digester and blower building is approximately $2,100,000 (2000 Dollars) including 7.8% sales tax, 20% construction contingency and 17% engineering, administration and legal costs. The City requested the inclusion of 17% engineering, administration and legal costs in lieu of the original estimate of 25% for these items. This cost does not include shared costs for facilities which have already been built, i.e., the influent pump station, headworks, and equalization basin, and outfall improvements. A detailed cost estimates of the improvements is contained in Appendix B.

The possibility of phasing the WWTP improvements has been investigated. Potential methods of project phasing, which were investigated, included building an additional SBR tank (175,000 gallon) and aerobic digester (35,000 gallon) which would accommodate one-half of the anticipated flows discussed in Chapter 5 and building the SBR prior to building the aerobic digester. The cost of building the 175,000 gallon SBR and 35,000 gallon aerobic digester is approximately 75% of the cost of building the full size facilities. The operation of the WWTP would be made more difficult by incorporating a different sized basin into the system. In addition, assuming the build-out capacity discussed in Chapter 5 is eventually needed the cost of building two half-size units would be 150%, or more given the increasing cost of money, than building full-size units the outset.

The SBR could be build as a first phase of the project. The third influent pump and blower building would need to be installed/built at the time of the SBR construction. The aerobic digester construction would need to follow shortly after the SBR construction. On an interim basis the existing aerobic digester could handle the increase biosolids generated from approximately 320 ERU over the original capacity. However, this would require the installation of new blowers to increase aeration capacity and operation of the digester at 4% solids. Under this load, approximately 40 days SRT would be achieved, however, there would be limited storage capacity in the digester. Assuming 320 ERUs were connected to the system on an interim basis before the SBR construction was complete the aerobic digester construction must occur simultaneously with the SBR construction.

SECTION 11– PLAN IMPLEMENTATION

In Section 9, alternatives for collection and treatment were discussed. Cost estimates were prepared for each alternative. This section presents the Capital Improvement Plan (CIP) and various methods of financing the CIP projects.

This section will discuss potential financing methods for the WWTP improvements, I/I improvements and the 12-inch diameter sanitary sewer needed to provide conveyance capacity to the properties in the west annexation area. The conveyance facilities to serve Fort Canby State Park and the Coast Guard Station discussed in Chapter 9 are assumed to be funded by the State and Coast Guard. Any sanitary sewer improvements, including pump stations and conveyance systems and improvements to downstream systems required to provide sanitary sewer service to the proposed developments discussed in the Plan Update, and other future developments, will be the sole responsibility of the developer.

Conveyance system, I/I improvements and the WWTP improvement are included on the CIP. Table 11-1 includes the CIP projects, anticipated date for initiation of the projects, anticipated cost of the projects and potential funding sources.

TABLE 11-1

Capital Improvement Plan

Project	Initiation Date	Estimated Cost	Potential Funding Sources
WWTP Interim Capacity Improvements	2001	$7,350	City of Ilwaco (Connection Charges)
Cook's Hill I/I Improvements	2001	$100,000	USDA Rural Development Grant
Cedar Street I/I Improvements	2001	$100,000	USDA Rural Development Grant
Howerton Way Sanitary Sewer Improvements (Port of Ilwaco)	2001	$350,000	CERB Grant and Loan
Flow Monitoring Program	2001	$10,000	PWTF Loan
Force Main from Fort Canby and Coast Guard Station	2002	$2,300,000	State Parks and Coast Guard
Wastewater Treatment Plant Improvements	2003	$2,100,000	Connection Charges, USDA Rural Development Grant/Loan

Several methods of financing were discussed in the 1994 Plan including grants and loans available to public agencies and system development charges. The City of Ilwaco connection charge for new connections to the sanitary sewer system of $3,500 was developed in order to collect the estimated cost per ERU of the WWTP upgrades and the 12-inch diameter sanitary sewer. New connections to the Seaview Sewer District sewer system are also supposed to pay $3,500 per ERU to the City of Ilwaco.

If the City of Ilwaco is allowed to provide additional hook-ups to the system the connection charges collected could be used to decrease the amount of financing the City would need to seek from potential funding agencies for the WWTP improvements.

The Table 11-2 presents the potential connection charges available to the City if interim capacity is available at the WWTP. The levels of participation indicated in this list were generated at a meeting held on March 29, 2001 at the City of Ilwaco.

TABLE 11-2

Potential Interim Participation

Entity	ERU's Anticipated Prior to 2003	Amount Generated By Hook-Up Fees
City	10	$35,000
Kaino	20	$70,000
State Parks	80(1)	$280,000
Coast Guard	30(1)	$105,000
MSW	50	$175,000
Realvest	?	?
Port Leased Property	?	?
Total Potential Interim Participation		$553,000

(1) The number of ERUs for Fort Canby were 67 and Coast Guard Station were 31 in the Fort Canby State Park Water and Sewer Feasibility Study, however the City has offered to allow connection of State Parks at 80 ERUs and the Coast Guard Station at 30 ERUs.

(2) Does not included estimated cost of the 12-inch diameter sanitary sewer of approximately $550,000.

If the interim connection fees are available the City may need to finance approximately $1,650,000 for the WWTP improvements.

Potential sources of financing for this project may come from USDA Rural Development, Department of Ecology Centennial Clean Water Fund and State Revolving Fund Loan or the Public Works Trust Fund Loan program.

An estimate of the amount of debt service for the WWTP project was made assuming the WWTP improvement and the Howerton Way sanitary sewer is funded through up front connection charges amounting to $402,500, $150,000 grant from the Groundfish Disaster Recover Fund and $350,000 from CERB for the Howerton Way sewer and the City secures a 50% grant/50% loan from USDA Rural Development for the balance of the project cost, $1,547,500. The annual debt service for this scenario would be $22,914.

Ideally, the connection charges collected for new connections to the sanitary sewer system in Ilwaco and the Seaview Sewer District would pay for the debt service on the WWTP improvements. However, if for some reason the anticipated number of connections are not generated the City will be responsible for the debt.

The City will need to apply to the funding agencies for financing of the third SBR unit. The various funding agencies have different time lines for grant/loan application. The USDA Rural Development program accepts applications at any time. Public Works Trust Fund Loan applications are due in June of each year. Department of Ecology loan/grant applications are due in February of each year.

In summary, the City of Ilwaco has funding sources in place to allow the City to move forward on the initial four projects on the CIP list, WWTP Interim Capacity Improvements, Cook's Hill I/I Improvement, Cedar Street I/I Improvements, and flow monitoring. The Port of Ilwaco has secured financing for the replacement of the Howerton Way sanitary sewer. The Fort Canby and Coast Guard Force Main, if constructed, will be financed by State Parks and the Coast Guard.