Executive Summary

The City of Vancouver (City) has established itself as a leader in effective sanitary sewer system management by maintaining adequate capacity, proactively maintaining the system to maximize asset life, and minimizing financial impacts on existing and new ratepayers. The City's Public Works Department provides wastewater collection and treatment services to an area of approximately 55.8 square miles, and includes customers inside and outside of the City limits.

The City's current plan, the 1990 Sanitary Sewer Master Plan Amendment, was approved in 1991. This plan was updated in September 1999 with the Wastewater Collection System Comprehensive Master Plan Year 2000 Update, which provided an updated hydraulic model to manage system capacity. In order to address population growth in the service area, changes to the wastewater collection system, and the need for reevaluating both successfully completed and recommended projects, the 1990 Sanitary Sewer Master Plan Amendment and the Year 2000 Update require updating. The purpose of this current General Sewer Plan is to provide a document that captures institutional knowledge, provides sound data that reflect current and build out conditions for utility planning, supports proactive decision-making by City staff, and meets the comprehensive sewer plan requirements established in the Washington Administrative Code (WAC).

This plan identifies needed extensions to the City's sanitary sewer system and addresses capacity restrictions. It provides guidance for serving future development. It also identifies needed wastewater treatment improvements based on the current regulations and includes a budget for asset replacement. The plan does not address additional wastewater treatment improvements that may be triggered by future regulations. It also does not have a specific Capital Improvement Plan for asset replacement. As the City builds out and the sewer system ages, the emphasis is shifting from growth to replacement and preservation of assets. The reorganization of the Public Works Department created a Capital Planning, Finance, and Asset Management Section. This workgroup, in a multi-year effort, will create an Asset Management Program to do a condition assessment and better refine the needs. The City's Hansen 8 software will be a valuable tool in this effort.

ES.1 Planning Area Boundaries

Vancouver is located in the southwestern portion of Clark County, Washington and includes a population of approximately 165,500 (OFM, 2010 Estimates). The City's sewer service area includes approximately 55.8 square miles of developed area, and extends outside the City limits to a portion of the unincorporated urban area north and east of the city limits. Vancouver also conveys and treats flow from a portion of the Clark Regional Wastewater District (CRWWD) service area, just north of the City limits and within Vancouver's Urban Growth Area (UGA). The study area included in this general sewer plan incorporates all these regions, and is shown as the shaded area on Figure ES 1. Figure ES 1 also shows the general vicinity of the City of Vancouver and other nearby jurisdictional boundaries.

ES.2 Existing Wastewater Facilities

The City of Vancouver's wastewater collection system consists of interceptors, trunk lines, mains, pump and lift stations, and force mains. The primary elements of the City's existing wastewater facilities are shown in Figure ES 2. The wastewater treatment system is comprised

of three main facilities: the Marine Park Water Reclamation Facility (Marine Park WRF), the Westside Water Reclamation Facility (Westside WRF), and an industrial pretreatment lagoon. Both the Marine Park WRF and the Westside WRF provide treatment for liquid wastewater; solids collected at the Marine Park WRF are conveyed to the Westside WRF for treatment. Approximately 20 square miles of the drainage basin contribute to the Westside WRF and approximately 17 square miles of the drainage basin contribute to the Marine Park WRF. Approximately 18 square miles can be routed to either facility. Several pump stations are used to balance flows between the Marine Park and Westside WRF and to alleviate capacity limitations in the interceptors. These diversion pump stations include the Burnt Bridge Creek Diversion Pump Station, Orchards Diversion Pump Station, Andresen Pump Station, and SEH Industrial Pump Station.

A major portion of the wastewater conveyance system consists of gravity lines (approximately 672 miles). Most of these lines have a diameter of 8 inches (approximately 515 miles). There are approximately 32 miles of force mains. In addition to the four major diversion pump stations discussed and identified above, there are an additional 30 pump stations that serve smaller, neighborhood, areas.

Flows from the gravity conveyance system are routed to a series of interceptors that serve as the backbone of the City's system. The Northside Interceptor and the Southside Interceptor are the oldest interceptors in the system, constructed in 1947 to intercept flow from sewers flowing into the river and direct it to the treatment plant. The majority of the interceptor system was constructed during the 1970s. Addition of the AB Interceptor, A Interceptor, B Interceptor, C Interceptor, D Interceptor, and E Interceptor extended the City's sewer system well outside the city limits. Interceptor F was added in 1996 to serve the growing northeast portion of the City.

The City-owned industrial pretreatment lagoon accepts industrial discharges from Great Western Malting, Frito-Lay, and Northwest Packing and discharges lagoon effluent to the Westside Water Reclamation Facility. Figure ES 2 presents the major interceptors, wastewater treatment facilities, and major pump stations in the City of Vancouver's Sewer Service Area.

ES.3 Population and Flow Projections

Projections of future domestic wastewater flow were determined based on the types of land use planned within the City's UGA as part of the City's Comprehensive Plan, and the average flow produced by each individual. Industrial flow was determined based on permitted flow or planned discharges from industries within the City. Growth within the service area was determined based on development assumptions used in the City's Comprehensive Plan and Clark County's Vacant Buildable Lands model, with adjustments made for available detailed subarea development plans. This methodology resulted in future projected population and employment of 283,431 and 157,736, respectively.

Dry weather loading rates (flow per person) were developed through extensive flow monitoring used in calibration of the City's dry weather flow hydraulic model conducted in 2007. Through the model calibration process, a flow of 75 gallons per capita per day (gpcd) was determined to be representative of overall wastewater generation in the City. The 75 gpcd used in model calibration is 86 percent of the per capita water consumption of 87 gpcd. The Water Master Plan developed an average water demand of 58.5 gpd per employee. Applying the same 86 percent ratio seen in residential applications results in a projected wastewater flow of 50 gpd per employee. Flow rates of 75 gpcd for the residential population and 50 gpcd for employees were

applied to the residential and employment numbers to generate base dry weather flow in the system model.

ES.4 Hydraulic Model Development and Calibration

The City's collection system capacity was evaluated through the development, calibration, and characterization of a hydrologic and hydraulic system model. The model was developed in Danish Hydraulic Institute's (DHI's) MIKE URBAN collection system modeling program. The modeled collection system network contains approximately 2500 pipes, with diameters 6 inches and larger; 15 pumping stations; and 230 catchments and represents the existing conditions during late summer of 2008.

The model was used to determine whether the existing system will be able to adequately convey estimated flows. Flows generated from neighborhood basins are assigned as inputs into the model network. Flow monitoring data collected at key locations were used to calibrate a dry weather existing conditions model. Rainfall records and corresponding wet weather flow data were used to estimate infiltration and inflow contributions. These contributions were added to the dry weather model to generate peak flows for the existing system conditions.

The hydraulic model was calibrated under both dry weather and wet weather conditions. The dry weather calibration involves preparing sub-models, selecting a dry weather calibration time period, and an iterative process of comparing model results to metered data. Adjustments are made to one of the flow data sets, diurnal patterns, energy loss coefficients, and wider scaling factors. The general approach to the wet weather calibration is similar to that of calibrating the dry weather model. Rainfall and other data are collected, reviewed and utilized, calibration time periods are selected, models are run and compared to metered flows, and parameters are adjusted.

ES.5 Current System and Future System Analysis

Following calibration, the hydraulic model was used to evaluate system capacity under both existing and buildout conditions. The steps involved in conducting this analysis included:

- Developing the buildout model by adding future catchments and adjusting network piping.
- Adjusting population employment, and industrial flows to reflect future buildout conditions.
- Evaluating infiltration and inflow contributions and selecting design storms to simulate future peak system flows.
- Evaluating system performance during the design storms under both existing and buildout conditions
- Examining improvements to address system deficiencies under existing and buildout conditions.

ES 5.1 Design Storm Selection

In order to evaluate how the system responds to wet weather flow, continuous simulations were run for both the existing condition and buildout models using historical precipitation data spanning 30 years as loading to the models. To select design storm events, the precipitation data was examined to identify the largest 24 hour total rainfall depth values, and these storm events were compared alongside with storm events from the 30-year period of record that generated the largest peak flows in the simulation results. A statistical analysis of the 30-year period of record was also performed to determine the anticipated 24 hour rainfall totals for storms with a range of return intervals. The results of this statistical analysis are shown in Table ES.1.

Table ES1: Statistical Analysis of Rainfall Data: 1979-2009

Return Period	Approximate Rainfall (inches)
25 yr, 24 hr	3.4
10 yr, 24 hr	2.4
5 yr, 24 hr	2.05
2 yr, 24 hr	1.81
1 yr, 24 hr	1.35

The results of the ranking of the peak flows generated in the simulation results, the ranking of the cumulative 24 hour rainfall depths, and statistical analysis of the rainfall data were examined in order to identify suitable storms to use as loading to the model to evaluate the performance of the collection system under future build out conditions. Design storms were selected from the 30 year period of rainfall record corresponding to both 5-year and 25-year return intervals. Based on these analyses, 19 November 1996 event was selected as an estimate of a storm representing slightly under a 25-year event, and the 1 January 2003 event was selected as an estimate of a 5-year event.

ES 5.2 Future Scenario Analysis

Models for several alternative build out scenarios were created and simulated in order to examine the impacts of specific changes. These scenarios are described in Table ES.2.

Table ES2: Simulation Results of Build Out System Scenarios

Scenario Name	Purpose	Results
63rd Street Pump Station Catchment Reconnection	Evaluate impact of redirecting flow from the 63rd Street Pump Station	Existing discharge location provides adequate capacity
Hewlett Packard Site Flows	Evaluate impacts of increasing flow from the Hewlett Packard site at SE 34th Street.	Discharge of all flow through the current discharge location results in surcharging. Directing flow from the Hewlett Packard site to two discharge locations is therefore recommended

Scenario Name	Purpose	Results
Activation of Burnt Bridge Creek Diversion Pump Station	Determine whether use of the Burnt Bridge Creek Diversion Pump Station is needed to manage future flows	Activation of the Burnt Bridge Creek Diversion Pump Station is necessary to minimize surcharge in the Westside Interceptor

The City of Vancouver has a tight system with respect to inflow and infiltration. Comparing the dry weather and peak wet weather flow at the Marine Park WRF and the Westside WRF generated through the model analysis with the actual rated capacities of these facilities as stated in their National Pollution Discharge Elimination System (NPDES) permits shows that both facilities have adequate capacity to handle average and peak flows associated with the buildout of the service area.

ES.6 Capital Improvement Program

Overall, the hydraulic analysis shows that the capacity of the conveyance system and pumping and treatment facilities are sufficient to meet future needs. Recommended improvements to the collection system in the various sewer basins were identified through the system hydraulic model, discussions with City staff, and evaluation of local problem areas in the system. The Capital Improvement Program (CIP) also includes 8-inch sewers that are extended into neighborhoods currently served by septic systems as part of the City's Sewer Connection Incentive Program (SCIP). It is also recognized that there will be a need to invest in the preservation and/or replacement of existing infrastructure as the system continues to age and to coordinate improvements with new roadway construction. The City is embarking on a comprehensive Asset Management Plan that will refine these needs. While there is adequate treatment capacity for buildout, known projects associated with maintenance and replacement of existing equipment and infrastructure are shown in Table ES.3.

Table ES3 Summary of Capital Improvement Projects

Basin Improvements

Name	Description	Timing	Trigger	Cost
Basin A12-3 Sewer Improvements	Upsize sewer from 8-inch to 12-inch from MH 2254 to MH 2249	2020-2025	Peak flow of 0.7 MGD	$715,000
BBCDPS Improvements	Reactivation of BBCDPS and upsizing influent sewer	2011-2012	Immediate capacity need to divert peak flows to the MPWRF	$383,000
Basin E5 Sewer Improvements	Bore under railroad tracks to parallel the existing 15-inch pipe between MH 1488 and MH 1498 with a second pipe	2015-2020	Industrial development over 2 MGD in Basin E5-4	$122,000
Basin S3-1 Sewer Improvements	Upsize sewer from 10-inch to 12-inch from MH 1335 to MH 1865	2011-2012	Immediate capacity need to address	$160,000

Name	Description	Timing	Trigger	Cost
	Provide locking watertight manhole cover at MH 1866 to prevent potential overflow		potential surcharging under peak flow conditions	
GMA Pump Station Improvements	Reroute Stein Estates Pump Station discharge and provide parallel force main from Maplecrest Pump Station	2015-2020	Funding availability	$1,600,000
Evergreen Highway Forcemain	Install 6,330 feet of 5-inch and 8-inch forcemain in Evergreen Highway	2021	Commitment of development at the Evergreen Highway Area Interchange	$1,750,000
Sludge Forcemain Extensions	Install 8,100 feet at 6 inch and 8 inch pipe and install an additional 6,811 feet of 6 inch and 8-inch pipe inside a dry line	2020	80% of design capacity	$2,060,000
2nd and Columbia Pump Station Removal	Extend short main from Waterfront Pump Station to take 2nd and Columbia Pump Station offline.	2014	Waterfront development or Columbia River Crossing project	$70,000
Basin B4 Pump Station Removal	Decommission Sandcastle Pump Station	2016	Successful easement negotiation	$195,000
Pinebrook Forcemain Reroute	Install 700 feet of new forcemain to redirect pump station discharge	2017	Decommissioning Basin B4 pump station	$265,000
	Sub-Total Basin Improvements:			$7,320,000

SCIP, Replacement/Preservation, and Roadway Coordination[1]

Name	Description	Timing	Cost
SCIP	Extend mains into neighborhoods served by septic systems.	2011 – 2026	$50 million total at $3 million per year
Replacement/ Preservation	Restore existing infrastructure. Estimate based on applying CIPP technology to clay pipes.	ongoing	$250,000 per year for 2011-2020; $1.0M per year for 2021-2023, $2.0M per year 2024 onwards
Main Street, 5th to	Replace 1,900 feet of old clay mains	2013	$520,000

15th	with 8-inch mains with roadway coordination project.		
NE 28th Street, 142nd to 162nd	Install 900 feet of 8-inch mains with roadway coordination project.	2016	$170,000
NE 137th Avenue, 49th to Fourth Plain	Install 2,600 feet of 8-inch mains with roadway coordination project.	2015	$430,000
NE 18th Street, Four Seasons to 138th	Install 1,700 feet of 8-inch and 10-inch mains with roadway coordination project.	2013	$395,000
Section 30 Arterial Expansion	Install sewer mains in coordination with Transportation's Section 30 Arterial Expansion Project.	2017	$2.0 million
	Sub-Total SCIP, Replacement/Preservation, and Roadway Coordination Improvements:		$73,015,000

Note:

1. SCIP projects will occur annually through completion of the program (planed for 2026). Replacement/Preservation projects will occur annually. Other Roadway Coordination projects will be triggered by initiation of the roadway improvements.

Development Improvements[1]

Name	Description	Timing	Cost
Neighborhood Pump Stations	Construct 18 pump stations identified for development.	As needed	$9.0 million
Force Main for northernmost WSLL Pump Station	Install approximately 7,500 feet of 8-inch pipe.	As needed	$1,644,000
Force Main for Waterfront Pump Station in Basin S2	Install approximately 2,200 feet of 12-inch pipe.	As needed	$501,000
Force Main for North Pump Station in Section 30 in Basin E5-5	Install approximately 5,500 feet of 8-inch pipe.	As needed	$1,206,000
Force Main for South Pump Station in Section 30 in Basin E5-5	Install approximately 3,300 feet of 8-inch pipe.	As needed	$723,000
Force Main for extension from City project to north of SR-14 in Basin E5-6	Install approximately 2,000 feet of dual 5-inch and 8-inch pipes.	As needed	$869,000
Force Main for pump station in Basin E5-7	Install approximately 14,000 feet of 8-inch pipe.	As needed	$3,069,000
Force Main for pump	Install approximately 4,000 feet of 6-	As needed	$865,000

station in Basin F-1	inch pipe.		
Force Main for pump station in Basin F-6	Install approximately 7,500 feet of 6-inch pipe.	As needed	$1,622,000
	Sub-Total Development Improvements:		$19,499,000

Note:

1. All projects will be triggered by private development.

Wastewater Treatment Improvements

Name	Description	Timing	Trigger	Cost
Capital Replacement and Preservation	Preserve and extend life of existing process equipment, including but not limited to: equipment coatings; pipe lining and repair; pump replacements;	2011 – 2030	Equipment age and condition	$7.367 million
Process Controls Electronics	Upgrade PLCs, HMIs, and other hard and soft devices for plant controls	2012 – 2016	Equipment age and condition	$0.5 million
West 16th PS Improvements	Replace shell and vault at West 16th PS	2013 – 2017	Equipment age and condition	$1 million
WS Aeration Membrane Improvements	Replace diffuser membranes	2011	Equipment age and condition	$70,000
FBF Improvements	Replace heat exchanger equipment	2011-2020	Equipment age and condition	$338,000
WS Buildings Painting	Paint exterior of buildings at Westside	2014-2017	Equipment age and condition	$121,510
WS Maintenance Building	HVAC System replacement	2012	Equipment age and condition	$25,000
Solids Centrifuge Improvements	Convert DC drives and motors to AC drives	2017	Efficiency upgrade	$250,000
UV System	Replace UV system	2017	Equipment age and condition	$300,000
WS Primary Clarifier Improvements	Coat basin and replace underflow pipe	2011	Equipment age and condition	$200,000
WS Process Controls	Upgrade electronics and software for process controls	2020	Equipment age and condition	$500,000
WS Wet Process Improvements	Upgrade to process equipment including UV disinfection system and aeration membranes	2020	Equipment age and condition	$0.42 million
MP Wet Process Improvements	AB Effluent Channel Split	2014	Process Improvement	$60,000
WS Odor Control	Covers / replace launders at primary clarifiers	2016-2017	Equipment age and condition	$1.2 million
WS Solids Process	Incinerator flue exhaust pipe	2011 -	Equipment age	$0.35 million

Name	Description	Timing	Trigger	Cost
Improvements	replacement, Centrifuge upgrade	2015	and condition	
Ash / Energy Recovery	Heat exchangers, cyclone separator, electrical generator	2018-2020	Efficiency upgrade	$8.35 million
Multiple Coating Projects	Gravity thickeners, primary clarifiers, ash auger, others	2021-2022	Equipment age and condition	$0.5 million
Energy Sustainability for Multiple Projects	Replacement pumps and blowers, variable frequency drives and heat recovery units that directly result in electrical and other utility savings.	2014-2018	Efficiency upgrade	$650,000
Lagoon Blower Replacement	Replace existing blower in Pretreatment Lagoon with high efficiency blowers	2017	Efficiency upgrade	$300,000
Roof Replacement at Westside	Roof at the Westside WRF will be replaced	2012-2014	Equipment age and condition	$60,000
Lagoon Fine Bubbler Diffusers	Replace aeration membranes at Pretreatment Lagoon with more efficient fine bubbler diffuser type membranes.	2017-2018	Efficiency upgrade	$700,000
Replacement of Admin Roof	The roof of the Westside WRF administration building will be replaced.	2011	Equipment age and condition	$35,000
CEMS System Upgrade and Replacement	Upgrade sensor probes and other instrumentation on the continuous emissions monitoring system.	2017	Equipment age and condition	$50,000
WS/MP Concrete tank coatings	Repair and recoat protective coatings and liners for primary and secondary treatment basins and equipment structures	2020	Equipment age and condition	$500,000
Septage Receiving Station Upgrade	Repair and upgrade septage receiving structure and equipment	2020	Equipment age and condition	$200,000
FBF Fab Blower Replacement/Upgrade	Replace aging blower with turbo or other energy efficient blower	2021	Efficiency upgrade	$500,000
WS/MP Chemical Tanks Replacements	Replace fiberglass/plastic tanks: sodium hydroxide, sodium hypochlorite, polymer	2021	Equipment age and condition	$500,000
WS UV System Upgrade	Replace aging and outdated UV disinfection system	2022	Equipment age and condition	$500,000
Main Industrial PS Upgrade	Repair / replace aging structures, equipment and wet well	2022	Equipment age and condition	$500,000

Name	Description	Timing	Trigger	Cost
Fluidized Bed Furnace Replacement Unit and Building	Solids incinerator with energy recovery for replaced or improved solids incineration process	2022	Equipment age and condition	$20,000,000
WS Schwing Pump Replacements	Replace aging and worn sludge transfer pumps	2023	Equipment age and condition	$600,000
WS Replace Odorous Air Treatment Scrubber	Replace fiberglass towers/internals and ancillary ductwork of air treatment scrubbers	2023	Equipment age and condition	$500,000
WS Grit Removal System Replacement	Replace aging and worn grit cyclones and ancillary equipment	2023	Equipment age and condition	$500,000
Lagoon Blower Upgrade	Second high efficiency air blower for Pretreatment Lagoon in effort to replace existing blowers.	2023	Efficiency upgrade	$300,000
MP Engineering Records Storage Bldg.	Equipment and records storage facility to replace aging building (located at Westside)	2024	Equipment age and condition	$1,000,000
MP Replace Odorous Air Treatment Scrubbers	Replace fiberglass towers/internals and ancillary ductwork of air treatment scrubbers	2024	Equipment age and condition	$1,000,000
WS/MP PLC Upgrades	Replace programmable logic controllers and SCADA equipment to reflect current and improved control / data systems	2024	Equipment age and condition	$800,000
WS Centrifuge Replacement	Replace aging centrifuges for solids thickening	2024	Equipment age and condition	$800,000
WS Gravity Thickeners Overhaul	Repair / replace structures and mechanical equipment inside solids thickening tanks	2025	Equipment age and condition	$1,000,000
Frito Lay PS Repair and Upgrade	Repair / replace aging structures, equipment and wet well	2025	Equipment age and condition	$1,000,000
WS Headworks Improvements	Influent wet well, pump and headworks improvements to replace aging equipment and improve reliability	2026	Equipment age and condition	$3,000,000
WS Effluent Pump and Line Upgrade	Repair aging effluent pipeline and pumps	2026	Equipment age and condition	$2,000,000
	Sub-Total Wastewater Treatment Improvements:			$58,546,000

ES.7 Other Collection System Programs

In addition to evaluating capital improvement needs, the General Sewer Plan efforts included a review of the City's odor control program and a review of current practices to evaluate the City's current Operation and Maintenance (O&M) practices relative to potential Capacity, Management, Operation and Maintenance (cMOM) regulations. The City also administers a Sewer Connection Incentive Program (SCIP) to encourage citizens to abandon septic systems and connect to the public sewer, and an Industrial Pretreatment Program to manage industrial discharges to the public sewer system.

ES 7.1 Odor Control Program

The City of Vancouver has demonstrated a commitment to eliminating nuisance odors with its existing odor control strategy. A recommended strategy was developed for eliminating nuisance odors, based on the City's existing practices. The recommended steps in this strategy are shown below.

1. Recognizing and acknowledging an odor problem
2. Identifying the odor source
3. Identify and prioritize the objectives for controlling the specific odor problem.
4. Evaluate the effectiveness of the implemented solutions
5. Selecting one or more odor control methods and implementing
6. Documenting the steps taken to control the odor problem.

It is also recommended that the City develop an "Odor Complaint Investigation Form" for use in the field and continue to aggressively evaluate historical areas of concern. Staff should also regularly evaluate whether passive odor control measures can be implemented in the gravity sewers, lift stations, and force mains. It is also recommended that the City staff learn how to regulate, control, and change, when necessary, the application rates of the BIOXIDE® chemical injection system.

ES 7.2 Wastewater Collection System Operation and Maintenance Programs / cMOM

As the City of Vancouver's valuable collection system infrastructure ages, the importance of preventative and predictive maintenance increases. A draft cMOM assessment checklist was developed to evaluate the City's current O&M practices relative to potential cMOM regulations and involved three primary elements: Information Collection and Review, Staff Interviews, and Operations Observation. The checklist was based on the Water Environment Federation Collection Committee's web-based guide to define cMOM requirements, and utilized elements of EPA's cMOM Program Self Assessment Checklist.

The City of Vancouver also has a strong collection system operation and maintenance program in place. No gaps were identified in the following program areas: Management Information System, Equipment parts inventory, Safety, Training, Internal communications, System mapping, and Engineering design.

The review did identify some areas where changes can be made to improve compliance of O&M practices with the proposed cMOM permit conditions. These recommendations are described in Table ES 4.

Table ES4: O&M Program Recommendations

Program Area	Recommendation
Video Inspection	• Standardize and define a rating system to determine the severity of defects observed during inspections
Sewer Cleaning	• Plot stoppages on maps to correlate with other data such as pipe size, material, or location (this effort is ongoing in the City's development of a link between CMMS and GIS data)
Manhole Inspection and Assessment	• Include measurement of atmospheric hazards, especially hydrogen sulfide levels
Pump Stations	• Develop criteria for manual and/or automatic manipulation of pump operations during wet weather events
Equipment and Collection System Maintenance	• Evaluate reprioritizing work orders backlogged more than six months
Hydrogen Sulfide Monitoring and Control	• Develop written procedures for the determination of chemical (Bioxide) dosages • Document chemical dosages, dates, and locations
Overflow Emergency Response Plan	• Develop procedures detailing how field staff should respond to media, enforcement agency, and/or public inquiries if Management can't be reached
Customer Service	• Consider training staff to respond to customer inquiries during field activities

ES 7.3 Industrial Pretreatment Program

The City of Vancouver has a state-delegated pretreatment program for industries within the City sewer boundaries. The City currently issues the following type of discharge permits: Categorical Industrial Permits, Significant Industrial Permits, Minor Industrial Permits, Letters of Discharge (LOD), Letters of Zero Discharge (LOZD), and Special Discharge Authorizations.

All industrial dischargers must comply with the Vancouver Municipal Code 14.10, which contains information on pretreatment requirements and local limits. Pretreatment staffs work with industries to eliminate pollutants and neutralize waste streams at the site of origin and ensure to meet the following objectives:

1. Ensure safe conditions for workers
2. Prevent industrial and other discharges from disrupting the treatment process
3. Prevent degradation of water quality from excessive heavy metals, toxic organics, or persistent, bioaccumulative toxins passing into and through the system

4. Protect the environment by minimizing metals and other toxins in the treatment plant sludge.

5. Seek and prepare for water and sludge reuse opportunities where possible.

The Industrial Pretreatment Program also includes an Investigative Analysis Plan designed for communication between treatment plant operators and Engineering staff to for effective deployment of investigation activities when unusual conditions are noted at the headworks of the City's treatment plants.

ES.8 Financial Analysis and Cost per Services

The City of Vancouver establishes sewer rates and charges based on the anticipated cost of services, and assesses a System Development Charge (SDC) or connection fee for new users connecting to the City's sewer system. The City recently completed a utility rate review process resulting in a recommendation to increase sewer utility rates in 2011 and 2012. The recommended rate increases were approved by the City Council in 2010, and incorporated in the Vancouver Municipal Code Section 14.04.230. The majority of the sewer fund expenditures are associated with operations and maintenance costs, debt service, and capital expenditures. The largest portion of the budget (63% of total expenditures) is Operations and Maintenance, which includes contracted services, utility and state taxes, supplies, and personnel. Debt service comprises the majority of the remaining budget, with capital improvements under 5 percent of the total budget. Over the next 11 years, the City will retire significant debts, resulting in debt payments decreasing from over $12M/year to just under $4M/year in 2019-2020. With the final debt service payment in 2020, all of the existing debt in the water and sewer utilities will be retired.

With the recent rate increases and with the potential to redirect funds from debt payment to capital improvements in the near future, all of the planned improvements can be funded using cash from the sewer utility fund.