

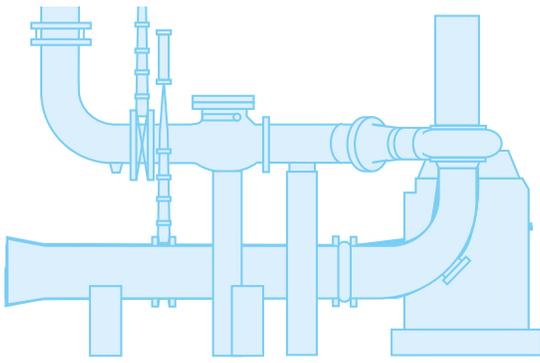
# Off-site Facilities

An overview of pump and  
regulator stations in the King County  
Wastewater Treatment Service Area

June 1999



**Wastewater Treatment Division**  
*Clean Water—A Sound Investment*



## Off-site facilities...

### *Important links in the wastewater treatment system*

## Regional Pump Stations and Regulators

The King County wastewater system serves 1.3 million residents within a 420-square-mile service area. A daily average of 205 million gallons of wastewater from homes, industries and streets reach the County's two regional treatment plants through 41 pump stations, 19 regulator stations and more than 255 miles of sewer pipes beneath the streets. These sewers, which are 12-inches to 12-feet in diameter, connect to large trunk lines, which then connect to interceptors. Interceptors are major gravity flow lines that carry wastewater to the two major treatment plants.

The north/south topography, carved out by glaciers over the past ages, requires a significant number of pump stations and tunnels to transport the wastewater west and south so it can be treated and discharged into salt water. Wherever possible, the County uses gravity to carry wastewater from local drainage basins to the treatment plants. Pump stations are used when necessary to lift sewage over hills and around lakes, to the main interceptors. These stations automatically regulate their pump rates depending on factors such as increased flows caused by heavy rains.

The area feeding into the East Section Reclamation Plant in Renton uses pump stations and gravity to transport flows into the plant. The system feeding the West Point Treatment Plant uses pump stations and regulator stations to regulate flows between pump stations and the plant. The regulation is necessary at West Point due to the combined storm drains and sanitary sewage collection system in the older parts of Seattle.

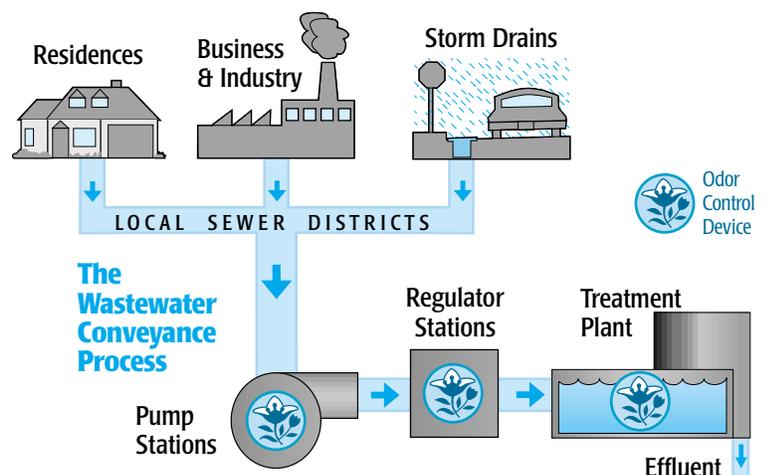
The pump stations range in size from small "package" stations handling about 250,000 gallons of wastewater a day to the largest pump station at Interbay which moves up to 133 million gallons of wastewater per day to the West Point plant. The size and number of pump stations is related to topography, population density and service area. Stations are designed to

handle the peak flow from what is known as a "20-year storm" with all pumps operating. Each treatment plant also has a very large pump station to bring wastewater into the plant for treatment and another to discharge effluent, or treated wastewater, out to Puget Sound.

Treatment plant staff continuously monitor operations at each pump station 24-hours-a-day via computerized data and telemetry systems, thereby providing quick response to power outages and equipment failures. Crews check each station several times a week to ensure that equipment is functioning normally. They regularly lubricate and perform preventive maintenance on equipment and each week they clean the wet well where sewage enters the station.

Most of the pump stations were built in the 1960s when the regional treatment system was first constructed. The new West Seattle station came on-line in summer 1998; the new North Creek station in fall 1999. Designed with an eye to future expansion, pump stations are improved as needed to increase pump capacity, upgrade control technology, replace old equipment and update odor control units. Architects designing improvements to a pump station consider the station's surroundings to help it blend better with its neighborhood. Many of the new stations incorporate art into the station design.

1



# East Section Pump Stations

## **North Creek**

In 1999, King County will bring on line the North Creek pump station to divert up to 36 million gallons per day of wastewater from the north service area during the wet season and pump the flows to York pump station. This station will off load flow from the Kenmore lake line by diverting flow during the wet season. The North Creek pump station will also interface with the York pump station. This interface will make sure the York station is running and can accept the flows from the North Creek station. The service area extends from Bothell in King County to Mill Creek in Snohomish County.

## **Hollywood**

The Hollywood pump station in Redmond serves northern Pine Lake Plateau, Lake Hills and Redmond. During dry weather months the station receives wastewater flow from the Northeast Lake Sammamish interceptor and pumps it to the Sammamish Valley interceptor, where it flows by gravity to the Woodinville pump station and then to the West Point plant. During wet weather months the Hollywood pump station is shut down, and the wastewater flow feeds the York pump station, which conveys the flow to the Eastside interceptor and then to the treatment plant in Renton. Hollywood and York pump stations are companion stations and only one operates at a time.

## **York**

The York pump station receives wastewater from the 72-inch diameter Northeast Lake Sammamish interceptor. Wastewater flow is pumped through two force mains (30- and 48-inch diameter) to the north end of the Eastside interceptor. The service area includes northern Pine Lake Plateau, Lake Hills and Redmond. (See Hollywood pump station above.)



*York Pump Station*

## **Juanita Bay**

The Juanita Bay pump station serves 7,650 acres in the Juanita and north Kirkland areas. Wastewater flow is pumped through two parallel force mains (18- and 24-inch diameter) to the Juanita interceptor, located along the Burlington/Santa Fe rail line.

## **Kirkland**

The Kirkland pump station receives wastewater flow from the Kirkland downtown drainage area and pumps the wastewater through a 14-inch diameter force main 3,200 feet to the Eastside interceptor.

## **Yarrow Bay**

The Yarrow Bay pump station in south Kirkland pumps wastewater through a force main to the Eastside interceptor. Flow enters from the north through an 18-inch diameter local sewer and from the south through a 15-inch diameter local sewer. Wastewater flow is pumped through a 14-inch diameter force main 1,430 feet to the Eastside interceptor.

## **Sunset**

The Sunset pump station, in Bellevue, receives flow from the Issaquah interceptor and a 10- and 12-inch diameter connection to the Bellevue system. The station pumps wastewater through two force mains (12- and 24-inch diameter) to the Heathfield pump station. The service area includes South Lake Sammamish, Issaquah and part of the Pine Lake Plateau.

## **Heathfield**

The Heathfield pump station receives wastewater flow from the Sunset pump station through two force mains (12- and 24-inch diameter) that are 3,220 feet long. The station pumps wastewater to the Eastgate trunk through two force mains (12- and 24-inch diameter) that are 1,650 feet long.

## **Medina**

The Medina pump station receives flow from the City of Medina through the Medina trunk. The station discharges wastewater to the Eastside interceptor through an 18-inch diameter force main. The force main connects directly to the interceptor via two siphons (12- and 18-inch diameter) which pass underneath I-405.

## **Wilburton**

The Wilburton pump station receives flow from the Factoria trunk. Wastewater is pumped through two 16-inch diameter force mains 290 feet to the low point of the Eastside interceptor's Wilburton siphon located next to the large railroad trestle just south of downtown Bellevue.

### **Bellevue**

The Bellevue pump station pumps wastewater 2,650 feet from the central business district to Sweyolocken pump station via the 20-inch diameter Bellevue force main and trunk.

### **Sweyolocken**

The Sweyolocken pump station receives flow from the North Mercer Island and Bellevue pump stations. It pumps wastewater 2,987 feet through two 20-inch force mains to the Eastside interceptor.

### **North Mercer Island**

The North Mercer Island pump station serves 1,500 acres in north Mercer Island. This station pumps wastewater 3.2 miles through the north Mercer interceptor, east channel siphon, and Enatai interceptor to the Sweyolocken pump station. The City of Mercer Island has 23 local pump stations that transport flow around the island to the north and south Mercer Island pump stations.

### **South Mercer Island**

The South Mercer Island station receives wastewater flow from the local sewer district via an 18-inch diameter line from the south and a 14-inch diameter line from the north. Wastewater flow is pumped east through a 16-inch diameter force main under Lake Washington to the Eastside interceptor. A flow monitoring system on the mainland side of the force main ensures the integrity of the under lake crossing.

### **South Henderson Street**

Serving the Rainier Beach and south Rainier Valley areas, the South Henderson Street pump station pumps wastewater through the Henderson Street trunk to the Elliott Bay interceptor. The trunk connects to the Elliott Bay interceptor at the Norfolk regulator station. As part of the Southern Transfer Project in 1995, the first 19 mgd of flow from the Henderson Street diversion goes to the Renton plant for treatment via the Allentown trunk, Tukwila trunk and Interurban pump station. Additional flows from combined sewers go to the West Point system. Flows over 19 mgd from the combined sewer go to the West Point Treatment Plant through the Norfolk regulator and the Elliott Bay interceptor. There is a storage and capacity upgrade project underway that will help decrease overflows in this basin that should be completed by 2005.

### **Interurban Avenue**

The Interurban pump station, one of the newest stations, came on line in 1995. It serves north Tukwila and the Rainier Valley. The Henderson Street diversion structure diverts up to 19-mgd flow from the City of Seattle service area through the Allentown and Tukwila trunks to the Interurban pump station.



*South Henderson Street Pump Station*

Additional flow of up to 8.9 mgd enters the Tukwila trunk from the Val-Vue/Tukwila service area. From the Interurban station, wastewater flow is pumped through two 24-inch-diameter force mains to the treatment plant in Renton.

### **Black Diamond**

The Black Diamond pump station receives wastewater flow from the City of Black Diamond and pumps flow to the Soos Creek Sewer District's Covington pump station for eventual discharge to a County interceptor sewer. Wastewater flow is then conveyed to the plant in Renton. This station is operated jointly by King County and the City of Black Diamond.

### **Pacific**

Pacific pump station, a small package station, receives wastewater flow from the Algona/Pacific service area and pumps flow 2,940 feet into the south end of the Auburn/West Valley interceptor. The station is operated jointly by King County and the City of Pacific.

### **Lakeland Hills**

The Lakeland Hills pump station collects and pumps sewage from the Lakeland service area south of the City of Auburn—an area bounded by the White River to the North and East, and Lake Tapps to the South. The station pumps sewage through the 5,900-foot long Lakeland Hills force main, under the Stuck River (White River) to King County's West Auburn interceptor. King County assumed operating responsibility for this system in 1997 and will upgrade it by 2002.



*Offsite staff routinely check, maintain and repair equipment at each pump station.*

### **Barton Street**

The Barton Street pump station is located on the north side of the Fauntleroy ferry dock in West Seattle. Combined sewage from the local collection system enters the station through a 60-inch diameter influent line. The Beach Drive interceptor begins with the station's 30-inch diameter force main and extends approximately 6,250 feet to the Murray Avenue pump station.

### **Murray Avenue**

The Murray Avenue pump station is in the southern end of Lowman Beach Park in West Seattle. It receives flow from a 954-acre tributary area and from the Barton Street pump station. The Murray station pumps combined sewage 1,250 feet to the Beach Drive Southwest interceptor to the West Seattle tunnel. High flows during storms can be transferred to the 63rd Avenue pump station.

### **53rd Avenue**

The 53rd Avenue pump station receives flow from the 808-acre tributary area around Duwamish Head. The station pumps combined sewage to the West Seattle tunnel. Flows during storms go to 63rd Avenue pump station, which pumps it to the Alki combined sewer overflow treatment plant.

### **63rd Avenue**

The 63rd Avenue pump station receives combined sewer high flows from a 1,212-acre tributary area and the three other Alki system pump stations. The 63rd Avenue pump station transfers storm flows above the base sanitary flows not transferred to the West Seattle tunnel to the Alki combined sewer overflow treatment plant through 24- and 42-inch force mains.

## **West Section Pump Stations**

### **Belvoir**

The Belvoir pump station serves the area drained by the Laurelhurst trunk. Wastewater enters the station through a 36-inch diameter influent line and is pumped so that it can flow by gravity to the 30th Avenue Northeast pump station.

### **Carkeek**

The Carkeek pump station receives wastewater flows from North Beach pump station and the local service area, and pumps the flows into the 8th Avenue interceptor, from where it goes to the West Point plant for treatment. Excessive flows above 8.4 mgd are directed to the Carkeek combined sewer overflow treatment plant for storage and eventual return to the pump station. When the pump station settling basins are full, flows are treated and directed to the outfall into Puget Sound.

### **Densmore Storm Water Pump Station**

The Densmore station conveys storm water flow from the Densmore drainage basin, Green Lake, and a portion of I-5 to an outfall pipe terminating in Lake Union. The station is a part of the University Regulator Combined Sewer Overflow Control Project.

### **Duwamish**

The Duwamish pump station receives flow from the south through the Elliott Bay interceptor and from the West Duwamish interceptor through the Duwamish siphon. Wastewater pumped through the station continues through the Elliott Bay interceptor to the Interbay pump station.

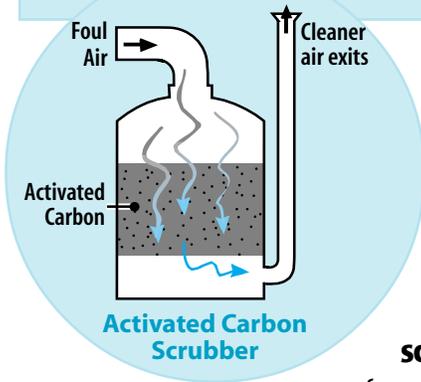
### **East Marginal Way**

The East Marginal Way pump station serves a 4,000-acre area, which includes the Boeing industrial complex. Wastewater flows from the east through the Henderson Street trunk and the Norfolk Street regulator station. Wastewater is pumped through the station into the 54-inch diameter Elliott Bay interceptor and Henderson trunk and flows to the Duwamish pump station.

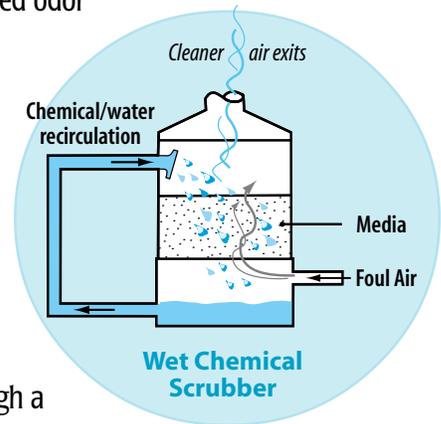


*Carkeek Pump Station*

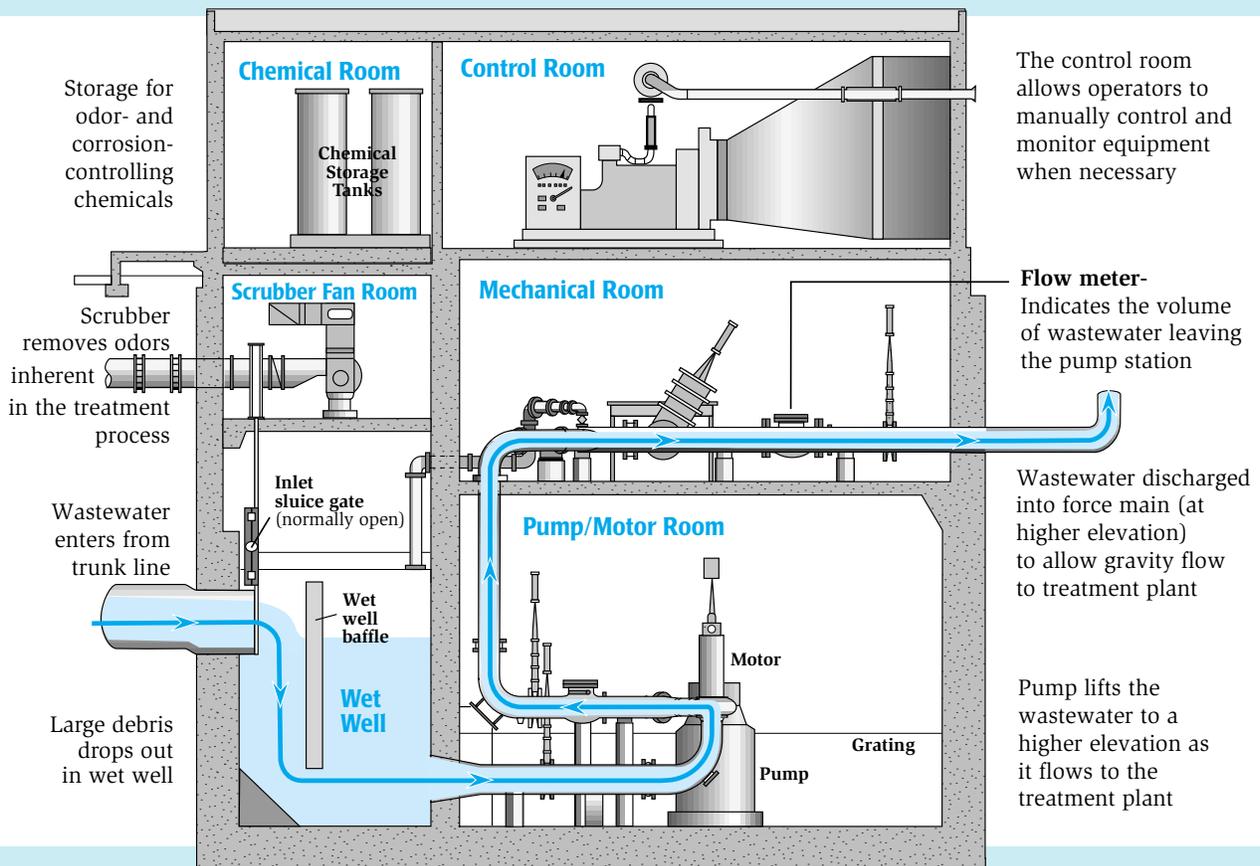
## How odor is controlled:



Since the early 1970s the agency has installed odor control units in neighborhood stations with additional measures being done in the 1990s. Being a “good neighbor” by controlling odors is part of the normal operation of every treatment facility. Most pump stations use **activated carbon scrubbing** odor control units. Here foul air is forced down through a bed of activated carbon granules that absorb the odors. Some stations have a **wet chemical scrubber** where foul air is forced up through a “rain” of a chemical and water solution. This solution breaks down the odors.



## How a typical pump station works:



The pump station receives wastewater, (raw sewage), from the local sewer districts, which in turn collect it from local homes, businesses and industry. Wastewater enters the station through the influent, or incoming, sewer and drops to the wet well. It is pumped up and out of the station via the pump/motor room before being discharged through a force main (a large diameter pipe that conveys wastewater under pressure to the treatment plant). The movement of wastewater creates odors, which are captured and scrubbed before air from the station wet well is released to the atmosphere. If there are problems with a station, telemetry systems alert operators at the main treatment plant. There, operators check the alarms via computer and notify crews to respond to the situation.

# Pump Station Highlights

	Pump Station Name	Location	Motors/Horsepower	Pump Total Head, (ft)	ADWF (mgd)	AWWF	Peak WF	Station Capacity (mgd)	Firm Pumping Capacity (mgd)	
EAST SECTION	<b>North Creek</b>	Bothell	3/500	76/105	shut down	7.3	23	36	26	
	<b>Hollywood</b>	Woodinville	3/60	23.5	7.7	9.4	26	21.6	14.4	
	<b>York</b>	Woodinville	3/600	200	7.7	9.4	26	41.1	27.4	
	<b>Juanita Bay</b>	Kirkland	4/250	186	4.1	5.1	16.9	21.1	15.8	
	<b>Kirkland</b>	Kirkland	3/150	189	0.7	0.9	5.5	9.1	6	
	<b>Yarrow Bay</b>	S. Kirkland	2/100 & 1/82	165	0.4	0.5	1.7	4.8	1.5	
	<b>Sunset</b>	Lake Sammamish	2/450	150	3.6	5.1	21	29.2	21.6	
	<b>Heathfield</b>	Lake Sammamish	2/200 & 2/450	145	3.6	5.1	21	29.2	21.6	
	<b>Medina</b>	Medina	2/50 & 2/250	180	0.9	2.1	8.2	10.5	5.3	
	<b>Wilburton</b>	Bellevue	2/100 & 1/75	110	1.4	1.7	5.1	10.2	7.8	
	<b>Bellevue</b>	Bellevue	3/100	90	1.2	1.7	12.2	13.8	9.2	
	<b>Sweyolocken</b>	Bellevue	4/125	86	4.5	5.1	31	23.5	16.8	
	<b>N. Mercer Island</b>	Mercer Island	3/125	140	1.4	1.7	5.7	9.1	6	
	<b>S. Mercer Island</b>	Mercer Island	3/55 & 125	63	1.1	1.5	5.9	17.4	11.6	
	<b>S. Henderson</b>	Rainier Valley	3/40	38	1.6	2	20	10.5	7	
	<b>Interurban</b>	Tukwila	4/270	102	8.2	11.5	29	40	29.2	
	<b>Black Diamond</b>	Black Diamond	2/50	83	.1/.16	.13/.22	.2/.32	3	1.5	
	<b>Pacific</b>	Pacific	2/15	275	0.3	0.4	2.7	2	.95	
	<b>Lakeland Hills</b>	Auburn	56 & 100		(Acquired in 1997 - no data available)					
	<b>Barton Street</b>	Alki	2/250	90	2	3.2	6	23	11.5	
	<b>Murray Ave</b>	Alki	2/100 & 2/300	74	2.2	5.1	46	33	25.1	
	<b>53rd Avenue</b>	Alki	2/41 & 125	75	1.4	2.1	14.4	14.4	7.2	
	<b>63rd Avenue</b>	Alki	3/200	53	0	0	77	50.4	81.2 total	
	<b>63rd Annex</b>	Alki	3/150	38.5	-	-	-	46		
	<b>Belvoir</b>	University	3/30	23	3.7	5.5	8.5	15	10	
<b>Carkeek</b>	Broadview	3/150	281	2.7	3.7	20	30	8.4		
<b>Densmore</b>	Green Lake	2/455 & 1/360	65	4	3	25.3	44.9	25.3		
<b>Duwamish</b>	Duwamish	3/200	18	12.5	16.3	125	120	100		
<b>E. Marginal</b>	Boeing	3/100	16.4/125	10.3	13.3	27.6	35	42		
<b>E. Pine Street</b>	Mt. Baker	3/75	73	0.7	1.1	1.5	5	5		
<b>Hidden Lake</b>	Shoreline	3/75	90	1.6	2	6	4.5	4.2		
<b>Interbay</b>	Interbay	2/491 & 1/600	20	39	48	133	129	120		
<b>Kenmore</b>	Kenmore	2/50 & 2/125	2/24	11	14	42	27	18.3/66		
<b>Lake Ballinger</b>	Shoreline	2/150 & 2/200	*	2.7	3.2	18	16.8*	12		
<b>Matthews Park</b>	Matthews Beach	250; 500; 900 & 600	49.75	23	29	71	74	40		
<b>North Beach</b>	Olympic View	2/20	102	0.5	0.7	6.8	3.4	3.2		
<b>Rainier Ave</b>	Rainier Valley	1/30 & 2/60	1/31 & 2/41	1	1.5	9	12	9		
<b>Richmond Beach</b>	Richmond Beach	4/150	370	2.4	3	12	10	10		
<b>30th Ave NE</b>	University	3/60	42	2.2	3.2	12	12	12		
<b>W. Marginal</b>	S. Park Industrial	3/40	20	2.7	3.7	6.6	21	16.4		
<b>West Seattle</b>	West Seattle	4/170	31.5	5.3	6.8	45	19	19		
<b>Woodinville</b>	Woodinville	3/60	21.3	0.5/8.4	0.7/10.2	3.3/16	22	17.6		

### **East Pine Street**

The East Pine Street pump station serves 480 acres in the east Mount Baker and south Madrona Park areas. Wastewater is pumped into the Southwest Lake Washington interceptor and flows through the Montlake siphon and trunk to the North interceptor.

### **Hidden Lake**

The Hidden Lake pump station is the primary pump station on the Boeing Creek Trunk. The station serves a drainage area of 2.9 square miles and pumps wastewater to the Richmond Beach pump station.

### **Interbay**

The Interbay pump station is part of the Elliott Bay interceptor system. The station receives flow from the Duwamish pump station and all of the regulator stations located on the interceptor, as well as flow from the south Magnolia trunk. Wastewater is pumped through two 48-inch force mains to Section 8 of the Elliott Bay interceptor and from there it proceeds to the North interceptor.

### **Kenmore**

The Kenmore pump station receives flow from the Woodinville pump station through the Bothell-Woodinville interceptor, Bear Creek, North Creek and Swamp Creek trunks and the Inglewood interceptor. The station pumps wastewater through the Kenmore interceptor, Section 2, and if necessary the sewage can be stored in the Logboom storage facility prior to discharge to the Matthews Park pump station.

### **Lake Ballinger**

The Lake Ballinger pump station receives wastewater flow from the City of Edmonds' eastern service area, and it conveys flow to the Edmonds treatment plant and to the West Point treatment plant. The County has an agreement whereby it treats some of the City's flow and the City treats some of the County flows. This station works with the Richmond Beach pump station to accomplish the flow transfer.



*Richmond Beach Pump Station*



*Lake Ballinger Pump Station*

### **Matthews Park**

The Matthews Park pump station receives flow from the north via the Kenmore pump station and Kenmore interceptor. Wastewater also enters the station from the west via the north and west Lake City trunks and the Thornton Creek trunk. The station discharges flow to West Point via the Lake City tunnel and north interceptor.

### **North Beach**

The North Beach pump station receives flow from the City of Seattle. The station serves Loyal Heights, Crown Hill and Greenwood areas. Wastewater is pumped 7,094 feet through a 14-inch diameter force main to the Carkeek Park combined sewer overflow treatment plant.

### **Rainier Avenue**

The Rainier Avenue pump station serves an area of 720 acres in the Rainier Valley district, 470 acres directly and 250 acres through the City of Seattle's 46th Avenue South pump station. The Rainier Avenue station pumps wastewater through an 18-inch diameter force main to the Rainier-Hanford trunk.

### **Richmond Beach**

The Richmond Beach pump station conveys wastewater flow from the Richmond Beach service area to the Edmonds treatment plant via the Richmond Beach-to-Edmonds pipeline. Via a local agreement flows are geographically swapped for treatment. The Richmond Beach station works with the Lake Ballinger pump station to accomplish the flow transfer.

### **30th Avenue Northeast**

The 30th Avenue Northeast pump station serves the area drained by the Laurelhurst trunk. The station receives flow from the Belvoir Place pump station plus local drainage area. The 30th Avenue pump station discharges wastewater to the Laurelhurst trunk, which connects to the North interceptor.

### **West Marginal Way**

The West Marginal Way pump station receives flow from the 8th Avenue South regulator station and from the Rainier Vista interceptor via the West Duwamish interceptor and an 8-inch diameter local line. Wastewater is pumped through three 16-inch diameter force mains to a junction structure and then flows by gravity to the Duwamish pump station.

### **West Seattle**

Built in 1998, the West Seattle pump station on Harbor Avenue in West Seattle serves about 4,095 acres in the Alki basin. The tunnel associated with the station also stores combined sewer overflows (CSO) from the Alki basin and Harbor regulator basin. The Alki combined sewer overflow treatment plant processes stormwater flows when the instantaneous flow exceeds 40 million gallons to the tunnel from the Alki basin or when the CSO storage is used up. The Alki plant can process up to 65 mgd pumped to it from the 63rd Avenue pump station.

### **Woodinville**

The Woodinville pump station receives flow from the Hollywood pump station and from a local drainage basin via the Sammamish Valley interceptor. Wastewater is pumped to the Bothell-Woodinville interceptor, then flows by gravity to the Kenmore pump station.



*West Seattle Pump Station*

## **West Section Regulator Stations**

### **Ballard**

The Ballard regulator station regulates flow from the Ballard trunk into the North interceptor. The trunk serves about 2,500 acres. Wastewater from the station flows through two 36-inch diameter woodstave siphons under the Ship Canal to the North interceptor.

### **Brandon Street**

The Brandon Street regulator station is part of the Elliott Bay interceptor system. It regulates flow from the Brandon Street basin into the Elliott Bay interceptor. Excess flows go through the Brandon Street outfall station into the Duwamish waterway.

### **Chelan Avenue**

The Chelan Avenue regulator station regulates flow from the Delridge trunk, which serves the east side of West Seattle and the Harbor Avenue regulator station, into the west Duwamish interceptor. Wastewater flows directly through the station into the interceptor.

### **Connecticut Street**

The Connecticut Street regulator station regulates flow from the 72-inch-diameter Connecticut Street trunk through a 36-inch diameter line into the Elliott Bay interceptor.

### **Denny Way**

The Denny Way regulator station is a dual regulator station that provides regulator and outfall gates and emergency overflow weirs for the Lake Union trunk and a local trunk. The regulator gates allow wastewater to flow into the Elliott Bay interceptor. The outfall gates may be opened to relieve excess stormwater flow. Two emergency overflow weirs allow wastewater from the local and Lake Union trunks to bypass the outfall gates into the outfall line, which discharges to Puget Sound.

### **Dexter Avenue**

The Dexter Avenue regulator station serves approximately 1,040 acres in the central portion of Seattle, including the west side of Capitol Hill, much of the central business district, and part of the Denny Regrade area. The station regulates flow in the central trunk to prevent overflows to Lake Union and backups into the upstream service connections. The central trunk connects to the north interceptor at Third Avenue West and West Ewing Street.



*Logboom Park Regulator Station*

### ***Eighth Avenue South***

The Eighth Avenue South regulator station regulates flow from the Highland Park area into the West Duwamish interceptor and West Marginal Way pump station. Wastewater flows directly through the station into the interceptor.

### ***Hanford Street***

The Hanford Street regulator station regulates flow from the Hanford trunk into the Elliott Bay interceptor through 700 feet of 48-inch diameter line. Excess stormwater overflows through the outfall station into the East Duwamish Waterway.

### ***Harbor Avenue***

The Harbor Avenue regulator station regulates flow from the north and northeast areas of West Seattle into Delridge trunk. Wastewater flows directly through the station into the trunk. High flows can also be sent to West Seattle pump station.

### ***King Street***

The King Street regulator station regulates flow from the waterfront area between King and Columbia streets through 734 feet of 42-inch diameter line into the Elliott Bay interceptor.

### ***Kingdome***

The Kingdome regulator station regulates wastewater flow from the Royal Brougham trunk, a 96-inch diameter gravity sewer, into the Elliott Bay interceptor.

### ***Lake City Tunnel***

The Matthews Park pump station pumps wastewater to the north portal of the Lake City tunnel. From there, the wastewater flows by gravity through the 96-inch diameter tunnel to the Lake City tunnel regulator station. The station regulates flow into the North interceptor from the Lake City tunnel and utilizes the tunnel for storage during high flows.

### ***Lander Street***

The Lander Street regulator station works in conjunction with the Hanford Street regulator station to regulate the flow of wastewater and stormwater from the Lander and Rainier Valley basins into the Elliott Bay interceptor. The Lander Street regulator station collects flows from the Lander Street trunk and, when storm flows are low, from the Lander Street storm drain, which parallels the trunk. As flows increase, the station sends stormwater to the East Duwamish Waterway via the storm drain and outfall, and restricts wastewater flow to the Elliott Bay interceptor by storing it in upstream lines. When the storage capacity is exceeded, the excess wastewater is diverted to the storm drain and a combined sewer overflow occurs.

### ***Logboom Park***

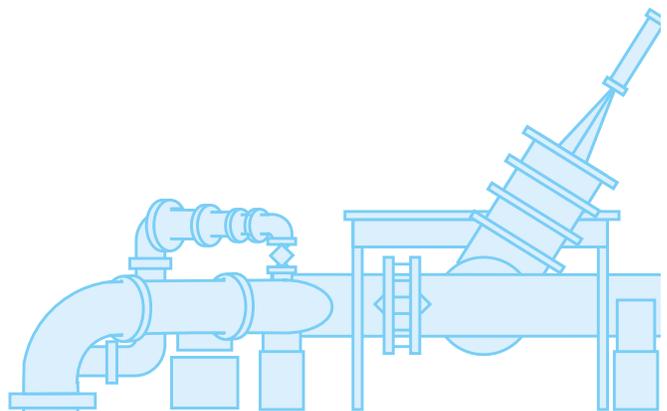
The Logboom Park regulator station receives flow from the Kenmore pump station through the Kenmore interceptor and two 132-inch diameter storage pipes of the Kenmore storage facility; it stores wastewater and controls overflow in the interceptor. The station regulates outlet flows to hold the interceptor level below the lake line level and prevent overflows into Lake Washington.

### ***Montlake Boulevard***

The Montlake Boulevard regulator station controls flow from the southwest Lake Washington trunk through the Montlake siphon and trunk to the north interceptor. Wastewater flows directly through the station into the Montlake siphon and to the North interceptor. The southwest Lake Washington trunk receives flow from the East Pine Street and East Lee Street pump stations and the Arboretum trunk, a drainage area of 3,300 acres.

### ***Norfolk Street***

The Norfolk Street regulator station regulates flow from the 84-inch-diameter Henderson Street trunk into Section 1 of the Elliott Bay interceptor. Flow can be diverted to the Renton plant upstream of the Norfolk regulator at the Henderson Street diversion structure.



King County uses artwork on pump stations to enhance their visual appeal in the community.



## Summary

There are many links necessary to operate a successful wastewater treatment system—pump stations, regulator stations, treatment plants and odor control facilities. Two other key elements are a highly trained staff and efforts to help facilities blend into their surrounding communities. King County continues to pursue the highest standards in operating and maintaining its off-site facilities—important links in protecting public health and the environment now and into the future.

12

### ***South Michigan Street***

The South Michigan Street regulator station is part of the Elliott Bay interceptor system. It regulates flow from the Michigan Street trunk into the Elliott Bay interceptor. Excess flow goes through the outfall station into the Duwamish Waterway.

### ***University***

The University regulator station regulates flow from the Green Lake and Laurelhurst trunks into the North interceptor. These two trunks serve an area of about 6,000 acres.

### ***West Michigan Street***

The West Michigan Street regulator station regulates flow from the Highland Park area into the West Duwamish interceptor. Wastewater flows directly through the station into the interceptor.

## Definitions

**ADWF** is the Average Dry Weather Flow in mgd that flows through the station. Wastewater flows vary according to the season of the year, weather conditions, day of the week, and time of day. Under dry weather conditions, the daily wastewater flows shows a diurnal flow pattern.

**AWWF** is the Average Wet Weather Flow in mgd that flows through the station. It is the flows going through the station during the wet season. The mean average is used.

**Combined Sewer Overflows (CSOs)** are overflows, during wet weather, of combined sewers that collect both sanitary sewage and stormwater runoff. This occurs when flows in the system exceed the capacity of the collection system.

**Firm pumping capacity**, (mgd), is the capacity of the station with the largest pumping unit out of service.

**Force main** is a pipeline that conveys wastewater under pressure. It is used in conjunction with pump stations.

**Interceptors** are the freeways of the conveyance system. The interceptors collect discharges from pump stations and all other sewer flows, and conveys flow by gravity to the treatment plants.

**Local sewers** are those lines operated by sewer districts or cities. Generally these are smaller lines, usually less than 14 inches in diameter. They collect all the gravity sewer flow from neighborhoods and businesses.

**Motors and horsepower** give an indication as to the size of the station. The more pumps and larger horsepower, the larger the station.

**Peak WWF** is the most Wet Weather Flow the plant can handle within the station. This number is based on the most flows within one hour during a very large storm.

**Pump station** is used when sewer trunk lines have conveyed flows to a low-lying area. The pump station lifts the wastewater up to a point where it can again flow by gravity to a wastewater treatment plant or another pump station.

**Pump station capacity** in millions of gallons/day (or mgd) shows how much the station can handle with all pumps operating.

**Pump, total head**, (in feet) shows the sum of all the energy needed to move water from one elevation to another.

**Regulator station** is a structure that controls the flow of wastewater from a trunk line to an interceptor. Regulators can be used to restrict or halt flow, thus causing combined sewage to be stored in the conveyance system until it can be handled by the main interceptor or discharged to the receiving water as a combined sewer overflow.

**Trunk lines** are sewer lines used to collect flows from local sewers and convey the flows by gravity to a wastewater pump station or to an interceptor. Trunk lines are usually greater than 14 inches in diameter.

### For additional information

on King County's wastewater treatment plants and distribution facilities:

- ☛ Phone **Wastewater Treatment Division** at (206) 684-1280
- ☛ Phone **Wastewater Public Outreach** at (206) 296-8286
- ☛ Check out the King County Department of Natural Resources' Wastewater Treatment Division Website at <http://waterquality.metrokc.gov> for additional information on wastewater treatment facilities and programs

