STEWARD OF THE WATERS

A Retrospective on Wastewater Treatment at Seattle's West Point

King County

Contents

December 1995

This report tells the story of a major step forward in keeping pace with our region's need for efficient wastewater treatment to protect the precious waters of Puget Sound.

Upgrading the West Point Treatment Plant to secondary treatment followed much public debate and consideration of alternatives. I commend the citizens, elected officials and agency staff who had the conviction and fortitude to see this process through.

Completion of this achievement comes as we are in the final stages of the 1992 voter-mandated consolidation of Metro and King County. The specially created Municipality of Metropolitan Seattle, known as Metro, served the region well for nearly 40 years. Now, in the face of population growth and attendant infrastructure and service needs, another chapter in our region's history begins. Starting next year, wastewater treatment and related environmental concerns become the responsibilities of the King County Department of Natural Resources.

I expect this department, and the consolidated government as a whole, to reflect the same qualities that distinguish the "new" West Point–increased efficiency and service, enhanced citizen involvement in decision making and improved return on investment.

I commend the project staff, consultants and contractors for a challenging job very well done, on time and under budget.

Gary Locke

Gary Locke
King County Executive

"We are transients on these hills and shores, and the waters are not ours to spend."

–James Ellis, "founding father" of Metro

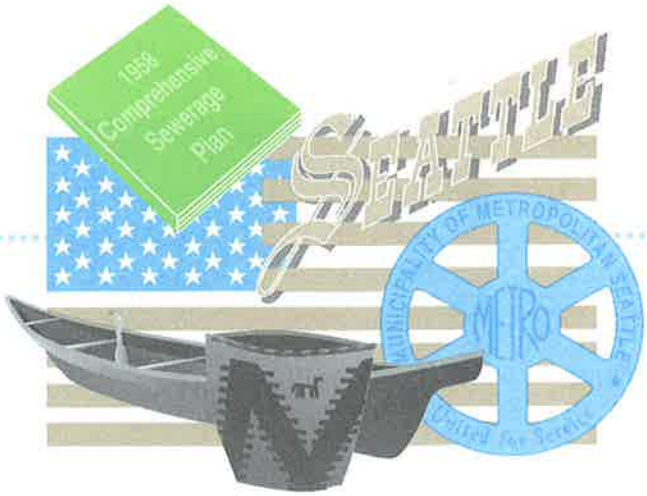
Seattle-area residents thought they had answered this call to stewardship in the late 1950s and early 1960s. They recognized the sickness of their waters, created a new agency to find a regionwide cure and constructed a network of wastewater treatment facilities, including a primary treatment plant at West Point on Puget Sound.

For a time, they were right.

Within a decade, though, the call was renewed. More would have to be done to keep from spending the waters.

This is the story of how residents responded again. It is a story of difficult decision making, innovative planning and construction and major investment in public health, environmental protection and open-space enhancement.

Its authors are the men and women who planned and protested, communicated and constructed, scheduled and supervised the upgraded and expanded West Point Treatment Plant into existence. They are due the credit for this important step in protecting the waters of the Pacific Northwest.



FROM ENCAMPMENT TO METROPOLIS

An Environmental Legacy

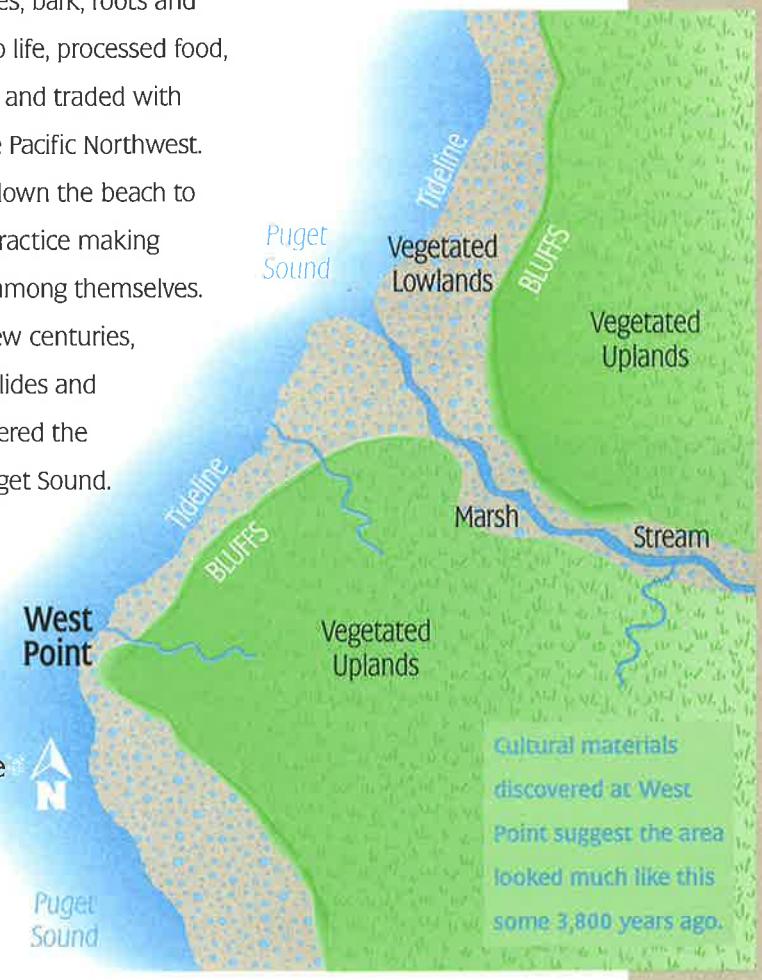
The story of West Point begins a very long time ago, before the demands of a growing city linked this former Native American campsite to sewage. It is a story of how, in meeting the challenges of the day, public officials and citizens began to see the importance of the environmental legacy they were leaving to future generations.

The First People at West Point

Known to the Duwamish as Pka'dzElcu (meaning "thrust far out"), West Point was more important to the settlement of Puget Sound than anyone knew before construction began to upgrade and expand the primary treatment plant. In 1992, workers digging a trench found a midden, or buried refuse, dating from some 4,000 years earlier. Researchers subsequently uncovered several middens and activity areas yielding artifacts that, together with geologic findings, painted a picture of the first people at West Point.

The expansive sand spit, backed by forested bluffs and bisected by a freshwater stream, was an ideal base camp for the Native Americans who populated the Puget Sound area after glaciers receded. Here they found the fish, shellfish, berries, bark, roots and grasses essential to life, processed food, crafted stone tools and traded with other groups in the Pacific Northwest. Young men went down the beach to trap small game, practice making tools and gamble among themselves.

Over the next few centuries, earthquakes, landslides and rising sea levels altered the central basin of Puget Sound. Families and small groups continued to make seasonal trips to West Point, but other sites became more productive year-round. By the mid-1800s when white settlers arrived in Elliott Bay, the importance of West Point to Duwamish,



Muckleshoot and Suquamish native cultures was legend.

Development of a Sewerage System

The fact that West Point was "thrust far out" made it a prime candidate for plans to manage a growing Seattle's sewage. Early residents had outhouses or connected plumbing to cedar-lined cesspools or the nearest body of water. At the tide flats, short pipes from buildings to Puget Sound were sufficient, as long as water closets were high enough to prevent backup during extremely high tides.

By Seattle's Great Fire of 1889, the population had exploded to 40,000, and the city was unmistakably odoriferous. Wanting to shed this frontier quality as they rebuilt after the fire, city officials decided to replace streets near the tide flats at a higher elevation to create steeper outfalls for sewage. For their part, Seattle voters approved the largest bond issue yet: $190,000 for a sewerage system.

Prior to the Great Fire of 1889, sewage from homes and businesses along Seattle's waterfront went out with the tide.

A consultant recommended that this system continue discharging sewage into fresh water through existing piping into Lake Washington and into salt water through a new tunnel from the Lake Union area into Elliott Bay. When R.H. Thomson became city engineer in 1891, he oversaw completion of this tunnel but reasoned that the city also needed a sewage outfall into the open waters of Puget Sound. His choice for the outfall was West Point, where currents were strong.

The line to the outfall, however, would have to cross through Fort Lawton, a U.S. Army base established in 1900 on some 650 acres overlooking West Point. The army ignored Thomson for a decade until a study of currents substantiated his choice for the outfall. Congressional pressure finally won U.S. Department of War approval of the line in 1909.

Within two years, a 12-foot-diameter, brick line known as the Fort Lawton tunnel was bringing wastewater from the central part of Seattle to a shallow outfall off West Point. Other major lines conveyed flows from the Lake Union area

City engineering employees work near the original Fort Lawton tunnel, which in rainy weather dumped raw sewage onto the beach at West Point.

into Elliott Bay and from the Rainier Valley area into the Duwamish River.

Communities springing up around Lake Washington viewed fresh water as their answer to sewage dishcarge. By 1922, 30 outfalls were spewing raw sewage into the lake. Thus did the region manage wastewater at a time when accepted practice was to discharge it, untreated, into waters swift enough or vast enough to disperse it.

The Environmental Toll

By mid-century, serious pollution of the region's waters was becoming obvious. Seattle's rapid growth after World War II created a need to supplement discharge of untreated sewage at West Point with a primary treatment plant discharging into the Duwamish River. Communities around Lake Washington also adopted primary treatment, placing 10 outfalls into the lake. Nutrients soon overfertilized the lake, choking it with foul-smelling algae. Swimmers banned from Lake Washington because of algae couldn't enjoy Puget Sound beaches either because of bacterial contamination.

In 1950, an eight-year study of the lake started to document the environmental damage and, toward the end of that decade, similar research began on the Duwamish River. Seattle proceeded with plans for its first primary treatment plant on salt water, which opened at Alki in 1957, followed shortly by the reopening of that beach to swimmers.

The problem was more than population growth, however. It was also a matter of coordination–or lack thereof–among jurisdictions. The report of a two-year study initiated in 1956 emphasized that growing communities in the Seattle area were making independent decisions about sewage collection, treatment and disposal, with an eye toward solutions that worked for them but not necessarily for the region.

Creation of Metro

Following two years of hard work by a citizens' committee, voters approved creation of the Municipality of Metropolitan Seattle (or "Metro") in 1958, giving the agency regionwide responsibility for sewage collection and treatment. Representatives of major jurisdictions in the service area made up the new Metro Council, which quickly adopted the 1958 study report as its comprehensive sewage plan.

> "The bridge to this time and place was not built by power, nor by wealth, nor an established elite. In plain truth, it was built by the citizenship of people no larger than ordinary life."
>
> *–James Ellis, chair, Metropolitan Problems Advisory Committee, at the 1966 dedication of the West Point Treatment Plant*

The closing of Lake Washington beaches to protect public health led to creation of Metro to oversee regional water quality.

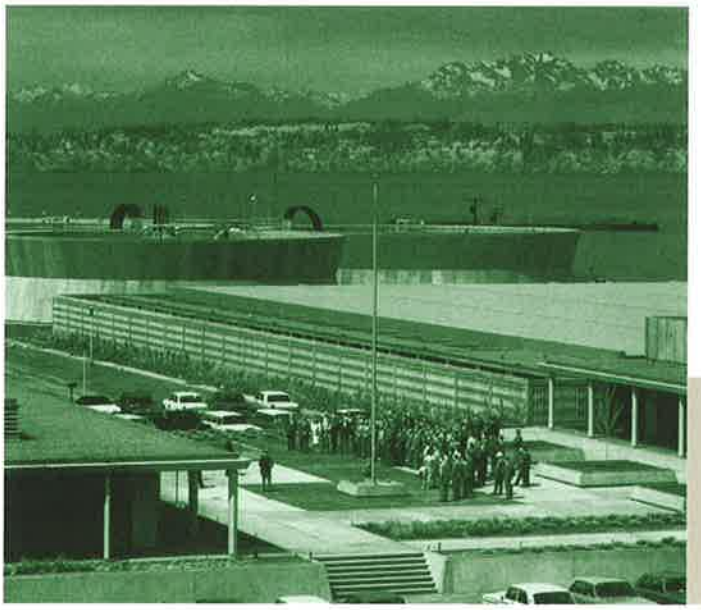
This plan called for stopping wastewater discharge into Lake Washington and conveying all raw sewage to four new plants, plus the existing facility at Alki, over the next 10 years. Metro would construct an advanced, secondary treatment plant at Renton to remove more pollutants before discharge into the Duwamish River. It would build a large primary plant at West Point and smaller primary facilities at Richmond Beach and Carkeek Park. The Duwamish River plant would close.

The largest facility in the updated system–and in the Pacific Northwest–would be the primary treatment plant at West Point, with an outfall into deep water. The U.S. Army had filled the point's salt marsh in the early 1930s to create a training site for amphibious landing craft and was willing to negotiate transfer of that land for the sole purpose of wastewater treatment.

Aleko Hepler III, great-grandson of Seattle's first city engineer, broke ground in 1963 for the West Point Treatment Plant.

Metro broke ground for the $12.9 million plant in 1963, tying the occasion to history by inviting a great-grandson of former Seattle City Engineer R.H. Thomson to turn the first trowelful of dirt. The dedication ceremony took place three years later, close on the heels of the ribbon cutting for Metro's secondary treatment plant in Renton.

By 1971, the Metro Council could look back with confidence on its comprehensive sewage plan. In just over 10 years, experts and officials had implemented what they saw as solutions to the region's wastewater problem, and Renton, West Point and the smaller treatment plants were operating smoothly.



The new West Point Treatment Plant went into service in mid-1966.

SHIFTING PRIORITIES, SHIFTING GEARS

The Rocky Road to Secondary Treatment

The future of wastewater treatment in the central basin of Puget Sound was not certain for long and again turned on a decision at the federal level. To meet the wastewater treatment standards established nationwide by the Clean Water Act of 1972, Metro's priorities would have to shift from heavy reliance on primary treatment to total reliance on secondary treatment.

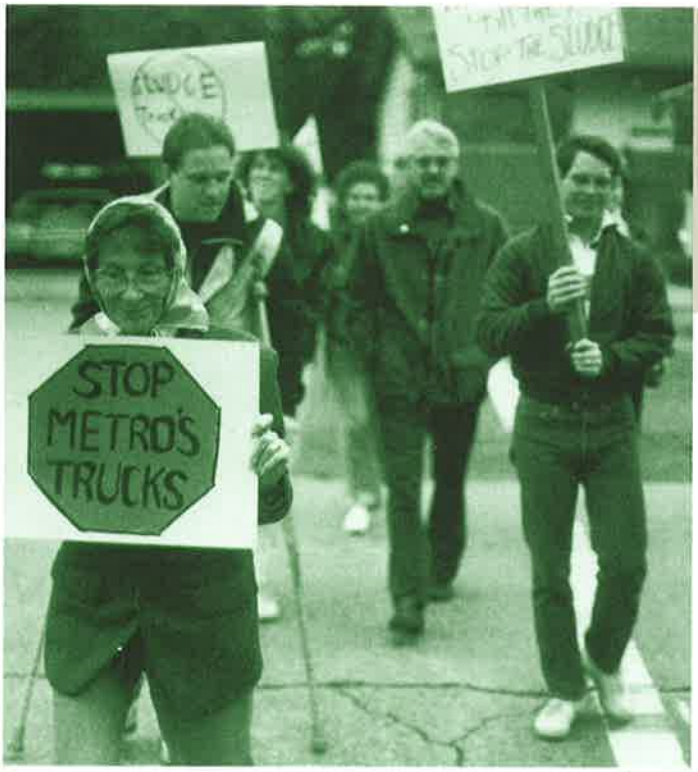
The Requirement for Secondary Treatment

In 1973, Metro began planning how to comply with the new federal mandate, a process that included soliciting community input about where to site secondary treatment facilities for the western portion of the agency's service area. Lobbying by jurisdictions along the West Coast, however, convinced Congress to amend the law in 1977 to allow a waiver of the secondary requirement if wastewater agencies could prove that primary treatment was not harming water quality.

Metro applied for this waiver, claiming that its four primary treatment outfalls into Puget Sound met the criterion. Study of the largest of these outfalls–the one at West Point–had found dilution of discharge to be at least 78:1 and no evidence of environmental degradation caused by this discharge.

At the same time the Clean Water Act became law, Seattle gained a major new park overlooking West Point. When the federal government reduced its military holdings at Fort Lawton, open-space proponents from throughout the area worked hard and successfully to convert

The ambitious master plan for Discovery Park expressed a preference for long-term phase-out of the treatment plant already located on the beach at West Point.



Public sentiment was divided and the debate intense over siting of secondary treatment at West Point.

the 391 acres of surplus land into what would be named Discovery Park, a tranquil, natural oasis in the city. Metro's primary treatment plant was already on the beach; but some environmental advocates saw it as incompatible with the new park. They were determined to remove the plant if they could or, if not, keep it from expanding.

> "From a design standpoint, all Metro developments must be considered as part of the park."
>
> *Master Plan for Discovery Park, 1972*

Metro's application for a waiver from secondary treatment put these advocates in a difficult position. Supporting the waiver would ignore growing concern about the health of Puget Sound, but opposing it would open the possibility of having an even more intrusive industrial facility on the beach at West Point.

Primary treatment screens, settles and disinfects wastewater, resulting in removal of more than half the suspended solids, more than a third of biochemical oxygen demand and less than half of the metals and toxic organic substances in domestic sewage.

The Washington State Department of Ecology approved the waiver in 1983, and a coalition of citizen groups sued to have the decision overturned. While this legal action was still on the table, studies the following year documented alarming levels of pollution in the central basin of Puget Sound and debunked the assumption that tidal action rapidly flushed pollutants into the vast Pacific Ocean.

In the face of this data and public pressure, the state in 1984 reversed its approval of the waiver and ordered Metro to provide secondary wastewater treatment for the West Point service area by 1991. The question was no longer *if* but *where*.

The Siting Debate

In 1985, Metro issued a draft environmental impact statement analyzing four alternatives, all involving continued use of treatment facilities at West Point.

Secondary treatment uses a biological process to consume organic wastes and, together with primary treatment, removes approximately 85 to 90 percent of the suspended solids, more than a third of biochemical oxygen demand and less than half of the metals and toxic organic substances in domestic sewage.

"That a sewage treatment plant was placed at West Point at all is irresponsible of our city planners. We now can correct that error for all time and restore that beach to the park department."

–Magnolia residents, May 23, 1986, letter to Metro regarding the supplemental environmental impact statement

Primary treatment was already there, and Seattle was "plumbed" with the Fort Lawton tunnel to convey wastewater to the plant. To ignore these facts, Metro reasoned, would be fiscally irresponsible, so planners had eliminated from consideration all alternatives that would have phased out West Point.

City officials and a site-alternatives coalition of civic, environmental and community groups contended, however, that those alternatives should be seriously considered because Seattle's shorelines-management ordinance prohibited expansion of shoreline treatment plants unless no feasible alternative could be found. Metro subsequently issued a supplemental environmental statement on three inland alternatives, all of which would eventually remove the plant at West Point.

The public debate was highly contentious as each affected community sought to have secondary treatment located somewhere else. In an especially charged session, the Metro Council narrowly voted in 1986 to site the new secondary facilities at West Point.

Metro then applied to the city for a plan-level permit to use the West Point site, and the state extended the deadline for secondary treatment to Dec. 31, 1995. The agency expected construction to take five years, which put the deadline for completing design and permitting at early 1990. A stretch of rocky road, however, still lay ahead.

Contrary to the recommendation of its own land-use staff, the Seattle City Council issued its permit in 1988. Citizen groups appealed to King County Superior Court and to the State Shoreline Hearings Board. The court vacated Seattle's plan-level permit, but the state board deadlocked. Its tie vote had the effect of letting stand the permit to build on the shoreline. In 1990, the city issued a new plan-level

permit and the following year advanced the project by granting Metro a project-level permit with scores of design, construction and operations conditions attached.

After years of discussion and negotiation, all parties reached a settlement early in 1991. Opponents of West Point agreed to drop pending appeals and not file any new ones, and Metro agreed to additional mitigation.

With the Dec. 31, 1995, deadline for secondary treatment still in place, Metro began construction in earnest on its biggest construction project to date. Provisions of Metro's settlement agreement with project opponents imposed more than 100 permit conditions, required the agency to take extraordinary measures to protect adjacent neighborhoods from the impacts of construction, pay for shoreline improvements elsewhere to compensate for loss of potential public open space at West Point, finance research on new processing technologies, contribute to a community-improvement fund and put extra emphasis on community relations.

Instead of completing design and permitting early in 1990 as planned, Metro was finally able to do so a year later, but the deadline for secondary treatment was still Dec. 31, 1995.

> "At times the magnitude of the (permitting) effort before us and the stakes involved could have become overwhelming. Those were the times when we just had to hunker down and stick to the game plan."
>
> –John Lesniak, West Point project superintendent, in a 1991 memo to staff

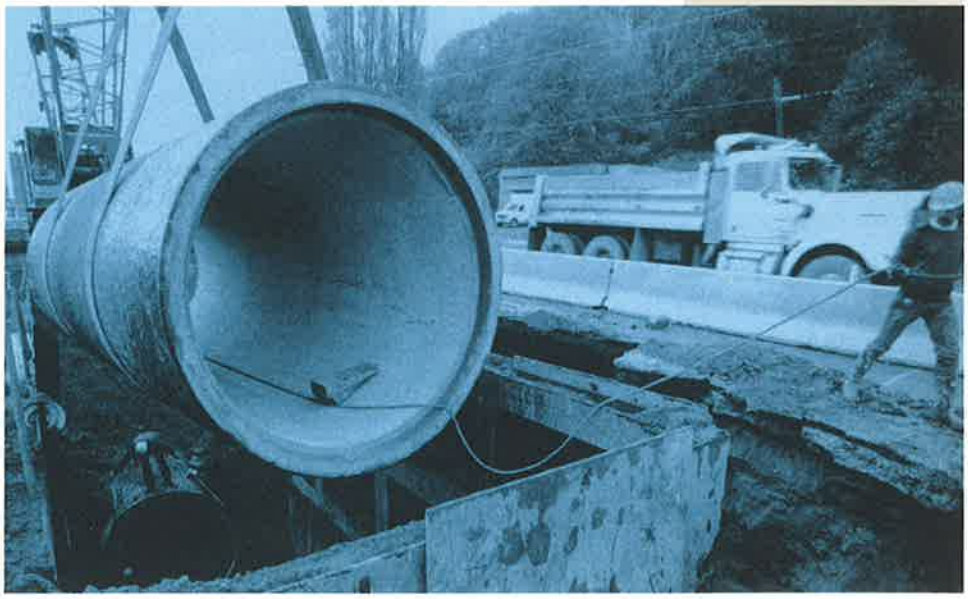
More Than a Plant Upgrade

As the permitting process for secondary treatment inched forward, Metro finalized plans to reduce overflows of its wastewater conveyance system. Seattle's original sewerage system conveyed both sanitary and storm wastewater in the same pipes, a satisfactory arrangement in dry weather but not during heavy rains, when wastewater that exceeded treatment-plant capacity went, untreated, into Puget Sound.

Metro and the city were making progress on separating combined sanitary/stormwater sewers into two conveyance systems, and the overall plan for secondary treatment would be a significant step in that direction. It called for Metro to

- redirect flows from its small plants at Carkeek Park and Alki to West Point and reserve those plants for primary treatment of storm-weather flows

Metro launched a "replumbing" plan to reduce the overflow of untreated wastewater from combined sanitary and storm sewers during heavy rains.



- expand capacity at its Renton plant
- replace its Richmond Beach plant with a pump station and redirect flows from the northern limits of the service area to Edmonds and West Point
- build an 8,300-foot-long tunnel parallel to the Fort Lawton tunnel constructed under Magnolia to West Point in 1911
- upgrade the computer-controlled system for regulating flows through its network of pump stations to make better use of West Point's storm-weather capacity.

Another aspect of the total project concerned biosolids (then called "sludge"), the solid byproduct of wastewater treatment. The original plant at West Point discharged digested biosolids into Puget Sound, a practice soon replaced by dewatering the biosolids and trucking this thickened material to a variety of locations for reuse as a soil conditioner and fertilizer and as an ingredient in composted soil amendments.

Years of regulatory and educational efforts to keep toxic substances out of wastewater had made biosolids safer for

"The decisions we make should reflect the heritage we have received and the stewardship responsibilities we must embrace."

– Charles Royer, former Seattle mayor, 1978 to 1990, in a May 26, 1986, letter to Metro

"The Metro Water Quality Committee tries to strike a balance that will enable us to oversee alternative options and respond to changes from predesign to refined implementation plans."

– Lois North, former King County Councilmember and chair, Metro Secondary/CSO Review Subcommittee, Clean Water, December 1989

such reuse, yet citizens were asking that Metro minimize truck traffic through the local community and eliminate existing digesters at West Point to open up more of the beach. Without new technology, Metro couldn't increase the market for biosolids and at the same time accomplish either citizen goal.

In 1989, the Metro Council chose a for-profit company to test the most promising new concept: drying undigested solids into granules and pellets for the blended-fertilizer market. Magnolia residents and environmental groups supported the concept as a way to reduce the size of the treatment plant and truck traffic. Metro committed to remove digesters by 2005 if the solids-

The region's forest lands benefit from nutrient-rich biosolids.

drying process used by the company at West Point proved it could successfully eliminate the need for these structures.

Paying for the Package

When privatization of solids processing was included, the budget that Metro submitted in 1990 was $578.5 million for upgrading and expanding West Point. Another $32.5 million was earmarked for shoreline and community improvements stipulated in permits and the settlement reached with project opponents. A $5 million portion was for shoreline improvements in King County and the remainder for sites in Seattle. Related work at other treatment plants and on controlling combined sewer overflows to be completed by 1997 brought the total price tag to nearly $1 billion.

Federal and state monies were available to offset a portion of the costs, with ratepayers making up the difference. In 1990, the Metro Council voted to proceed with the plan for West Point and related overflow control, knowing that the average household's sewer bill would increase by nearly 50 percent to pay for it.

West Point Funding Sources

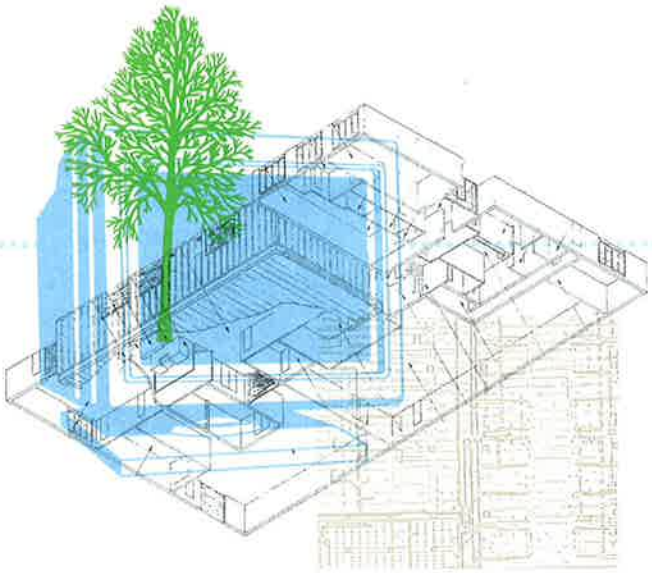
- A $250 million grant over 20 years from the Washington State Department of Ecology
- A $48 million loan from the Washington State Department of Ecology
- A $14.7 million grant from the U.S. Environmental Protection Agency (for the parallel Fort Lawton tunnel)
- The remainder from municipal bonds financed by ratepayers.

West Point Project Costs

	Budgeted (1990)	*Projected at Completion (1997)[a]*
Construction	$356,369,614	$347,949,680
Procurement	65,988,732	37,538,223
Engineering	72,869,478	94,692,527
Permits & Easements	4,412,163	4,921,944
Other Agencies—Coordination	1,500,000	11,585,636[b]
Legal Services	4,000,000	3,997,293
Staff Labor & Office Expenses	47,218,359	64,209,783
Contingency	26,154,656	
TOTAL	$578,513,002	$564,895,086

[a] Projection as of June 1995.

[b] Includes cost of settlement reached February 1991 (approximately $8 million).



FORM AND FUNCTION, COMMUNITY AND HABITAT

Planning in a New Era

Design of an upgraded and expanded West Point Treatment Plant began in earnest in 1988 when the City of Seattle granted its plan-level siting permit. By then, Metro had spent some $30 million on site studies and preliminary design and was anxious to proceed to final drawings.

From Ideas to Plans

Metro chose CH2M Hill as its prime design consultant. The firm had been a subconsultant on the study of siting alternatives and prime consultant on the predesign analysis of treatment processes. After the permit decision, CH2M Hill opened a Bellevue project office to bring together subconsultants, specialty consultants and Metro staff working on a design project distinguished by its magnitude, complexity, timeline and reliance on computer technology.

The team shifted into high gear to achieve 25 percent design early in 1989, the point at which plans were sufficiently detailed to make realistic cost projections. To reach this milestone, designers produced 600 of the more than 6,000 drawings eventually required for West Point.

In addition to working with Seattle's parks and engineering departments, the team solicited input on landscaping and public-access issues from a citizens' advisory committee. These representatives of community and professional groups, the Seattle Design Commission, Metro's Citizens' Water Quality Advisory Committee and Friends of Discovery Park met for two years to develop recommendations and respond to design ideas.

Computer-aided design enhanced citizen involvement by efficiently showing how ideas would translate into structures. Computer software intended to portray the straight lines and regular angles typical of an engineering project had to be modified to show as well the irregular shapes of a design incorporating environmental mitigation.

Starting with an understanding of plant operations, citizens advised Metro and its consultants throughout design of new West Point facilities.

At the peak of design activity, more than 200 people in Washington and Oregon were working on West Point. These designers were linked by computer, and all drawings were delivered to Metro electronically to save time and improve coordination as the various components of the project took shape.

This computer-based approach also allowed updating of plans for the original plant as construction progressed. Metro incorporated changes to as-built drawings with drawings of new facilities to give West Point's operations and maintenance staff–and the designers of future changes–a complete set of accurate, highly detailed plans.

Minimizing the Industrial Look

Extraordinary attention to detail and to construction coordination was essential throughout the design of West Point. Because of permit and settlement-agreement restrictions, designers had to fit facilities that might typically be built on 80 acres onto only 32 acres.

Discovery Park visitors' first indication of pending construction was geotechnical testing on the hillside defining the western perimeter of the park. By building a retaining wall along this property line, the tallest buildings could hug the hillside, getting them away from the shoreline and minimizing the visual bulk of the plant on the site.

Mitigating environmental impacts was of much greater interest to the public, though, than plans for upgrading treatment facilities. Metro had no experience creating 20-acre shoreline parks, and aggressive opponents of West Point expansion doubted the agency could.

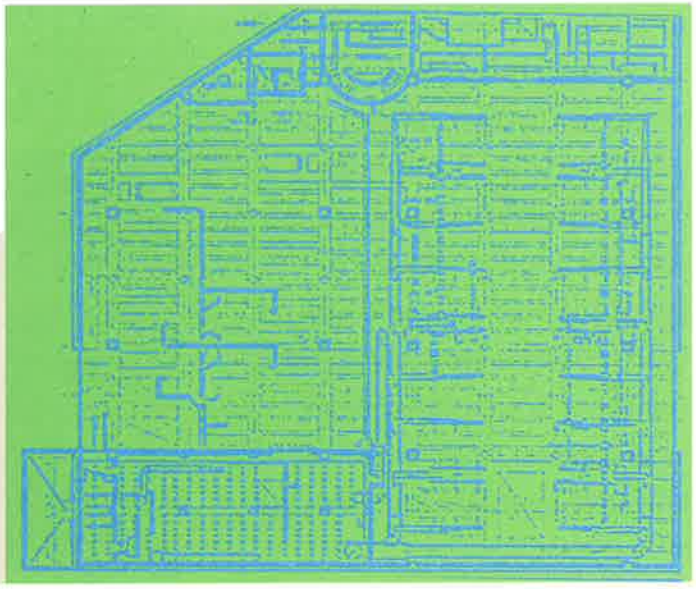
A pair of nesting bald eagles sighted in 1988 a quarter-mile east of the plant in Discovery Park became an informal gauge of habitat disruption during much of construction. Before the 1993 Inauguration Day windstorm forced them to move to another tree in the park, the pair raised nine eaglets, apparently unruffled by activity at the point.

To keep impact of the completed plant on the community to a minimum, planning revolved around recommendations of the citizens' advisory committee, which included

- a berm to screen the plant from the beach and trails
- an enhanced meadow, pond and natural beach
- a blanket of native plants to enhance habitat and screen facilities from view
- textured surfaces and muted colors
- strict controls on noise and odor.

Part of the design effort was directed at infrastructure projects to upgrade access to West Point and bring in higher-capacity electrical and water systems for the plant. Safety-related elements included adding a pedestrian pathway parallel to Metro's access road through Discovery Park and devising safe crossings where park trails intersected the road.

To reduce reliance on truck transportation during construction, designers planned a 300-foot-long, three-berth



Advanced software and computer networking enabled accelerated completion of West Point's complex and massive design.

temporary dock for barges to haul materials to and from the site and an on-site "batch plant" capable of making 180 cubic yards of concrete an hour. Related projects were creating an off-site parking lot with shuttle service for construction workers and relocating maintenance personnel stationed at West Point to reduce traffic even further and free space for construction activity.

Matching Design to Budget

At 25 percent design, Metro took its plans to two panels of outside experts. They were to review the design, suggest a construction schedule and, since the facilities envisioned during predesign penciled out nearly $200 million over budget, identify ways to reduce costs.

Advice from both panels was remarkably similar: The project could be built within five years, but minor modifications would not be enough to solve the budget problem. What would ease the cost, though, was not relying on gravity.

To use gravity to convey flows through the plant, the original design called for positioning secondary facilities 15 feet lower than primary facilities. Adding an intermediate pump station, however, would cost much less than the price tag attached to the gravity concept. Without as much excavation, the retaining wall would not have to be as deep, nor would groundwater be as much of a concern during construction. This change did not affect how much of the plant would be covered by landscaping.

> "I think this project is going to prove that we can make the shoreline there better than it's been in most people's memory and still have a functioning, highly effective treatment plant."
>
> —Linda Sullivan, West Point mitigation manager, in Metro's Monitor, Oct./Nov. 1991

Elevating secondary facilities shaved some $180 million from the projected overrun. A number of smaller changes brought estimated costs fully in line with the budget. To keep costs in line as design progressed, Metro and its consultants instituted a "design-to-cost" control system. By meeting frequently to review the design and monitor estimates, the project team saw potential cost overruns coming and made adjustments to head them off.

Innovative Scheduling

Scheduling to complete the project within five years was easier said than done. The expert panels had agreed Metro could do it by awarding the whole project to one prime contractor, who would schedule all work within the confined site. This traditional approach to construction, however, would limit the field of prospective bidders to large, national companies.

Metro chose, instead, to give local contractors a chance to participate in one of the largest public-works projects ever launched in the region. Staff divided the project into five principal prime contracts and took responsibility for coordinating the master schedule.

Overall sequencing of the project was also a challenge. Construction projects typically follow a "forward pass" sequence in which work starts at the

Metro monitored the well-being of bald eagles who nested nearby in Discovery Park throughout most of construction.

"Our goal was a well-running treatment plant in a park the public likes, meeting most of the best expectations and involving as much of the community as we could. Nobody gives awards for that."

–Jim Benedict, West Point construction manager, in a 1994 interview

beginning of the system to be built and moves sequentially. This approach, though, would have poured too many players onto the site at once and probably would not have put West Point into the end zone until after the December 1995 deadline for secondary compliance.

The solution was to look at what had to be running, not at what had to be built. By scheduling backward from critical dates instead of forward to meet them, the construction sequence fell into place. Those dates were June 1995 to begin testing all systems, summer 1994 to start the new effluent pump station and June 1994 to transfer centrifuge operations to the new solids-handling facility.

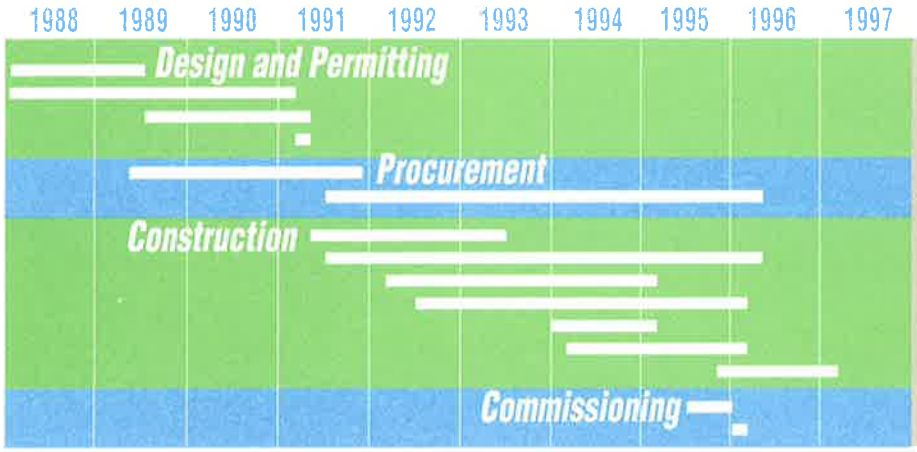
Critical to the tight sequencing of work was "partnering," a concept borrowed from private-sector construction whereby contractors, consultants and project management staff talk out and solve problems to avoid delays. In retrospect, the decision to emphasize partnering was one of the most important Metro made to keep the project on schedule.

On the strength of this planning, Metro had the confidence to award two-thirds of the construction work early when the market was favorable and to purchase most plant equipment ahead for installation as soon as facilities were ready. Operations training paced construction so that, when treatment processes were finished, plant employees were prepared to test them and bring them into service.

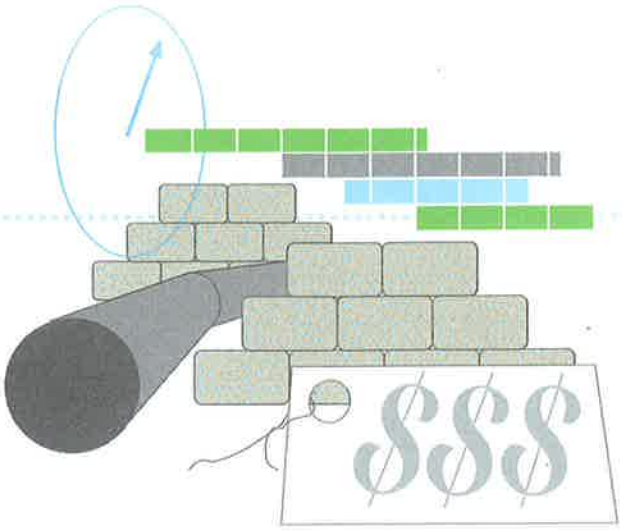
"Partnering sets up the environment that you work in, that you trust and work together."

–Ed Cohen, construction executive, M.A. Mortenson, from Metro's 1994 "Out of the Ground" videotape

A lot of work lay ahead, though, before these systems became realities. The design team had scale models of West Point ready for the public and permitting agencies in the spring of 1990. By fall, consultants and staff were assembling final plans and specifications for submittal to the state and city in December 1990.



To the extent possible on the confined site, several construction activities occurred simultaneously to meet West Point's deadline.



BUILDING AGAINST THE CLOCK

West Point Takes Shape

By February 1991, Metro was poised to construct the largest single investment to date in protecting the health of Puget Sound. In addition to building a complex project of this magnitude, the agency faced three unalterable requirements: Keep the plant running during construction, meet the December 1995 deadline for secondary treatment and stay within budget.

Site Preparation

Excavation of more than 500,000 cubic yards of earth was the top priority, since two-thirds of secondary facilities, several ancillary structures and more than 10 miles of process and utility piping would be underground. The $72 million contract for site preparation went to M.A. Mortenson, Inc., which would go on to be the prime contractor for most of the project.

Work under the first major contract began in 1991.

After the go-ahead to build, heavy equipment began moving earth to the plant's periphery. Some was removed by barge, and trucks moved the remainder around the site as needed to allow work to proceed. Much of this dirt became the 15-to-20-foot-high earthen berm rimming two sides of the plant.

Work started immediately on the retaining wall defining the park property line at the rear of the site. Excavation in this area unexpectedly exposed a stream, later shown to be the probable source of fresh water for Native Americans who had camped on the point centuries earlier. Taking advantage of

Guided beach exploration for children was part of the groundbreaking for secondary treatment at West Point.

A Closer Look at the Retaining Wall

- Length: *3,000 feet*
- Height: *35 to 60 feet*
- Thickness: *4 feet*
- Soldier piles: *77*
- Tiebacks: *1,471, ranging from 50 to 115 feet long*
- Concrete poured: *28,200 cubic yards*

A temporary barge dock enabled the movement of tons of supplies and debris to and from the construction site by sea.

cooperative weather, the contractor finished the retaining wall three months ahead of schedule, getting West Point off to an encouraging start.

Other work on the site during the early months of construction focused on setting up the concrete batch plant and building the temporary barge dock.

Because crews had to start pouring concrete before the dock was ready, initial supplies of aggregate were barged in at low tide and transferred to the batch plant by crane. Barges made the 20-mile trip north from Steilacoom, Wash., in four hours, bringing a total of some 11,400 tons of sand and gravel over three years. At the height of site preparation, barges left West Point laden with as much as 24,000 tons of construction spoils a week.

This sea traffic was essential to avoid gridlock on the site and spare neighborhood streets from the estimated 20,000 round trips by concrete trucks that would otherwise have been necessary. Truck traffic on Magnolia streets throughout construction was well below the 150 round trips a day allowed by permit.

Even though the last major contract at West Point was for landscaping, revegetation was also a consideration

The retaining wall next to Discovery Park was a priority project during site preparation.

during site preparation. After completing the retaining wall, Metro planted 11,000 native trees and shrubs on the hillside above it to enhance wildlife habitat and screen treatment facilities from the view of Discovery Park visitors. Another 7,500 native trees and shrubs lining the roadway through the park capped utility and access improvements. Divers transplanted eelgrass over 10,000 square feet of sediment to offset damage to near-shore habitat caused by the barge dock.

Divers transplanted eelgrass to restore intertidal habitat disturbed by construction of the barge dock.

Constructing Around the Past

None of this work made headlines, however. The news maker during site preparation was the discovery of a Native American shell midden some eight to 10 feet below mean sea level. A U.S. Geological Survey geologist at West Point collecting data on a major Puget Sound earthquake 1,100 years earlier advised project staff of the find, the significance of which was soon confirmed by archaeologists.

Metro stopped work, asked contractors to adjust activities to avoid the area temporarily and called in Larson Anthropological/ Archaeological Services to excavate test pits and recover cultural materials. The discovery of additional middens and activity areas later in the year extended the consultant's involvement until all excavation was completed in the spring of 1994.

The firm identified Native American cultural materials at 17 locations over four and one-half acres. After thorough analysis, the artifacts and soil samples removed became the responsibility of one of the affected tribes. Exhibitions in the West Point area gave the public a chance to view selected materials.

Metro added hundreds of native trees and shrubs to screen the retaining wall from park visitors.

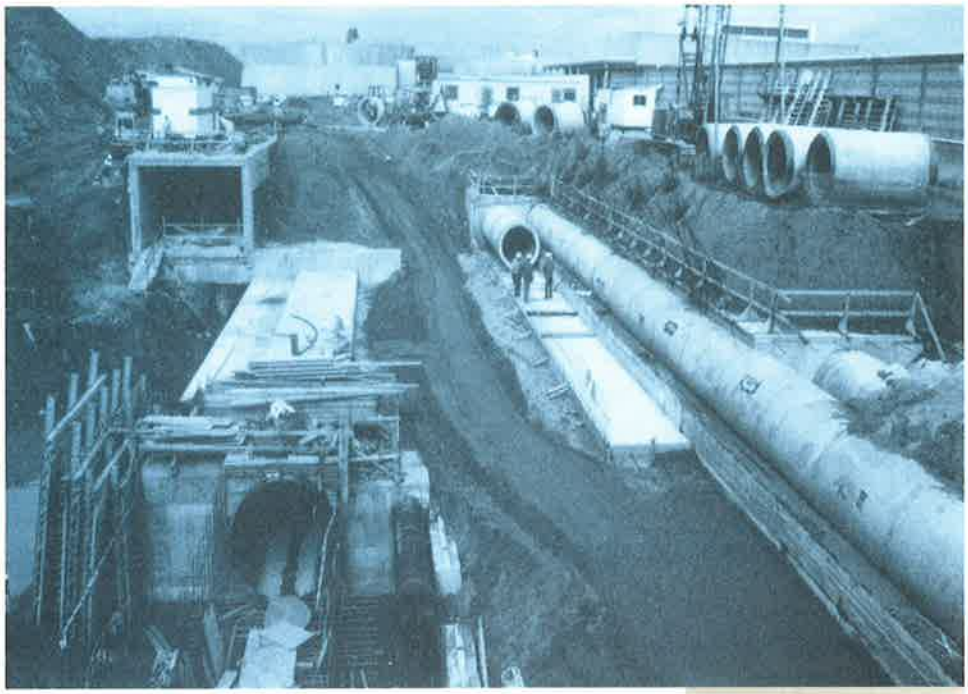
Construction and Renovation Contracts

During 1991 and 1992, Metro awarded 50 of the project's 100-plus construction and procurement contracts. Work on the largest construction contract (for $107 million) to build most of the secondary treatment facilities began in the spring

of 1992. This "liquids stream" contract included installing conduits, electrical and mechanical equipment and miles of piping in underground utility "galleries," two pump stations, 24 high-purity-oxygen aeration basins and 13 secondary clarifiers.

As it had done with solids drying, Metro intended to privatize the oxygen-production facility. Unresolved liability concerns, however, scuttled the idea, so the agency had to find the money within the existing construction budget to build it. Savings elsewhere–especially on contracts bid below estimate–allowed funding of this and other smaller, unexpected expenses as the project unfolded.

Solids-handling and odor-control facilities began to take shape in the summer of 1992 under a $22 million contract. The centerpiece of this "solids stream" work was a three-story building which, when completed two years later, was partially screened by an extension of the meadow from Discovery Park.



To maximize use of the site, workers encased pipe systems so the foundations of new treatment structures could be built over them.

Metro awarded the $40 million contract to upgrade West Point's 30-year-old primary treatment facilities to Magnolia Contractors. Much of this work occurred over three summers, when wastewater volume was at its lowest and shutting down individual primary clarifiers would not hamper plant operations. Throughout renovation, the primary treatment plant stayed within

As secondary clarifiers took shape, so did the "footprint" of the West Point plant.

The end of construction was in sight when staff moved into West Point's administration and operations building early in 1995.

the water quality standards of its federal discharge permit.

Work on West Point's 18,000-square-foot administration and operations center began early in 1994. This new facility was ready for occupancy early in 1995, signaling the beginning of the end of construction.

Contractors, engineers, vendors and operations staff collaborated on a plan for phasing in new equipment and procedures, within the context of a functioning plant. This plan went into effect in June 1994 with testing of the new solids-processing system. Metro put dewatering centrifuges into service, followed by test loading of processed biosolids onto trucks.

Metro contracted four years in advance for tens of thousands of native plants such as these for West Point landscaping.

With these systems operational, contractors demolished the original solids-handling facility to allow construction of the earthen berm. What might look to the casual observer like a mound of dirt between the treatment plant and the beach was much more to geotechnical, structural and horticultural specialists. By controlling compaction and mixing organic amendments into the top three feet of the berm, they converted the dirt excavated years earlier and moved around the site numerous times into a well-draining medium for native plants.

Landscape Restoration

As Metro looked toward more milestones within the West Point site, public interest turned to what old-timers had known as "Barnacle Beach" skirting the plant on the north and south. Metro had restored the south beach in 1981 and, in conjunction with upgrading the plant, it improved aesthetics of the north beach and public access.

Restoration and enhancement of the landscape continued in late 1995 with the awarding of West Point's landscaping contract. As new treatment systems went into service, crews prepared the 20-acre shoreline park for the largest native-plant restoration project in the Pacific Northwest.

In 1991, Metro had selected three nurseries to propagate 80 species of trees, shrubs, ground-cover plants and grasses. These plants would be brought to West Point as needed through 1996 and arranged to screen the plant from view and maximize their benefit for wildlife.

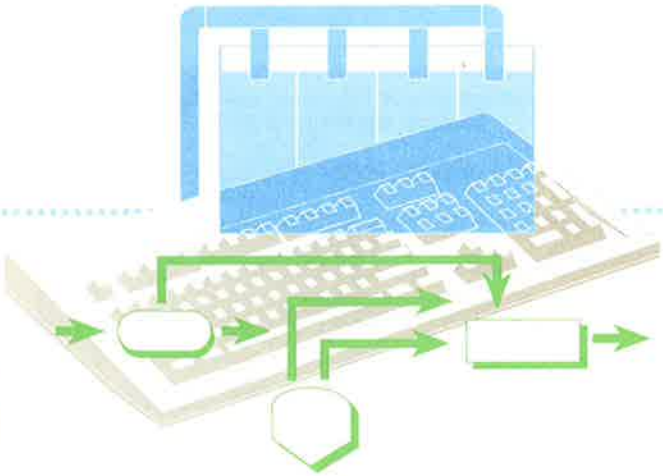
Individual effort backs each recognition given to the West Point project.

Facts About West Point Construction

- Amount of earth excavated: *500,000 cubic yards*
- Amount of topsoil added: *40,000-50,000 cubic yards*
- Amount of concrete produced on site: *285,000 cubic yards*
- Total number of contracts awarded: *110*
- Full-time-equivalent construction jobs, including apprenticeships, at peak year of construction: *381*
- On-site piping: *10 miles*
- Diameter of largest on-site piping: *12 feet*
- Diameter of main outfall: *8 feet*
- Diameter of emergency outfall: *12 feet*
- Plants in on-site landscaping: *13,021 trees; 51,481 shrubs; 132,982 ground-cover plants; 100,000+ plugs of beach grass*

Principal Recognitions

- **Medal of Excellence (with CH2M Hill),** *Engineering News-Record, for environmentally sensitive, cost effective design, 1992*
- **National Finalist,** *American Consulting Engineers Council, for CH2M Hill's design of the temporary barge dock, 1993*
- **Honor Award,** *Puget Sound Chapter, Project Management Institute, for project management during site preparation, 1993*
- **State Historical Preservation Office's Annual Award,** *for outstanding achievement in preservation planning, 1994*
- **Dr. Martin Luther King Jr. Humanitarian Award,** *King County, for exceptional participation of minority- and women-owned firms, 1995.*



STATE OF THE ART

West Point in Operation

Wastewater treatment and solids processing are around-the-clock operations at West Point. In addition to its size as the largest such plant in the Pacific Northwest and its extraordinary environmental accommodation, West Point is characterized by its operating efficiency.

Service Without Fail

Even for veteran West Point employees, advanced systems made operating and maintaining the plant a new ballgame. Principal activities of plant operations more than doubled with the upgrade to secondary treatment, as did the amount of equipment. Thus, most additions to the staff were in maintenance and operations.

West Point has 153 full-time-equivalent water pollution control employees on site. Most of them work weekday shifts, with a minimum of 10 on duty nights and weekends. The private solids-drying facility is designed to employ 16.

New technology and a team approach to management have increased the efficiency of a staff responsible for a complex process that must operate without fail. The plant upgrade included installing a second electrical power feeder as a backup. In the event of a total power failure, systems will shut down and wastewater will discharge directly into Puget Sound through a new 605-foot-long emergency outfall.

The plant's miles of fiber-optic cables link an extensive computerized operating system, plus a network of smaller computers to localize control of equipment if the main computer fails. Banks of terminals now replace the lighted status board that dominated the former plant's control room, allowing continuous monitoring of operations and minor adjustments at the touch of a keyboard.

Metro Staffing at West Point

Administration	5
Maintenance	70
Operations	40
Service	20
Laboratory	18

Operations specialists can monitor any function at West Point by computer.

Redundancy was the rule in planning for key functions. If one pump malfunctions, for instance, another automatically starts to avoid having to discharge untreated wastewater. Redundancy also enables uninterrupted service during the regular maintenance essential to efficient and continuous operation.

Environmental Mitigation

As it was during construction, environmental mitigation is a priority during plant operation, especially concerning noise and odor. The new West Point reflects commitment to being a good neighbor to people walking beaches and trails, as well as to the residents of Coast Guard housing adjacent to the West Point Lighthouse.

Noisiest functions are positioned as far as possible from the beach, and the earthen berm and concrete retaining wall act as noise barriers. Exposed equipment (such as compressors and heating vents) is fitted with silencers,

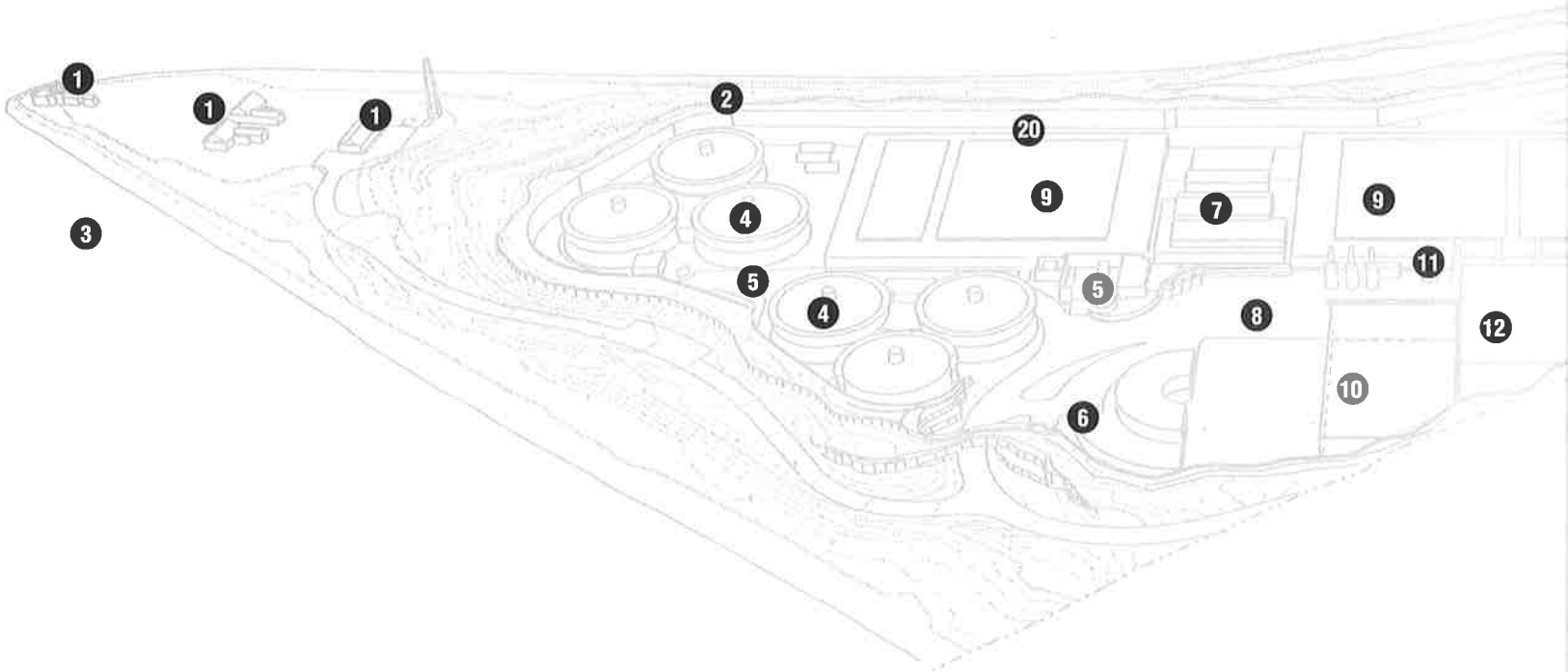
> "We have built to a high standard because the public would not be happy if the plant didn't do the job it was intended to. We've tried to spend money well for a reliable system that has a long life."
>
> –Gordon Gabrielson, manager, West Point Treatment Plant, in a 1995 interview

and equipment that could not be purchased or retrofitted to meet noise standards was custom-designed so it would.

To avoid any discernible odor in publicly accessible areas, West Point uses technology that scrubs air from odor-generating processes with a mixture of water and neutralizing chemicals. Activated carbon neutralizes air from solids digesters, and the solids drying facility is maintained at negative air pressure to minimize the escape of odors.

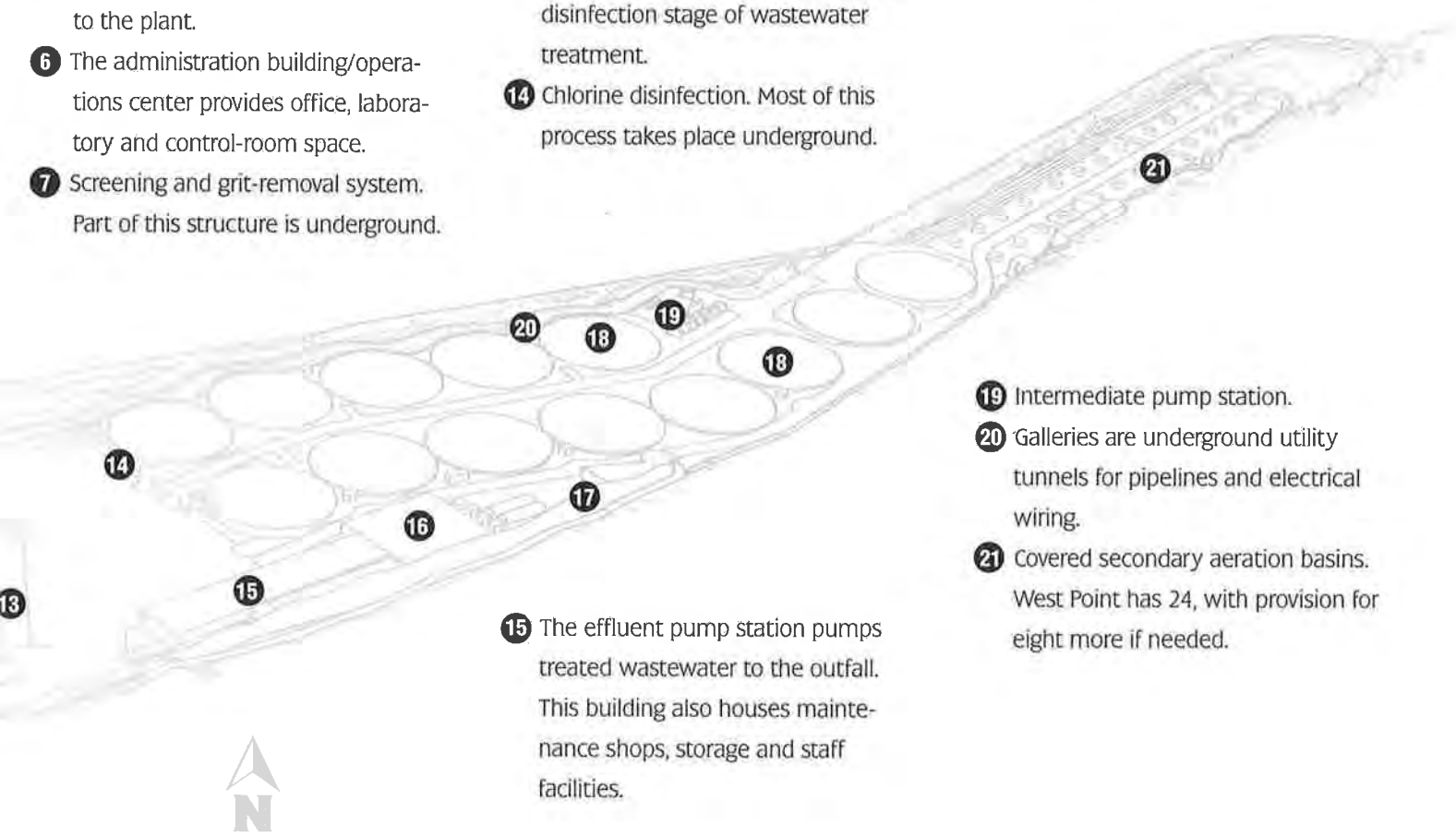
The Layout of West Point

Positioning of facilities at West Point had to accommodate the existing



primary plant and outfall, plus available land between the shoreline and bluff. This view is from the water, looking toward the Discovery Park bluff.

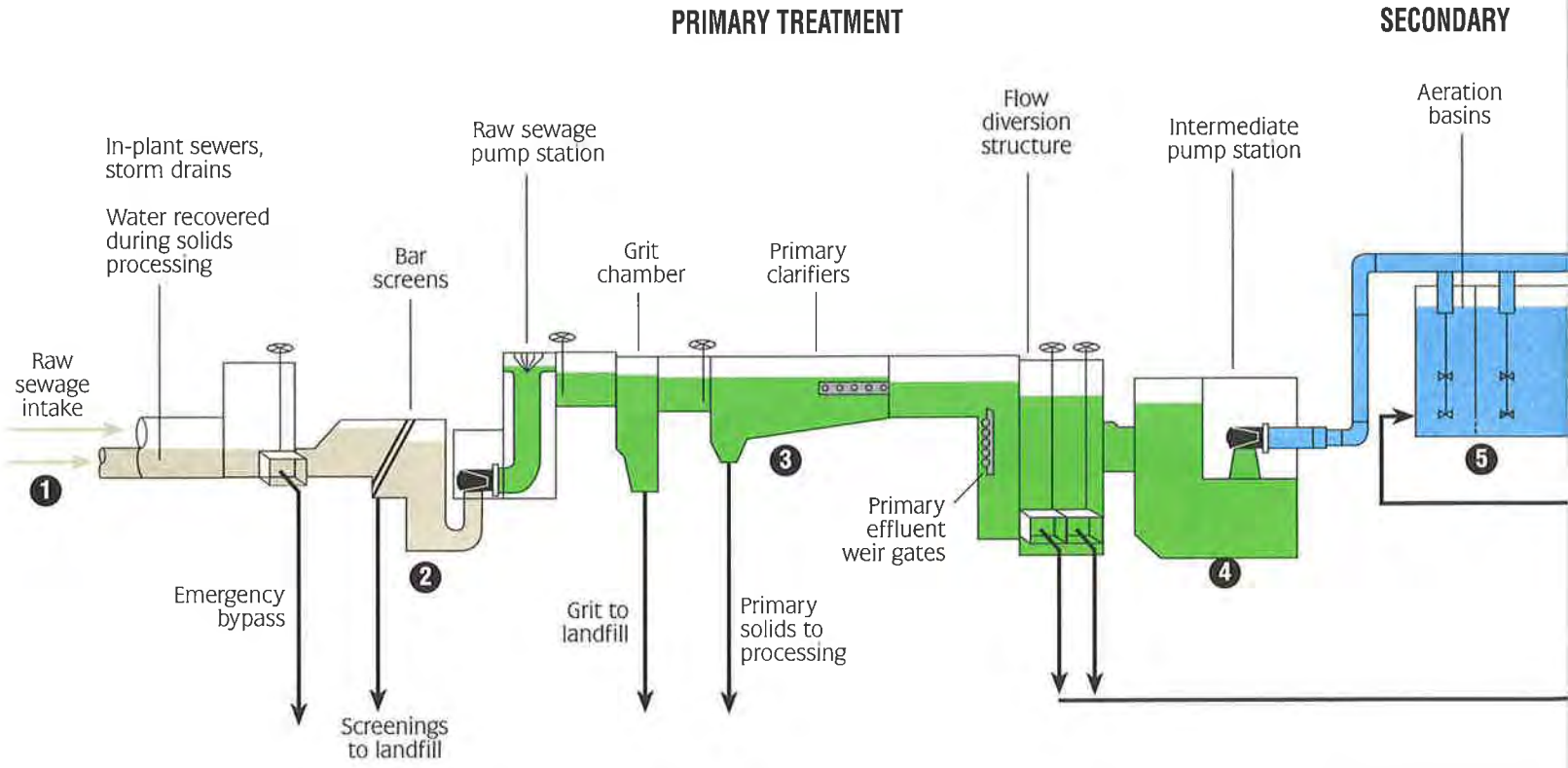
1. Coast Guard lighthouse and housing.
2. Earthen berm.
3. Outfall into Puget Sound.
4. Solids digesters. West Point has six, with provision for one more if needed.
5. Electrical substations provide power to the plant.
6. The administration building/operations center provides office, laboratory and control-room space.
7. Screening and grit-removal system. Part of this structure is underground.
8. Pump station for intake of raw sewage.
9. Primary clarifiers. West Point has 12.
10. Private solids-drying facility.
11. The odor-control facility scrubs air from wastewater and solids processing. West Point has six scrubber towers, with provision for three more if needed.
12. Solids-handling facility.
13. The chlorine building houses the chlorine and equipment used in the disinfection stage of wastewater treatment.
14. Chlorine disinfection. Most of this process takes place underground.
15. The effluent pump station pumps treated wastewater to the outfall. This building also houses maintenance shops, storage and staff facilities.
16. The oxygen-production facility produces high-purity oxygen for the aeration basins. Liquid oxygen for peak times and equipment failures is also stored here and vaporized, as necessary, for the aeration basins.
17. The facilities services building houses shops, offices and a meeting room for staff.
18. Secondary clarifiers. West Point has 13, with provision for two more if needed.
19. Intermediate pump station.
20. Galleries are underground utility tunnels for pipelines and electrical wiring.
21. Covered secondary aeration basins. West Point has 24, with provision for eight more if needed.



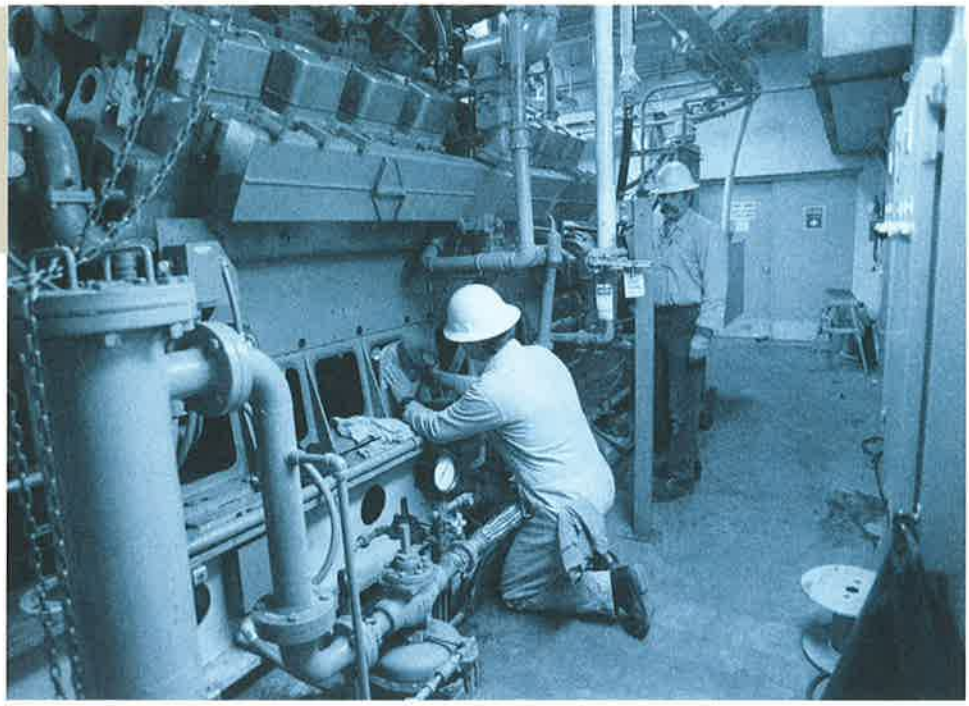
Wastewater Treatment at West Point

Here's what takes place during primary and secondary treatment. Secondary treatment adds a biological process after primary treatment.

1. Raw sewage is conveyed to the plant through a network of pipes and tunnels. Pump stations throughout the service area boost wastewater uphill, and regulator stations control stormwater in the combined system. In the event of catastrophic plant failure, an emergency bypass would discharge wastewater directly into the sound through an emergency outfall.
2. Bar screens remove large objects such as rags and sticks, and grit chambers settle out sand and gravel, all of which is trucked to a landfill.
3. Primary clarifiers remove floating material and settle out more solids, which are withdrawn for separate processing. Primary treatment is now complete.
4. Wastewater goes through the intermediate pump station to begin secondary treatment. During heavy rains when the volume of wastewater from combined sewers is high, excess flow can be diverted directly to chlorine disinfection before discharge.
5. High-purity oxygen and bacteria are introduced to break down organic matter in the wastewater.
6. Secondary clarifiers settle out more solids, a portion of which is returned to the aeration basins to provide the bacteria needed in processing. The rest is withdrawn for separate processing.



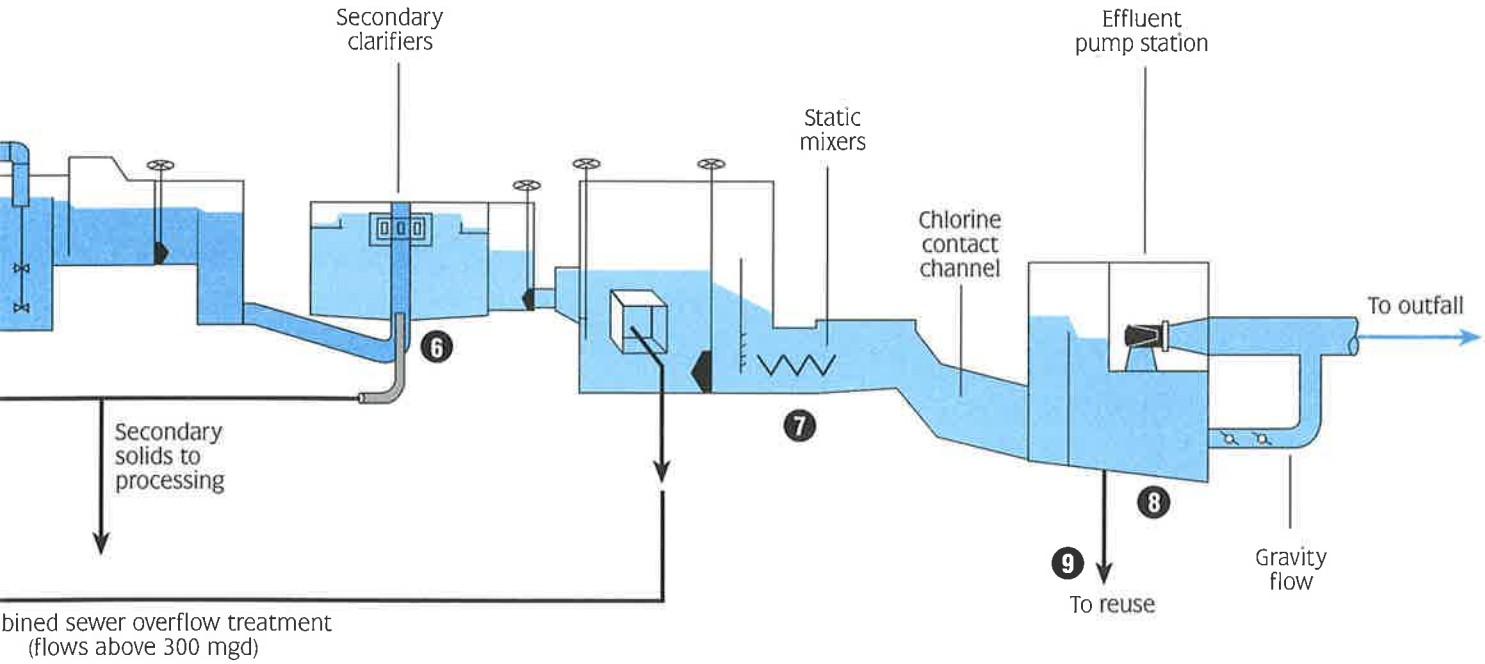
Continuous maintenance keeps West Point equipment in peak operating order.



7. Chlorine disinfects wastewater en route to the final pumping station.
8. Treated and disinfected wastewater is discharged through an outfall into Puget Sound.
9. A portion of the treated wastewater is used for cooling buildings at the plant and for irrigating landscaping.

ENT

DISINFECTION



bined sewer overflow treatment
(flows above 300 mgd)

Solids Processing at West Point

Processing of solids removed during primary and secondary treatment is a shared undertaking of King County and PCL Constructors/Sludge Management Inc. (PCL/SMI).

1. Raw organic solids from primary and secondary treatment are blended to a uniform consistency.
2. Solids are pumped out of the blend tank onto a moving belt, which acts as a filter to remove water and thicken solids. The water that seeps through is piped back to the main plant for treatment. From this point, processing occurs in one of two ways:

King County Processing

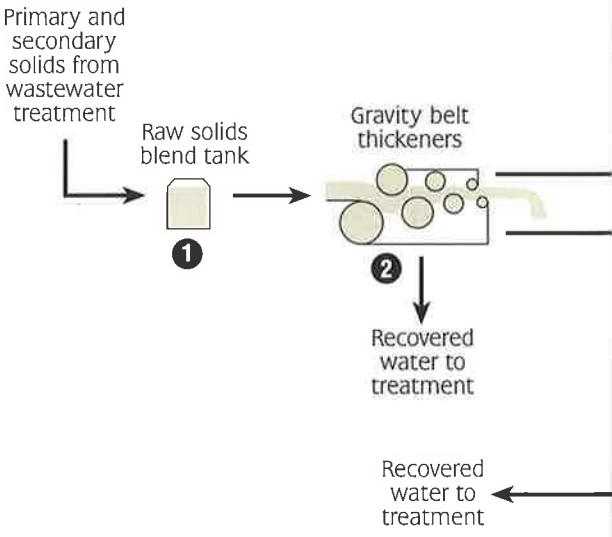
3A Thickened solids are blended to a uniform consistency and passed through a heat exchanger to raise the temperature of the solids and stimulate digestion.

4A Organic material and pathogens are broken down in digesters; this process generates methane gas.

5A Most of this gas fuels pumps for raw sewage and a cogeneration system to produce electricity; the excess is incinerated.

6A Digested solids are spun in centrifuges to eliminate more water, which is piped back to the main plant for treatment.

7A These nutrient-rich, thickened biosolids are loaded onto trucks for land application as a conditioner and fertilizer.



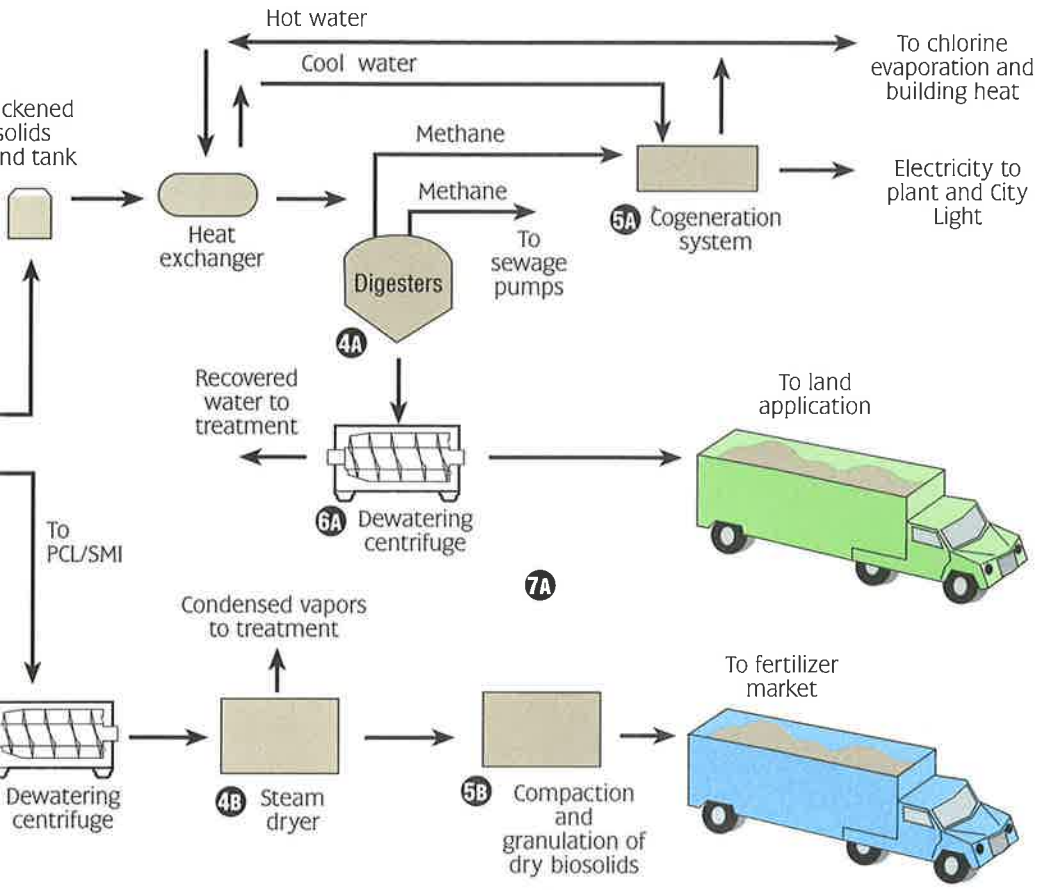
Biosolids are loaded inside the solids-processing building to contain odors.

Private Processing

3B Undigested solids are pumped to PCL/SMI, where they are centrifuged.

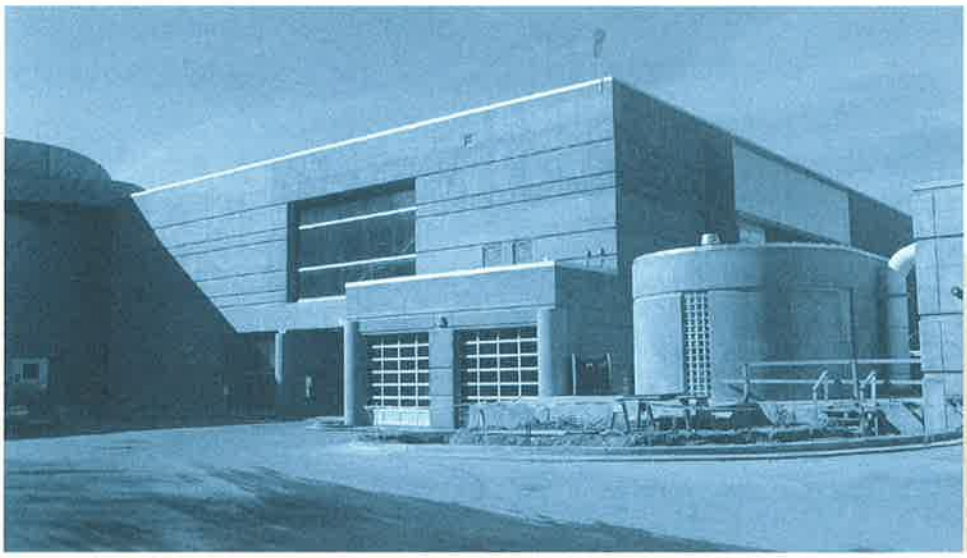
4B A steam dryer fueled by recycled oil further reduces water content to less than 10 percent. Condensed vapors are piped back to the main plant for treatment.

5B Dry biosolids are formed into granules or pellets and loaded onto trucks within the solids-processing building for transport and marketing as ingredients in blended fertilizer.



Facts About the West Point Treatment Plant

	1966	*1989*	*1996 (projected)*
Customers served	286,000	305,000	600,000
Portion of total Metro customers	85%	53%	50%
Area covered by facilities	15 acres	24 acres	32 acres
Public open space and landscaping	9 acres	9 acres	20 acres
Full-time equivalent staffing	26	110	153
Annual operating cost	$.18 million	$2.8 million	$20 million
Daily capacity	125 million gallons	125 million gallons	133 million gallons
Daily capacity, peak storm	325 million gallons	325 million gallons	440 million gallons
Annual production of biosolids	Not applicable	8,500 dry tons	18,800 dry tons
Average monthly biochemical oxygen demand in discharge allowed by federal permit	Not applicable	100 milligrams per liter	30 milligrams per liter
Average monthly total suspended solids in discharge allowed by federal permit	Not applicable	72 milligrams per liter	30 milligrams per liter



The solids-handling building encloses all solids-processing equipment and truck-loading facilities.

BEYOND WASTEWATER TREATMENT

The Lasting Benefits of West Point

Someone familiar with the original West Point Treatment Plant would hardly recognize it today. An urban natural area spills over improved facilities to protect water quality and public health, and pioneering technology promises expanded uses for treatment byproducts.

West Point is, however, more than the sum of facilities and stewardship measures. An important part of the story about how the region accomplished this public-works project is the legacy of what was learned.

Community Relations

The protracted, difficult process of deciding to upgrade West Point emphasized to elected officials and agency staff that the "public" in public works is more than a source of funding. West Point served notice that citizens want–and expect–to be involved in major projects from their inception.

> "You don't want experts defending the things they say. You want them to listen to what citizens say, to what the people really want. To me, that's the proper approach."
>
> –Robert E. Kildall, president and founding member, Friends of Discovery Park, in a 1995 interview

Community relations proved its value when proponent and opponent become partners in the dance. As West Point planning moved forward and as permit and settlement conditions dictated, Metro's customary investment in communication mushroomed to include

Citizens were keenly interested in landscaping and access provisions of the proposed upgrade at West Point.

Citizens were informed and involved throughout the West Point project.

"There was a real learning process for most of us on the project team, to sensitize ourselves to the importance of environmental mitigation. The mitigation portion will be what makes this a landmark project."

–Jim Goetz, project manager, CH2M Hill, in a 1995 interview

printed materials, open houses and tours, a temporary project-information office, a speakers bureau, news articles, displays and a construction hotline. These information activities complemented construction activities with community relations in mind, including street and safety enhancements, a wheel wash for trucks leaving the site and constant monitoring of truck trips through the neighborhood.

The West Point Citizens' Advisory Committee also demonstrated its value. It assured that "user" perspectives were incorporated into design decisions and became an avenue for building credibility with the public.

Shoreline Public Access

Generations of residents will benefit from West Point's emphasis on habitat, both on- and off-site. Metro's shoreline-enhancement dollars are enabling acquisition of critical shoreline sites in Seattle and King County for public access and habitat restoration. In the process, governments and citizens are working together to fund and carry out restoration of these parcels. The public gains natural open space, and the region benefits from the collaboration.

West Point itself is illustrative of how industrial function can be environmentally sensitive. If public officials so choose and designers follow through, wastewater treatment can co-exist with wildlife habitat and passive recreation, and the clock can be turned back on environmental damage.

Innovations in Contracting

West Point was a testing ground for innovations sure to have wider application to public-works contracting in the region. One was partnering to foster quick resolution of coordination prob-

Shoreline improvement dollars tied to the West Point project are helping fund habitat restoration throughout the region.

Metro contract compliance specialist Willie Winston, left, regularly talked with workers to monitor equal-employment opportunity on West Point construction contracts.

"Everywhere people look, they'll see evidence that minority- and women-owned businesses played an important role in the West Point project."

–Alec Stephens, former Metro M/WBE West Point liaison, from Metro's 1994 "Out of the Ground" videotape

lems. Metro applied it before and during construction at West Point, showing that efficiency, working relationships and results improve when contractors, consultants and project staff talk about details throughout the course of a major project and resolve issues as they arise.

Another innovation was a constellation of creative approaches to involve certified minority- and women-owned firms in the project. Instead of meeting participation targets using a few certified businesses, Metro and its majority contractors set a tone for contracting at West Point that emphasized spreading the wealth and increasing diversity.

Communication occurred early and often so work could be packaged into contracts that encouraged women and minorities to bid. Creative packaging also assured that some work was grouped into bite-sized pieces suited to small companies. The result was a marked increase in the percentage of public-works dollars going to certified businesses and in the number and ethnic diversity of those businesses.

Metro also began requiring prime contractors to include apprenticeship opportunities for minorities and women wanting to enter construction trades. As part of a regionwide emphasis involving schools, labor unions, community-based organizations and public agencies, Metro stipulated apprenticeships in contracts and monitored contractor compliance with goals of the program.

Archaeological Research

The considerable archaeological research that took place at West Point within the context of major construction taught an important lesson: Incorporate archaeological monitoring into the

Metro's approach to contracting gave apprentices such as Carma Clark the opportunity to begin or continue their training at West Point.

planning process as a routine component of shoreline construction projects.

Information available about the site at the time design was under way gave no indication that the point was of cultural interest and, even if it had, a cursory study might not have been informative. The discovery of cultural materials was made only because major excavation was required during site preparation.

Few undisturbed shoreline sites remain around the rim of Puget Sound's central basin. If trained eyes see what is being unearthed as these sites are excavated, a sharper picture of the first people in this region might come into focus.

The unexpected discovery of cultural materials at West Point underscored the importance of monitoring major shoreline excavation.

"The farsighted effort of Metro and its engineering managers at West Point should become a routine part of all coastal construction projects."

–Larson Anthropological Archaeological Services 1994 report to Metro

Among Native American artifacts discovered at West Point is this lip ornament common to Coast Salish tribes.

A CLOSER LOOK AT HISTORY

The Chronology of West Point

The story of West Point is much more detailed than the summary presented in preceding chapters. This chronology is a comprehensive blend of historical facts about the site, the evolution of Metro's sewerage system and the process of upgrading to secondary wastewater treatment.

5000 BP Erosion as post-glacial sea levels stabilize some 5,000 years before the present era creates a broad, flat plain in the West Point area.

4000 While landslides and rising sea levels slowly alter the area, Native American hunter-fisher-gatherers begin using West Point as a base camp.

3500 Continued erosion and rising sea levels create more attractive beaches and sand spits elsewhere, diminishing West Point's importance as a campsite.

1400 Small families or groups of Native Americans use West Point as a campsite for short periods only.

1792 AD Capt. George Vancouver's sloop *Discovery* and tender *Chatham* explore and map Puget Sound.

1851 Seattle is incorporated.

The first water closet is installed in the White House.

1880 U.S. Lighthouse Service builds the first access road to West Point.

1881 U.S. Lighthouse Service erects the West Point Light, the only red beacon for mariners on Puget Sound.

1882 Seattle health officer criticizes sewers as inadequate for a town of 4,000.

1889 Seattle voters approve the largest bond issue yet ($190,000) to build a sewerage system.

1892 Seattle City Engineer R.H. Thomson proposes West Point as the site for an outfall into Puget Sound.

1900 The new U.S. Army post on Magnolia Bluff is named Fort Lawton.

1904 Study of currents identifies West Point as the best discharge point for untreated wastewater into Puget Sound.

1909 Thomson receives federal approval for the outfall off West Point.

1911 Seattle completes the Fort Lawton tunnel to bring flows to West Point, the Lake Union tunnel for discharge into Elliott Bay and the Rainier Valley system for discharge into the Duwamish River.

1930 U.S. Army begins filling the salt marsh at West Point for amphibious landing-craft training through World War II.

1940 Seattle City Council decides to build the city's first primary treatment plant near the Duwamish River off Diagonal Way and proceeds to construction.

1952 Seattle City Council decides to expand the Duwamish River plant and build a primary treatment plant at West Point; only the expansion moved forward.

1956 King County, Seattle and the state of Washington fund a comprehensive sewage

The West Point light station stands alone at its once-remote location.

and drainage plan calling for closing the Duwamish River plant, completing pipes to West Point and building primary treatment plants at West Point and Renton with regional capacity.

1957 Voters reject a proposal to create the Municipality of Metropolitan Seattle (Metro) to be responsible for sewage, public transportation and comprehensive planning in the Seattle/King County area.

Seattle opens its first primary treatment plant on salt water, at Alki Point.

1958 Voters approve creation of Metro, with responsibilities limited to regional sewage collection and treatment, including cleanup of Lake Washington. The Metro Council is assembled with representatives from major jurisdictions in the region.

1959 Metro Council adopts the first comprehensive sewer plan for the region, including construction of regional treatment plants at West Point and Renton and closure of the Duwamish River plant.

1960 Washington Supreme Court upholds agreements between Metro and Seattle, clearing way to begin implementing the comprehensive sewer plan.

1961 Independent engineering study confirms feasibility of the comprehensive sewer plan.

1962 U.S. Army grants Metro a 99-year easement for approximately 30 acres at West Point for a sewage treatment plant and related facilities.

1963 Metro begins construction of its $12.9 million primary treatment plant at West Point.

1964 Washington State Department of Natural Resources grants Metro an easement for a sewage disposal plant on 40 acres of tidelands at West Point.

U.S. Department of Health, Education and Welfare conveys 2.67 acres of surplus property to Metro at West Point for public-health purposes.

1965 Metro begins secondary treatment at its Renton plant.

1966 Metro dedicates its primary treatment plant at West Point.

1968 Citizens for Fort Lawton Park forms, the forerunner of Friends of Discovery Park.

1970 President Richard Nixon signs the "Fort Lawton Bill," allowing transfer of surplus federal lands at no cost back to the cities that donated them.

1971 Metro Council reaffirms the comprehensive sewer plan's two-plant concept.

1972 Federal government transfers 391 acres of Fort Lawton to Seattle for development of the largest park in the city's system.

Federal government transfers approximately 30 surplus acres at West Point to Metro, the same 30 acres granted to Metro by easement in 1962.

Congress passes the Clean Water Act requiring secondary treatment at all municipal wastewater plants by 1977; President Nixon vetoes but Congress overrides.

Citizens for Fort Lawton Park issues a master plan to make it "one of the truly great urban parks of the world."

1973 Metro begins planning to bring its primary treatment facilities on Puget Sound into compliance with the secondary treatment requirement.

Metro forms advisory committee involving advocates for Discovery Park.

1974 Washington State Department of Ecology issues a five-year interim permit for continued discharge at West Point, later extended to remain in effect until secondary treatment is in place.

Newly formed Puget Sound Water Quality Defense Fund sues to stop Metro's plan to pipe solids from Renton to West Point.

1976 Metro begins soliciting public comment on its plan for secondary facilities.

1977 Lobbying by West Coast dischargers, including Metro, convinces Congress to amend the Clean Water Act to allow waiver of the secondary treatment requirement for existing facilities, as long as marine water quality is protected.

Federal government transfers more of Fort Lawton to Seattle, bringing the total size of Discovery Park to 535 acres.

1978 Metro applies for secondary treatment waivers for all four of its wastewater plants with outfalls into Puget Sound.

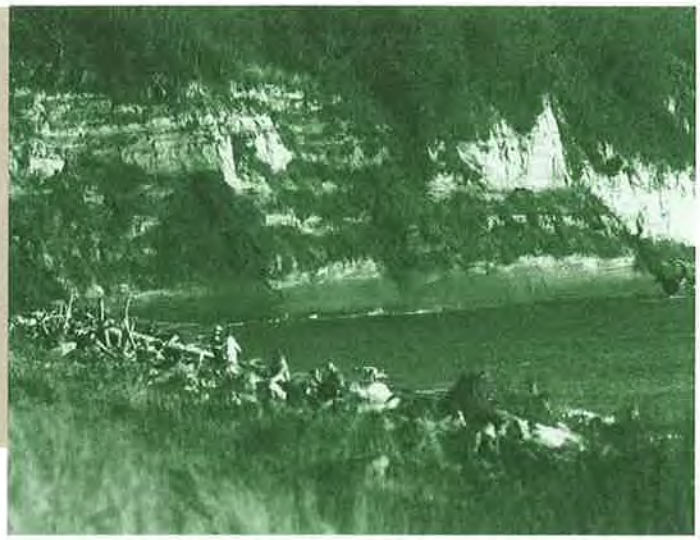
1981 Metro eliminates its solids test lagoon at West Point and restores the south beach with gravel and grasses.

U.S. Environmental Protection Agency tentatively approves a waiver for West Point, subject to concurrence by the state Department of Ecology.

1982 Metro moves into the final stage of its facilities plan for continued primary treatment, as allowed by the waiver.

Laying sewer lines was a mammoth project for Seattle, as shown in this photo taken about 1918.

From Native American campsite to "Barnacle Beach" at the turn of this century to today's natural tide-washed expanse, residents have enjoyed the beaches at West Point.



A coalition made up of the Puget Sound Water Quality Defense Fund, Friends of Discovery Park, Washington Environmental Council and Legal Advocates of Washington sues to block the Metro waiver.

1983 Metro Council approves facilities plan, including continuance of primary treatment at all four Puget Sound plants.

State Department of Ecology concurs with waiving the secondary treatment requirement for West Point.

1984 State Department of Ecology issues its policy and strategy for municipal wastewater management, noting that secondary treatment will eventually be required for all plants.

Metro issues a study report documenting toxicant problems, including those in Elliott Bay, and compares the ability of primary and secondary treatments to remove toxicants in wastewater.

National Oceanographic and Atmospheric Administration releases its analysis of currents, showing protracted retention–not rapid flushing–of discharge into Puget Sound.

State Department of Ecology reverses its earlier decision and orders Metro to provide secondary treatment for the West Point service area by early 1991.

Metro begins soliciting public input on a program to address toxicants in Elliott Bay and the Duwamish River estuary, including upgrading plants to secondary treatment and increasing control of overflows from combined sanitary/stormwater sewers.

Health of Puget Sound becomes an issue in the gubernatorial race, with strong support from both major contenders.

1985 Metro issues a draft environmental impact statement analyzing four alternatives for secondary treatment, all involving continued treatment at West Point. Seattle protests that no inland locations were studied.

1986 Metro Council agrees to consider Seattle's proposal to replace West Point with a major secondary facility in the Duwamish River industrial area or at Interbay, or replace West Point with smaller facilities at both sites.

Seattle City Council withdraws its legal challenge to Metro's draft environmental impact statement and concurs with the mayor's appointment of a citizens' technical advisory committee.

Metro issues a supplemental environmental impact statement on inland alternatives to upgrading West Point.

Metro Council rejects its Water Quality Committee's recommendation for a Duwamish-area plant and adopts a plan to upgrade West Point.

Metro applies to the City of Seattle for a plan-level siting permit for West Point.

1987 State extends its deadline for complying with federal discharge water quality standards at West Point to Dec. 31, 1995.

Metro contracts for predesign studies and environmental review of secondary facilities at West Point.

Metro completes construction of two additional solids digesters at West Point to increase capacity.

Seattle's Department of Construction and Land Use recommends against issuing the plan-level siting permit on grounds that other acceptable sites are available.

1988 Seattle City Council issues a plan-level siting permit, stating that it sees no feasible alternative to upgrading West Point.

Puget Sound Water Quality Defense Fund and others appeal the siting permit to King County Superior Court and to the State Shoreline Hearings Board.

Metro applies to the City of Seattle for a project-level zoning permit.

West Point Citizens' Advisory Committee meets for the first time to consider landscaping and public-access issues.

1989 Metro staff and consultants complete predesign of the upgraded plant.

Metro Council authorizes contracting with a private company for a new approach to solids processing at West Point.

Superior Court vacates Seattle's plan-level siting permit and remands the matter to the Seattle City Council.

Metro submits a revised application for a project-level siting permit addressing project changes.

State Shoreline Hearings Board ties 3-3 and fails to overturn Seattle's plan-level shoreline permit for West Point; appeal goes to Washington Court of Appeals.

Seattle City Council issues a new plan-level siting permit for upgrading West Point.

1990 Superior Court upholds Seattle's new plan-level siting permit.

Washington Court of Appeals upholds the State Shoreline Hearings Board's decision not to overturn Seattle's plan-level shoreline permit.

Metro Council sets West Point budget at $578.5 million, based on cost estimates prepared at 25 percent of design.

1991 Seattle City Council issues a project-level siting permit with conditions.

Court of Appeals denies request to reconsider its decision.

U.S. Army Corps of Engineers issues permits for West Point, including wetland fill.

Metro and project opponents sign a settlement. Opponents agree to file no further appeals and drop pending appeals; Metro agrees to additional environmental mitigation.

As chair of the Metropolitan King County Regional Water Quality Committee, King County Councilmember Larry Phillips, gesturing, looks to the future with members of the Citizens' Water Quality Advisory Committee.

Metro awards the site-preparation contract and construction begins.

1992 Excavation at West Point reveals Native American middens of archaeological significance.

This information is available on request in accessible formats for people with disabilities by calling (206) 684-2046 (voice) or (206) 689-3413 (TTY/TDD).

1993 Metro and City of Seattle begin selecting shoreline improvement sites using $30 million set aside to compensate for potential loss of shoreline public open space caused by upgrading West Point.

Environmental Protection Agency adopts regulations for safe, beneficial use of biosolids for conditioning and fertilizing soil.

1994 Metro and King County merge; Metro becomes King County Department of Metropolitan Services.

1995 Metro begins secondary treatment at West Point.

1997 Construction, landscaping and certification of West Point complete.

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