





Proactive Water System Planning has been the underlying philosophy of North City Water District ever since our system was originally designed in 1931. Over the years, regular and ongoing upgrades have resulted in a water system that far exceeds national infrastructure averages, while continuing to meet the current and ever-increasing needs of our primarily residential service area.

The goal of our Water System Planning is to ensure our water system, along with its associated operations, staff, and equipment, are being managed and maintained as safely, efficiently, and cost-effectively as possible.

We invite you to learn more about this effort inside...

#### At a Glance

- Approximately 25,000 customers
- Roughly 5 square mile service area
- Serves residents in the Cities of Shoreline and Lake Forest Park
- Two reservoirs: 3.7 million and 2.0 million gallons
- Four Supply Stations
- Two Booster Stations
- One Pump Station
- Fourteen Pressure Reducing
  Stations and Valves
- Ninety-six miles of water main (piping)
- Three emergency connections to neighboring water systems

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1 Overview of the Planning Process



Anyone who provides water service to the public—whether a special purpose district, public utility district, city utility, or even a private water system—is required by Washington state law to create and update a Water System Plan every 10 years. As a Special Purpose District established specifically for, and singularly focused on water, we've been developing and updating a proactive Water System Plan since 1933.

#### What is a Water System Plan?

Think of a Water System Plan as a comprehensive road map: identifying and analyzing where we've been, where we're at currently, how we're doing, and where we're headed.

The goal of a Water System Plan is to ensure our water system, its associated operations, staff, and equipment, are being managed and maintained as safely, efficiently, and cost-effectively as possible.

What distinguishes one Water System Plan from another are the policies established by its governing organization (in our case, our publicly-elected Board of Commissioners) by which that system is operated.

#### How Do We Update Our Water System Plan?

Each time we do an update, we begin with the prior plan, and then collect data to compare, contrast, and analyze past projected data versus actual results. This gives us an informed foundation from which to identify necessary adjustments and modifications.

For example, we have long held the philosophy of doing some capital improvement projects every year, along with inflationary rate increases when necessary—thus avoiding major rate increases to address major projects and system upgrades.

The same is true of our larger, more significant facility upgrades: by planning for them over one or two decades, we can achieve two significant benefits: 1) a more gradual financing solution, and 2) a proactively updated water system.

As a result of this long-term planning, we have completed over \$26 million in capital projects in the last six years, taking advantage of public/private partnerships with developers, collecting connection charge revenues from proposed development, and taking advantage of low interest loans and bonds—resulting in significant system upgrades with minimal rate increases.

Much like a small business, we not only pay attention to our bottom line, we are also keenly aware of maintaining great customer service and value.

### Our Water System Plan encompasses 8 components:

#### 1. Overview:

Reviewing our Purpose, Policies, Rules and Regulations, Conservation, Customer Service, and long term water supply contract with Seattle Public Utilities



2.

#### **Basic Planning Data:**

Historical data; Topography; Land Use and Zoning; Population and Employment; System Demand Projections

#### 3. Existing Water System

Supply; Emergency; Facilities; Equipment; System; Water Treatment

#### . Minimum Design Criteria for System Components

Jurisdictional Regulations; Planning Considerations; Reliability and Security; Water Supply and Pressure; Pipeline Velocities, Sizing, and Material: Valves; Fire Hydrants; Cross Connection Control; Water Storage; Pump Stations; Facility Placement; Plans and Specifications; Water Quality Standards



#### 5. System Analysis:

Source; Storage; Pumping; Distribution; Monitoring

### 6. Capital Improvement Planning

#### 7. Operations & Maintenance:

Personnel; Processes; Records; Water Quality; Safety; Emergencies; Public Notification; Preventive Maintenance

#### 8. Financials:

Water Supply, Cost of Service, Connection Charges, Funding, Capital Improvement Financing, Developer Policies, Standard Details and Specifications, and Multi-Year Rate Study











## Basic Planning Data, Existing Water System, and Minimum Design Criteria



#### 2 Basic Planning Data

The next step is a comprehensive review of the following basic planning data:

- 1. History of our District: for current perspective and future benchmarks;
- 2. Service Boundaries: including several parcels outside of our corporate boundary that we are working to incorporate;
- 3. Topography: different ground elevations that require different water pressure, resulting in seven unique "pressure zones;"
- 4. Land Use and Zoning;
- 5. Past and Future Population and Employment: information, trends, and projections
- 6. Associated Water Demands: how water is provided within each of the seven pressure zones; and
- 7. Current trends: increasing population growth with decreasing water usage (due to effective conservation).

Analyzing each of these components and predicting the ratio of projected growth versus water conservation is key to developing an effective Water System Plan roadmap—guiding us in the best approach to support our area's development with appropriate water system components—from reservoirs, pump stations, transmission and distribution systems (including water mains, valves, hydrants), to the buildings and vehicles that support operations.



#### **3 Existing Water System**

Our Water System Planning effort entails a broad overview of our water system from source to delivery—in order to verify adequate supply and components for the best possible water service, both now and into the future.

All of the water provided by North City Water District comes from Seattle Public Utilities (SPU)'s regional water system, sourced from both the Tolt and Cedar River Watersheds. Water travels through five connections to supply seven pressure zones, two storage reservoirs, and a booster pump station. There are two additional local interties—one with the Mountlake Terrace water system north of the District, and one with SPU's water system west of 1-5 to provide back-up during emergency situations.

Our water transmission and distribution system is comprised of approximately 96 miles of water main (not including individual customer service lines). These pipes are predominantly constructed with cast iron and ductile iron, which make up approximately 77 percent and 22 percent of the system, respectively. Water main sizes vary from 2 inches to 20 inches in diameter, although 72 percent of the system consists of 6-inch and 8-inch diameter mains. Over 50 percent of the District's water mains were installed between 1966 and 1968.



#### 4 Minimum Design Criteria

Regular communication with our local jurisdictions—including the cities of Lake Forest Park and Shoreline, and the Northshore and Shoreline Fire Departments—is critical to establishing minimum design criteria for an effective Water System Plan "road map."

Given the ongoing population growth and resulting development in our area, a key topic of our design discussions has been land use code: recent changes will require another increase in the size of our water mains—from 6" to 12" diameter—to accommodate fire flow requirements for new multi-family complexes as a result of our area's growth.

One of our foremost goals in communicating with these jurisdictions is to identify ways that we can jointly coordinate more projects together—both short term, and as far out as twenty years—which can often directly impact design criteria.

It is our belief that by working together to identify the location and timing of upcoming projects, and wherever possible, scheduling our projects simultaneously or immediately after each other, we can all minimize project costs as well as disruption to neighborhoods and commercial areas.

Finding ways to work together means we don't have to tear up streets in front of a home or business more than once every decade or so.

# 4 Minimum Design Criteria, continued









Regular review of our Design Criteria helps North City Water District remain current while proactively addressing our area's ever-expanding development.

In the last two years, North City Water District has been working closely with a variety of public and private entities to ensure appropriately sized water mains for their development projects.

# Each of the following projects represents successfully negotiated agreements for coordinated water utility work during redevelopment... resulting in less cost to our ratepayers:

- Sound Transit: two light rail stations located at NE 148th Street and NE 185th Street, and work all along the new railway
- Shoreline School District: including North City Elementary School, Aldercrest Campus, and Kellogg Middle School
- Shoreline Fire District
- The developer for the old North City Post Office site
- The Buddha Jewel Monastery
- The Arabella Apartments 2

We are also in communication with over a dozen other potential developments, although none of these have signed an agreement yet.

We will continue to regularly review and update our Design Criteria and Standards to ensure future development meets the most current standards at the time they enter into agreements with our District.





We analyze every aspect of our water system including source, storage, pumping, flow, and our network of water mains (piping), so that we can anticipate and address challenges to our system before they become a problem.

Typical challenges faced by water systems serving a built-out community such as ours include aging system components, increasing demand due to increasing population density, ongoing conservation constraints (the less water used, the less dollars collected for system operations and maintenance), limited funding sources for infrastructure upgrades, as well as stricter regulations.

One of the biggest impacts on water system analysis is fire flow demands: the amount of water readily available to a given area in the event of a fire. Large volumes of water coming through one or two adjacent hydrants cause higher velocities in the water mains, along with resulting lower pressures at the higher elevation points in the system. We continually strive to optimize the way our system addresses each of these impacts as efficiently and cost effectively as possible.

Water quality is another very important aspect of our system analysis, and one that we continue to address on a daily basis. In just the last ten years, we have expanded our ability to test and validate water quality by...

- Adding a new supply station
- Upgrading our largest reservoir including a PAX Mixer for internal water circulation
- Adding two new water connections (one for supply, one for emergencies) to the Cedar River through Seattle's regional system (for proactive source redundancy)
- Installing additional water sampling stations within our distribution system to help us monitor the water quality
- Completing construction of our new North City/Denny Clouse Pump Station which helps us monitor both fire flows and water quality throughout our system (which is why we like to call this facility the "heart" of our system).

As the population continues to increase in our area, we will continue to evaluate the impacts in terms of increased demand on our system, and adequate water storage, including a possible new reservoir.







We use hydraulic computer modeling to perform extensive system analysis, calculating water pressures and usage estimates for different customer types and locations, then following up with field testing to confirm the model's accuracy. The best time to do field testing is at night, when there is minimal active flow in the water system.

# 6 Capital Improvement Planning











### At this stage of our Water Planning Process, we synthesize all of the data to identify short-, medium-, and long-term capital improvement needs.

Looking forward over the next 20 years, our Water System Plan has identified the following capital improvement project goals and purchases:

- Occupy and begin operations in our new, recently completed maintenance facility.
- Address ongoing improvements for fire flow and water quality to meet the demands of our ever-increasing development and resulting population.
- Address ongoing improvements to the resiliency of our water system resiliency ensuring that our community has adequate water during an emergency or disaster.
- Coordinate operational- and maintenance-related projects, including telemetry upgrades, and booster pump station upgrade/replacement when these components reach the end of their service lives.
- Update District mapping and GIS to ensure accurate planning and operations.

Our Water System Plan also identified a longer-term outline, looking out nearly 40 years to estimate when approximately 50 one-time capital projects will be required. Although the project scope may change slightly over time, this larger roadmap ensures our water system is the best it can be, by balancing a well-planned approach, the most cost-effective financing, and optimal scheduling based on changes in the overall construction market, in order to identify the best return on investment.

Lastly we continue to work with the two cities whose citizens we serve, the two fire districts in our area, and other utilities in the region to coordinate all of our various projects in order to minimize the impact on our community.



Our operations and maintenance programs are divided into three categories: normal operations, preventative maintenance, and emergency operations.

Normal Operations include tasks we perform on a regular basis, such as making routine checks on valves, hydrants, pumps, and reservoirs, responding to broken or damaged water mains or hydrants, and addressing construction-related tasks.

Normal operations also include water quality monitoring. We routinely collect water samples from 16 stations located throughout our system, and use the results to inform how and where we circulate water throughout the system in order to maintain optimal water quality. Another normal operation related to water quality is maintaining and monitoring a cross connection control program, for households or businesses that have the potential to introduce water back into the system.

Preventative Maintenance reflects one of the District's founding philosophies: proactive and routine maintenance including regularly scheduled inspections of all of our vehicles, equipment, and water system components.

**Emergency Operations** are anything we do that falls outside of our daily routine.

#### **Planning for Efficient Operations**

Our Water System Plan identifies specific approaches that help us ensure smooth ongoing operations, including:



- Regular staff training—including weekly safety training, intense one day or multiple day specific task trainings, and professional organizations' certifications.
- Owning and maintaining appropriate equipment, such as our large vactor truck, which operates like a giant vacuum to remove dirt and debris around a water main far more rapidly and efficiently than shovels, resulting in increased crew productivity.
- Tracking routine maintenance using electronic information storage, which also helps fire districts keep track of our routine hydrant maintenance.



Our Water System Plan is directly informed by our biennial budget reviews. This effort begins with a careful analysis of the costs of past operations and maintenance, employee labor, and wholesale water (labor and water are our two highest obligations). This data analysis serves as the foundation behind all of our financial decisions.

Because our Board of Commissioners all live within our service boundaries, they are keenly aware of the cost of service, and the goal of keeping costs to a minimum. When capital improvements and infrastructure upgrades are identified, they and our management team work hard to determine the most appropriate scope, timing/phasing, and financing that will have the least impact on our ratepayers. Financing methods include low-interest state funding, occasional grant funding, loans, bonds, and as often as possible, negotiating public/private partnerships with developers to complete water system improvements—which not only benefits the developer and North City Water District, but ultimately, our customers.



# **Three Appendices**

### We can help you save water!







### *Our 2020-2030 Water System Planning effort included three new components in addition to our usual eight:*

#### Appendix A: Water Use Efficiency/Conservation Plan

This year, our Water System Plan included our updated goals for Washington state's water use efficiency (WUE) conservation program. Our local, District-specific goal is to continue providing comprehensive community awareness and education about water conservation, water issues, and our involvement in these efforts. Our Regional, customer-driven goal as a member of the Saving Water Partnership is to continue maintaining the total average annual retail water use under 110 million gallons per day through 2028, despite forecasted population growth.

#### **Appendix B: Coliform Monitoring Plan**

As a regional partner with Seattle Public Utilities, North City Water District participates in the Regional Coliform monitoring program. Water samples are taken throughout the regional system to ensure our water quality remains outstanding. In 2015 and 2016, North City Water District installed additional water quality monitoring stations to help us better monitor water movement and quality. These new stations, and the newly updated Coliform Monitoring Plan, are now included in our Water System Plan.

#### Appendix C: New ShakeAlert Program

North City Water District has been taking additional measures to ensure ongoing water supply in the event of an earthquake, including participation in an early warning system called "ShakeAlert." Developed by the Pacific Northwest Seismic Network (PNSN) at the University of Washington, and the US Geological Survey (USGS), "ShakeAlert" consists of a network of sensors spread throughout the west coast that provide early warning alerts to water and sewer utilities, enabling us to take proactive steps to help protect people, equipment and facilities. The amount of time for early detection depends on the epicenter of an earthquake, which is expected to be between 0.5 and 4 minutes.

North City

Serving the communities of Shoreline and Lake Forest Park Since 1931

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