

CHAPTER 6:

OPERATIONS & MAINTENANCE

An operations and maintenance program is required for all water systems for compliance with WAC 246-290-320. This chapter provides an overview of the water system responsibility and authority, system operation and control, water quality monitoring, emergency response and cross-connection control. More information regarding certain programs referenced herein is available from the District.

6.1 SYSTEM ORGANIZATION, MANAGEMENT & PERSONNEL

The responsibilities for the day-to-day management of the District's water system including operation, maintenance and administration are discussed below.

6.1.1 Board of Commissioners

Highland operates under the direction of a three person elected Board of Commissioners with each Commissioner serving a six-year term. The Board of Commissioners holds regular scheduled meetings at the District office on the second Thursday of each month, or other schedule as may be established by the Board. A record of all resolutions adopted by the Board is maintained at the District office.

Table 6-1: 2014 Elected Commissioners

	Term
Donovan Sheppard	Six-Years
Richard Johnson	Six-Years
Ted Stonebridge	Six-Years

6.1.2 District Organization

A copy of the District's organization chart is shown in Figure 6-1. Responsibilities of key District personnel are indicated in Table 6-2.

Table 6-2: Staff Responsibilities

Field Supervisor

- Integrates engineering, legal and accounting services into effective procedures.
- Implements policies and is responsible to the Board of Commissioners.
- Directs the implementation of short and long term plans for maintenance, operation, and expansion.
- Provides leadership and direction to field employees, ensuring Board policies are understood and carried out throughout the District operations.
- Serves as representative of the District to the public, other jurisdictions, State and professional organizations.

Table 6-2: Staff Responsibilities

- Supervises the preparation of the annual budget and makes recommendations to the Board on the allocation of resources and priorities.
- Coordinates with engineer and financial personnel in development and administration of the District Comprehensive Water Plan.
- Maintains historical well and pumping data and uses independent judgment to gauge system operation.
- Interprets various data for projections for planning and budgeting.
- Performs chemical and physical analysis for the purpose of water quality assurance.
- Develops and supports research and special projects.
- Liaison with outside information processing staff such as engineers or geologists with regard to data collection and analysis.
- Performs a variety of duties essential to the operation of the reservoirs, pump station and filters according to Washington State Department of Health regulations.
- Duties include attending board meetings when required, trouble shooting, coordinating repairs with District and contractor crews, and carrying out back-up and relief duties at the direction of the Board of Commissioners.

Administrative Assistant / Office Manager

- Responsible for customer service, front desk and telephone functions, utility billing, vendor payments, and work order preparation.
- Performs a variety of accounts receivable and cash receipt accounting functions.
- Assists coordinating field and office services.

Field Assistance (As Needed)

- Assists with customer service, meter reading, water quality testing, main and service locates, installation and repair of meters, service line and main line repairs, landscape maintenance, contractor relations, and inspection and engineer data collections.

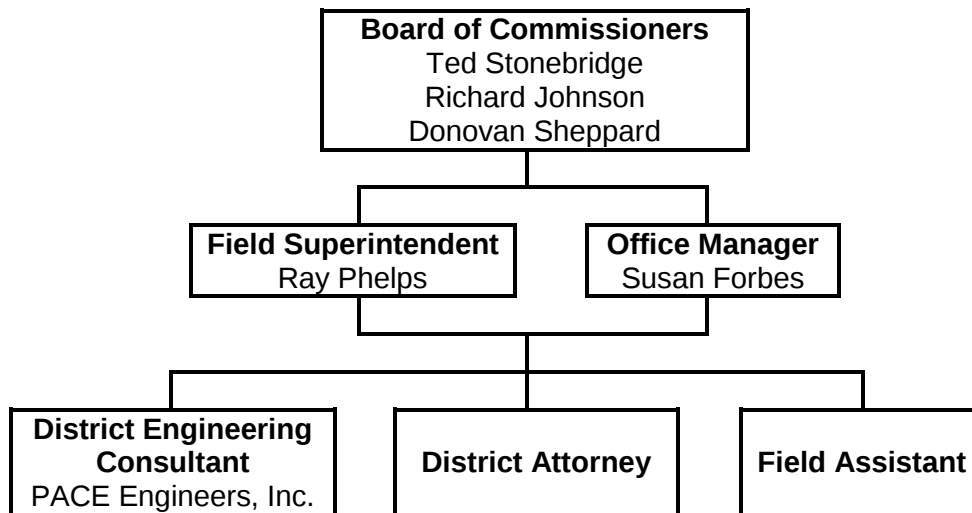
District Engineering Consultants

PACE Engineers, Inc.
11255 Kirkland Way, Suite 300
Kirkland, WA 98033
Dave Hutley, P.E.
Susan Boyd, Principal Planner

District Attorney

Grant Weed (Weed, Graafstra, & Benson, Inc. P.S.)
21 Ave A
Snohomish, WA 98290-2962

Figure 6-1: Organization Chart



6.2 PERSONNEL CERTIFICATIONS

The State regulation (WAC 246-292-020) requires certified operators for certain positions. Personnel certified as waterworks operators by the State of Washington are summarized below.

Table 6-3: Certification Status	
Employee	Certification
Ray Phelps	Water Distribution Manager II Cross Connection Control Specialist
Pete (Lofus) Neese	WDM I

6.2.1 Professional Development

Attendance at conferences, seminars, sponsored seminars, and training opportunities are encouraged by the District. Tuition for job-related seminars and classes are paid for by the District. Incentives are also provided in the form of wage increases for higher levels of certification.

6.3 MAJOR SYSTEM COMPONENTS

Existing system components are discussed in detail in Chapters 1 and 3 and shown on the Existing Water System Map. Major system components include two welded-steel tank reservoirs, approximately 30 miles of distribution main, two pump stations, with telemetry controls and standby generator, four pressure reducing valves, and five metered supply connections from the City of Everett's Transmission Line No. 5. Two pump stations boost water from the supply line to the District's two storage tanks. The undulating terrain of the District requires five pressure zones for existing and future service: 585, 520, 425, 380, and 315. Currently, service is provided in the 585, 520, and 425 pressure zones.

From the storage tanks water is introduced into the distribution system by gravity to the 585 pressure zone. Water flows through the distribution system, primarily transported along Florence Acres Road and Old Owen Road, passing through PRVs into the 425 pressure zone.

When system pressures drop due to increased demand, the secondary tap to the Everett Transmission Main at Bollenbaugh Hill Road opens and feeds the system by gravity.

The Friar Creek system, located in the 520 pressure zone, is served by gravity through two taps (one secondary to the District system and one manual emergency) to the City of Everett Transmission Line #5. The system consists of only distribution piping; there are no booster pumps or storage facilities.

6.4 ROUTINE SYSTEM OPERATION

Tanks Nos.1 and 2 are interconnected and typically function as one storage facility, with water delivery to the tanks controlled by telemetry between Pump Station No. 1 and Reservoir No. 1.

The level of Tank 1 is measured by a pressure sensing device. The tank level data is then transmitted to Pump Station No. 1, where the signal is used for control of the pumping system. When the level in Tank 1 drops to a preset on-level, the station pump is started, and the pump operates to fill the tank until a preset off-level is reached.

System performance is measured by the daily pump run time, the total volume of water delivered to the system, and the volume of water used each day compared to the number of people served.

6.5 PREVENTATIVE MAINTENANCE

The key to routine operation is the ongoing maintenance of all facilities and equipment, which are checked in accordance with manufacturer's specifications. The following is an overview of the maintenance schedules for facilities and equipment.

6.5.1 Fire Hydrants, Valves, and Pipe Distribution System

The pipe distribution system is well maintained. Supplies and parts for the water system are stored at the District office. If a spike in unaccounted-for water occurs or a service complaint is received, District personnel investigate the cause immediately. Most repairs to the system are accomplished within 24 hours. Those repairs not completed within 24 hours are usually completed within 5 to 7 days of discovery. Delays in repair typically result from the unavailability of parts or personnel.

The District has conducted an aggressive program to replace old, leaking meters. The majority of deficient meters have been replaced, contributing significantly to bringing the District threshold for unaccounted-for water down to fewer than 40,000 gallons per month.

Flushing of lines is conducted on a semi-annual, quarterly or monthly basis. Depending on historical data, the District varies the frequency for flushing certain lines. The District utilizes a software program to monitor and adjust the line flushing schedule.

Valves are checked annually, and opened and closed to confirm that they are in operational condition.

Fire hydrants are checked and operated annually by the District. The District advises the Sultan and Monroe Fire Districts of any problems and makes repairs immediately.

6.5.2 Storage Facilities

The District currently has two storage tanks in service with a total capacity of 1.16 million gallons. Table 6-4 shows the location of each tank and the inspection and cleaning plan for each.

Table 6-4: Tank Location and Cleaning Plan			
Tank # (size)	Address	Inspected	Cleaning
1 (0.55 MG)	29119 Reiner Road	Every 3-5 years	As needed
2 (0.61 MG)	10417 Woods Lake Road	Every 3-5 years	As needed

Tanks Nos.1 and 2 are inspected routinely. The interiors of the tanks are visually inspected utilizing underwater divers every 3 to 5 years. Tank No. 1 was inspected in 2004 with services from a diver contractor. Cleaning was performed with a vacuum system. The outside of the tanks are visually inspected on an ongoing basis. Tank No. 1 was last painted in 2001, and had minor repair work completed in 2002. Tank No. 2 was painted in 2006 as part of the original tank construction. Both tanks are scheduled to be painted within 20 years.

6.5.3 Pump Stations

Pump Station No. 1 is maintained in a warm, dry condition to prevent equipment from short-circuiting. The station is visited daily, Monday through Friday, and on the weekends as weather demands. The pumps are checked and inspected daily for any visible leaks, or for any visible tampering or trespassing. Pump maintenance is performed by District staff. Electrical maintenance is performed by Service Electric Company.

6.5.4 Pressure Reducing Valve (PRV) Stations

Currently, there are four PRV stations. Valve meters are checked on a regular basis to ensure they are functioning properly.

6.5.5 System Taps

There are five system taps from the City of Everett Transmission Line No. 5, each with an individual meter. Each tap is inspected on a regular basis.

6.5.6 Generators

The standby generator is stored and maintained at the storage tanks location. The generator is exercised twice a month, and connected online and operated quarterly. A complete inspection and maintenance program is conducted annually by D-Square Energy Systems, Inc.

6.6 EQUIPMENT, SUPPLIES, AND CHEMICAL INVENTORY

The District maintains an inventory of equipment and supplies to support operation and routine repair of the system.

6.6.1 Equipment

Table 6-5 lists the vehicles and equipment that the District currently owns.

Table 6-5: Motor Vehicles and Equipment	
Item	Description
1.	2005 Chevrolet
2.	2008 Ford
3.	Generator
4.	Compressor
5.	Electric Sump Pump
6.	Gas Mud Pumps
7.	Pipesaw
8.	Defuser
9.	Welder
10.	Tapping Machines
11.	Mole Bullet
12.	Locator

6.6.2 Supplies

The District maintains an inventory system of supplies and parts in stock for the water system. The supplies and parts are located at the District office. The inventory is used in conjunction with the maintenance and/or repair of facilities within the District.

6.7 WATER QUALITY MONITORING PROGRAM

The District's existing water source is the City of Everett and, as a result, primary water treatment is performed by the City of Everett. The following summary addresses water quality as it pertains to the District's operations program.

6.7.1 Sampling Procedures

Under State Regulations for total coliforms, the number of samples a utility is required to collect each month, to determine compliance under the Total Coliform Rule (TCR), is based on population served (including resident and non-resident population). Based on the District's population, it is required to collect samples at three locations each month.

The water sampling sites are discussed in Chapter 4 – System Analysis, and listed in the Coliform Monitoring Plan included in Appendix J. Each sampling site has one routine location and two repeat locations as required by the State. The sampling points are located to reflect

different population concentrations so that representative water samples are obtained. The District complies with all water sampling and monitoring requirements in accordance with DOH guidelines under WAC 246-290-300.

The District will follow the Revised Total Coliform Rule (RTCR) procedures stated in DOH Publication 331-556. A treatment technique trigger is a situation that requires a water system to take action. RTCR requires water systems to conduct an assessment to “find and fix” any sanitary defects whenever a treatment technique trigger occurs. There are two assessment levels. Both evaluate the entire system from the sample collection point to the source of supply. A treatment technique trigger might occur any time that routine and repeat samples are collected. Therefore, Highland is prepared to start a system evaluation as soon as it is notified of total coliform-present results, which trigger the assessment requirement.

6.8 CROSS CONNECTION CONTROL

A Cross-Connection Control Program is required for the District’s system by WAC 246-290-490. The District’s Board of Commissioners adopted the cross-connection control program through Resolution No. 0099-0032 on February 25, 1999.

The purpose of the cross-connection control program is to protect the health of water consumers and the potability of the District water system by assuring the inspection and regulation of plumbing in existing and proposed piping networks, and the proper installation and surveillance of backflow prevention assemblies when actual or potential cross-connections exist and cannot be eliminated.

The District maintains an inventory and status list of each existing device in operation. All new construction is evaluated for cross-connection when a request for water connection is received. All backflow assemblies are required to be tested annually and all District field personnel are required to be cross control specialists.

Further information regarding the Cross-Connection Control Program can be found in Appendix K or obtained from the District office.

6.9 EMERGENCY RESPONSE

The District has developed an Emergency Management Plan to help the District identify, prepare and respond to emergency situations. The plan includes elements such as Direction and Control, Situation Analysis, Public Information, Support Functions, and Response Procedures. This plan was developed to be compatible with the Washington State Comprehensive Emergency Management Plan, Snohomish County Emergency Operations Plan, and the Federal Response Plan.

6.9.1 Notification Procedures

Water quality monitoring and emergency response plans call for notification to the public of emergency conditions and of required demand curtailment measures. Sample announcements are presented here in increasing order of severity. The District should contact

newspapers and several local radio and television stations, which broadcast in the service area, to make prior arrangements concerning emergency announcements.

In the event of a water quality violation, the Water System Manager notifies DOH as well as issuing an announcement in the local newspapers detailing the violation and the measures taken to rectify the situation. If the water quality issue is severe enough, the announcement will include a “boil water” recommendation and/or order for those customers who would be susceptible to waterborne bacteria.

State law, WAC 248-54-750, Reporting and Public Notification, clearly outlines the District’s responsibilities for both verbal and written communication with water users in situations, which may be caused by emergencies. All staff with authority for public announcements is familiar with these regulations.

In addition to public announcements, communication with emergency services is vital. Critical contacts and phone numbers are posted at all phones and are available at the District office. Water system emergencies require notification of DOH and in some cases, DOE. Various sample emergency announcements are provided in the following paragraphs.

6.9.1.1 Sample A

For Immediate Release – High Water Demand – Water Use Reduction Requested

Highland Water District is experiencing unusually high water demand, making it difficult to maintain adequate storage tank reserves. Customers of the District are requested to reduce water consumption and to avoid wasting water wherever possible. It will be particularly helpful if homeowners will make every effort to reduce lawn watering. The problem is expected to be temporary in nature and a public announcement will be made when normal water consumption can be resumed.

6.9.1.2 Sample B

For Immediate Release – Water Source Issue – Conservation Required

Highland Water District has experienced a major loss of its production capacity. The District’s customers are directed to stop all outdoor water use and make every effort to conserve valuable water. The District is doing everything possible to correct the situation and will make a public announcement as soon as the problem has been rectified.

6.9.1.3 Sample C

For Immediate Release – Water Source Issue – Mandatory Curtailment of Water Use

This is a Community Emergency Announcement. Highland Water District has experienced a major loss of its water production capacity and, therefore, is unable to maintain normal water deliveries. It is mandatory that all watering, industrial, and commercial use be discontinued. Water must be conserved for sanitary and potable use only. Your cooperation is urgently requested. The District is doing everything

possible to restore the water system to normal operations. You will be notified of any change in the situation.

6.9.1.4 Sample D

For Immediate Release – No Potable Use Allowed - Alternate Supply Provided

Highland Water District has experienced total loss of its water production capacity. As a result, the water mains have been shut off and normal water deliveries have been discontinued. The District has arranged to deliver water by tank truck to residential areas for potable and sanitary uses only. The following is a schedule of tank truck deliveries and locations:

- Water Delivery Location:
- Time of:
- Site Address:
- Operation Date:

When picking up water at the tank truck locations, please bring your own clean containers. The District is doing everything possible to resume normal water service and will notify you as soon as water service has been restored.

In the event of a water quality violation, the District's General Manager or designee shall notify DOH as well as issue an announcement in the local newspapers detailing the violation and the measures taken to rectify the situation. If the water quality issue is severe enough the announcement will include a "boil water" recommendation and/or order for those customers who would be susceptible to waterborne bacteria.

6.9.2 Vulnerability Assessment

The District is not required to prepare a Vulnerability Assessment based on the number of service connections; however, the District participated in preparing the Snohomish County Hazard Mitigation Plan (October 2004). The District has completed a Hazard Identification/Vulnerability Analysis. This report is not available for public view.

The first portion of the Hazard Identification/Vulnerability Analysis report identifies District facilities most at risk. The report also identifies the loss of function associated with each facility resulting from a hazardous event. The report also identifies those water users with the highest priority water need in terms of quality and quantity.

The second portion of the report lists the natural and man-made disasters that would affect District facilities. Each disaster is defined or described, as to the resulting impact to District facilities. Delineated measures the District will take to reduce damage and service disruption are outlined.

Security measures protect all District facilities, including the District office and remote sites such as pump stations and reservoirs. Doors and entrances to all facilities remain locked when not in use. Access ladders are fitted with locked panels and are protected by metal

cages in order to discourage access by unauthorized personnel. To date, the District has not experienced any significant problems with vandalism or interference with facility operations by unauthorized personnel.

Portions of the District's watermain system cross creeks, wetlands or seismic hazard area. The vulnerability of these facilities to a total loss of service has been reduced, for the most part, by looping the system. This allows for sections of the system to be valved off and the direction of water flow changed. Small areas may be out of service due to a watermain failure, but the disruption would be minor. In cases of broken watermains, the affected areas could be valved off so that water service to other customers would be maintained.

In conjunction with conducting the Hazard Identification/Vulnerability Analysis, and participating in preparation of the Snohomish County Hazard Mitigation Plan, the District identified three critical facilities, recommended improvements to those facilities, and ranked them by priority. The District has included these initiatives related to mitigation of a seismic event in the Capital Improvement Program in Chapter 7. These projects are the seismic retrofit of Reservoir No. 1, Pump Station No. 1 and approximately 20,000 linear feet of AC watermain.

6.9.3 Emergency Call-Up List

The District's telephone number (360) 794-6900 is utilized during and after office hours. The District utilizes an answering service during off-hour operation. Customers calling at this time are referred to the answering service. The appropriate personnel will be contacted during an emergency situation, as one field employee is on-call after working hours. In the event of a major emergency that requires a response outside of the District's normal operating structure, the District's response will be based on the Incident Command System (ICS). Further information regarding the ICS or the District's Emergency Management Plan is available for review at the District office.

6.10 SAFETY PROCEDURES

Employee assistance is needed in the District's efforts to ensure the safety of all employees. Employees are charged with observing the special safety rules of their work area, as well as the following general rules of safety at all times:

Report any injury, safety hazard, or damage to property immediately to a supervisor or general manager.

- Keep individual work area clean and orderly. Untidiness and clutter invite accidents.
- Do not smoke or permit others to smoke in "No Smoking" areas.
- Know and follow the established safety rules. When in doubt, ask before proceeding.
- Do not allow unauthorized persons to operate equipment or have access to restricted areas.
- If assigned to a job requiring protective clothing or equipment, use it without fail. Always dress in a way that will not invite job-related injuries.

- Store all materials and equipment in their proper areas.
- Bring potential safety hazards to the attention of a supervisor when found.
- Never run or engage in horseplay on District property.
- Drive safely and courteously when operating District vehicles.
- If lifting heavy objects, do so properly and with the appropriate number of persons.
- The District has an excellent safety record and strives on a daily basis to maintain a safe working environment.

6.11 CUSTOMER COMPLAINT RESPONSE PROGRAM

Responding to customer concerns or inquiries has been a long-standing priority in the District. The following steps are taken when a customer concern or inquiry is received:

- Upon receipt of an inquiry or concern, a two-part work order is generated: one copy stays with the office and the other goes with the field representative.
- A field representative is assigned to investigate the inquiry or concern.
- The field representative interfaces with the customer and/or investigates the problem, and information or justification is noted on the work order form and returned to the office.

All inquiries or concerns are documented and kept on file in the office.

6.12 OPERATION AND MAINTENANCE IMPROVEMENTS

The District strives to provide the best in management, maintenance and operation of the District's water system. The District regularly evaluates existing programs and has proposed new programs as part of this goal.

In terms of existing activities, the District will continue with the current meter replacement program. As an ongoing effort, the District promotes and supports staff training.

In the future, the District plans to augment staff with one additional field personnel when the number of service connections reaches 1,500. To support more efficient operation of its facilities, the District has proposed a new telemetry and security system project. This project would allow staff to monitor system operations and provide improved reliability and response time in the event of an emergency. Additionally, the District also has plans for a hydrant improvement program, prioritizing improvements based on customer need.

6.13 CONSTRUCTION PROCEDURES

The District maintains appropriate levels of inspection during construction projects and requires developers extending the system to coordinate closely with the District throughout planning, design, and construction. All new facilities are tested in accordance with DOH requirements. Construction completion forms are required for all construction projects and are kept on file with the District. A copy of the required completion form follows on the next page.



CONSTRUCTION COMPLETION REPORT FORM

In accordance with WAC 246-290-120 (5), a **Construction Completion Report** is required for all approved construction projects. Operators **must** submit a Construction Completion Report to us within sixty (60) days of completion and before use of any water system facility. This includes any source, water quality treatment, storage tanks, booster pump facilities, and distribution projects.

Please type or print legibly in ink:

Highland Water District

Name of Water System

Raymond P. Phelps

Name of Purveyor (Owner or System Contact)

PO Box 158

Mailing Address

Monroe

WA

98272

City

State

Zip

DOH System ID No.:

32850 J

DOH Project No.:

(if applicable)

Date Construction Documents

Approved by DOH

(If applicable)

PROJECT NAME AND DESCRIPTIVE TITLE: _____

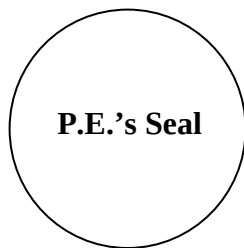
CHECK ONE: ☐ Entire Project Completed. ☐ Description of Portions Completed.

PROFESSIONAL ENGINEER'S ACKNOWLEDGMENT (Complete items below—Attach additional sheets as needed)

The undersigned professional engineer (PE), or their authorized agent, has inspected the above-described project which, as to layout, size and type of pipe, valves and materials, reservoir and other designed physical facilities, has been constructed and is substantially completed in accordance with construction documents reviewed by the purveyor's engineer or approved by the Department of Health. In the opinion of the undersigned engineer, the installation, physical testing procedures, water quality tests, and disinfection practices were carried out in accordance with state regulations and principles of standard engineering practice.

I have reviewed the disinfection procedures ☐, pressure test results ☐, and results of the bacteriological test(s) ☐ for this project and certify that they comply with the requirements of the construction standards/specifications approved by the Department of Health. (Check all boxes that apply that are consistent with the nature of the project.)

This project changes the physical capacity of the system to serve consumers. The system is now able to serve _____ equivalent residential units (ERUs.) ☐ Not applicable



Date Signed

Name of Engineering Firm

Name of PE Acknowledging Construction

Mailing Address

City

State

Zip

Engineer's Signature

State/Federal Funding Type (if any) _____

Please return completed form to your regional office checked below.

☒ **NWRO Drinking Water**
Department of Health
20425 72nd Ave. S, Ste 310
Kent, WA 98032-2388
253-395-6750

☐ **SWRO Drinking Water**
Department of Health
PO Box 47823
Olympia, WA 98504-7823
360-236-3030

☐ **ERO Drinking Water**
Department of Health
16201 E. Indiana Ave, Suite 1500
Spokane Valley, WA 99216
509-329-2100

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

The operator must attach a completed Water Facilities Inventory (WFI) form in accordance with WAC 246-290-120(6), if applicable. Contact your regional office for WFI forms or additional Construction Completion Report forms.

