8 | OPERATIONS AND MAINTENANCE

INTRODUCTION

The City of Woodland's (City) water operations and maintenance (O&M) program consists of the following elements:

1. Normal operation of the water supply, treatment, and distribution system.
2. Emergency operation of the water system, with one or more of the components not available for normal use due to natural or man-made events.
3. Preventive maintenance program for ensuring that the water system is maintained in accordance with generally accepted standards.
4. Cross-connection control program, as required by state law, to ensure that there is no threat to the integrity of the water supply due to contamination from a customer's operations.

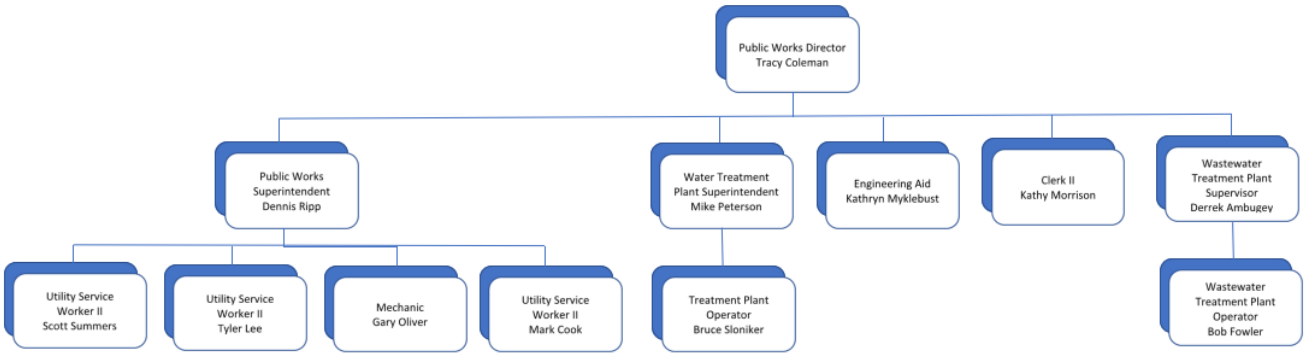
NORMAL OPERATIONS

City Personnel

The City's water system personnel are under the direction of the Public Works Director. As shown in **Figure 8-1**, the Public Works Director supervises daily operations of the utility, including all water, wastewater, and stormwater operations. This position reports to the City Administrator.

The Water Treatment Plant staff consist of two personnel that function under the Public Works Director. The water system tasks that are performed by the Water Treatment Plant Superintendent and Treatment Plant Operator include inspection, testing, installation, and repair of system facilities; routine operation and preventive maintenance; recordkeeping; administrative tasks; general clerical work; and corrective or breakdown maintenance required in response to emergencies.

Figure 8-1
Organization Chart



Personnel Responsibilities

The key responsibilities of the water operations and maintenance staff are summarized as follows.

Public Works Director – Directs all activities and programs within the Public Works Department. Develops annual budget. Oversees assigned annual capital projects, develops project schedules and scopes of work, and facilitates selection of consultants. Tracks progress through the development of plans, specifications, and estimates and maintains the water distribution model. This position reviews bidding and contracts, approves submittals, and manages engineers and contractors through inspections and contract close out. Responsible for planning, organizing, staffing, and management activities within the Utility Operation Division. For the Water Division, this position is responsible for the repair and maintenance of the water system, including transmission and distribution mains, treatment and source water facilities, storage facilities, and booster pump stations. Oversees all annual maintenance programs, including flushing, valve exercising, and source water well and reservoir inspections. The Public Works Director is tasked with capital improvement program (CIP) and budget development for the utility. This position ensures that any required public notifications regarding the water system are made and may serve as the press contact.

Water Treatment Plant Superintendent – Reports to the Public Works Director and is responsible for all maintenance activities associated with the water treatment plant, water supply, distribution, pumping, and storage systems, including distribution main flushing, valve exercising, and well monitoring. The Water Treatment Plant Superintendent ensures all water quality monthly reports are complete and submitted to the proper authorities. Responsibilities include meter reading/repair, water quality monitoring and recordkeeping, and water conservation and cross-connection control programs. This position also performs preventive maintenance and checks calibration and proper monitoring of telemetry equipment.

Treatment Plant Operator – Reports to the Water Treatment Plant Superintendent and is responsible for day-to-day operation and maintenance of the water system, including transmission, storage, pumping, and treatment facilities. Duties include performing routine operations and monitoring activities and construction activities throughout the distribution

system, including replacing or extending water mains, installing valves, installing/replacing hydrants, emergency repairs of water main breaks, and utility locates.

Public Works Superintendent – Reports to the Public Works Director. This position is responsible for all maintenance activities associated with distribution water supply throughout the City street infrastructure of pipes and valves. Responsible for organizing staff and work parties for day-to-day operation and maintenance of the water system. Duties include oversight of work activities, including performance of routine operations and monitoring activities, emergency repairs of water main breaks, utility locates, and other service needs.

Utility Service Worker II – Reports to the Public Works Superintendent and is responsible for day-to-day operation and maintenance of the water system, including transmission and pumping. Duties include performance of routine operations and monitoring activities and construction activities throughout the distribution system, including replacing or extending water mains, installing valves, installing/replacing hydrants, emergency repairs of water main breaks, and utility locates.

Mechanic – Reports to the Public Works Superintendent. Organizes, staffs, and manages the Fleet/Facility Division. Responsibilities include preventive maintenance and repairs on vehicles and emergency generators used by Public Works. This position assists in the repairs of pumps, generators, booster pump stations, and lift stations as needed.

Clerk II – Reports to the Public Works Director. This position coordinates and monitors all cross-connection control programs and works directly with the Water Treatment Plant Superintendent and Public Works Superintendent, who are both certified in cross connection. The Clerk II sends out all the reminder notices for the cross-connection program and inputs all documentation received in relationship to the program. The information is checked by the Water Treatment Plant Superintendent and Public Works Superintendent monthly and prior to any monthly or quarterly report submittals. Manages customer inquiries related to Public Works, including dirty water, pressure extremes, and taste and odor issues. Tracks and coordinates all inquiries with the Water Treatment Plant Superintendent and Public Works Superintendent until the reported problem is resolved.

Engineering Aid – Reports to the Public Works Director. This position coordinates bidding and contract execution, issues progress reports and pay estimates, attends project site meetings, and facilitates project closeout. Manages customer inquiries related to Public Works, including dirty water, pressure extremes, and taste and odor issues. Tracks and coordinates all inquiries with the Water Treatment Plant Superintendent and Public Works Superintendent until the reported problem is resolved. Works with the Water Treatment Plant Superintendent and Treatment Plant Operator to gather data and input for the annual water report.

Certification of Personnel

Chapter 246-292 Washington Administrative Code (WAC) requires that the City's water system is operated under the direct supervision of a Certified Operator. The City's water system requires a Level 2 Water Distribution Manager. In addition, specialty certification is required for backflow device inspection and testing.

The City is in full compliance with current laws and regulations regarding staff certification and training. Several City Public Works employees possess Washington State Department of Health (DOH) certifications. **Table 8-1** shows the current certifications of the City's O&M staff that are pertinent to operation of the City's water system. It is City policy to maintain a well-qualified, technically trained staff. The City annually allocates funds for personnel training, certification, and membership in professional organizations such as the American Water Works Association (AWWA). The City believes that the time and money invested in training, certification, and professional organizations are repaid many times in improved safety, skills, and confidence.

Table 8-1

Woodland Water Personnel Certification

Name	Position	Certification
Dennis Ripp	Public Works Superintendent	WWC-I, CCSI, WTPO2, POP
Mike Peterson	Water Treatment Plant Superintendent	WTPO3, WDM3, CCSI, WWTOP I, POP
Bruce Sloniker	Treatment Plant Operator	WTPO, WDM3
Derrek Ambugey	Wastewater Treatment Plant Supervisor	WWTPO IV, WDM, WWCS
Tyler Lee	Utility Service Worker II	WDSI, WWCS, POP, WDM2
Scott Summers	Utility Service Worker II	WWC-I, WDSI, CCSI

KEY:

CCSI = Cross-Connection Control Specialist
CESCL = Certified Erosion Sediment Control Lead
WDS = Water Distribution Specialist
WDM = Water Distribution Manager
WDM2 = Water Distribution Manager 2
WDM 3 = Water Distribution Manager 3
WDM4 = Water Distribution Manager 4
WTPO1 = Water Treatment Plant Operator 1
WTPO2 = Water Treatment Plant Operator 2
WTPO3 = Water Treatment Plant Operator 3
WTPO4 = Water Treatment Plant Operator 4
WWCS = Wastewater Collection Specialist (see WWC-1 or WWC-II)
WWC-I = Wastewater Collection Specialist I
WWC-II = Wastewater Collection Specialist II
WWTOIT = Wastewater Operator in Training
WWTPO I = Wastewater Treatment Plant Operator Group I
WWTPO II = Wastewater Treatment Plan Operator Group II
WWTPO III = Wastewater Treatment Plant Operator Group III
WWTPO IV = Wastewater Treatment Plan Operator Group IV
POP = Public Operator Pesticide

Available Chemicals and Equipment

The Public Works Department owns heavy equipment such as dump trucks, forklifts, backhoes, and loaders. If necessary, larger equipment is leased or rented on an as-needed basis from local suppliers. The City's maintenance and construction crews have personnel trained and experienced in heavy equipment operation.

Smaller commonly used tools and equipment are carried in the employee's trucks or are readily available from the stockroom. Tools and equipment such as pumps, small compressors, portable generators, pressure washers, and power tools are available from the supply room. Larger, infrequently used items are rented from various equipment rental companies located in near proximity to the City.

The Public Works Department keeps an inventory of commonly needed parts, as well as emergency supplies, at the Public Works facility. The Water Treatment Plant Superintendent and Public Works Superintendent track the inventory and order additional supplies as required. Critical spare equipment kept in stock includes meters, meter boxes, various valves of all necessary sizes, pipe fittings, pipe, emergency clamps of various sizes, etc. Large non-emergency items are purchased on an as-needed basis.

Chemicals are used at the City's water treatment plant (WTP) facility. Chlorine in the form of 12.5-percent sodium hypochlorite is added to the raw water source for disinfection purposes. The chlorination facility at this site consists of 22 pounds per day of chlorine on average. The system and the two metering pumps operate on a gallons per hour oxidation demand. If the filters receive an influx of iron and the chlorine level is insufficient, the water will travel filter to waste and an alarm will call out. DOH requires a maintained minimum free chlorine residual of 0.20 milligrams per liter (mg/L) at the first water service and 1.00 mg/L in the clear well. Alarms are set to notify staff when residuals drop below 0.30 mg/L and over 1.30 mg/L.

The WTP uses sodium hypochlorite for water oxidation and disinfection. The WTP also uses soda ash for corrosion control and softening. The WTP is equipped with telemetry systems to monitor and alarm when there are failures and inconsistencies in the systems operation. **Table 8-2** lists the types, storage locations, and storage quantities of chemicals used at the City's WTP. **Table 8-3** identifies the typical vendors for chemical supplies.

Table 8-2

Woodland Water Treatment Plant Chemicals

Chemical	Storage Location at WTP	Storage Quantity
Nalco Ultrion 8185	North Wall	200 gallons
Nalclear 8170	North Wall by Transfer Pump	6 - 50 lb. bags
Sodium Bisulfite 38%	West Wall	1,091 gallons
Dense Soda Ash	North and East Walls	432 - 50 lb. bags
Sodium Hypochlorite 12.5%	West Wall	1,091 gallons

Table 8-3

Chemical Supply Vendors List

Name	Phone	Products
Univar Solutions	(602) 586-4261	Sodium Bisulfite, Dense Soda Ash, and Sodium Hypochlorite
Cascade Columbia	(503) 625-5293	Nalco Ultrion 8185 and Nalclear 8170

The Public Works Department utilizes several different types of communications equipment to ensure a reliable and redundant means of communication within the department. All employees are equipped with cellular telephones, which are pre-loaded with contact information for City personnel. Most existing vehicles and all new vehicles are equipped with a Public Works communication radio, and handheld radios also are available.

Routine Operations

Routine operations involve the analysis, formulation, and implementation of procedures to ensure that the facilities are functioning efficiently and meeting pressure requirements and other demands of the system. The utility's maintenance procedures include prompt response and repairs to ensure customers receive high-quality water service.

Continuity of Service

As a municipality, the City has the structure, stability, authority, and responsibility to ensure that water service will be continuous. For example, changes in the City Council or staff would not have a pronounced effect on the utility's customers or quality of service.

Routine Water Quality Sampling

DOH has adopted federal regulations that specify minimum monitoring requirements for water systems. The sampling requirements depend on the population served, source type, and treatment provided. The specific requirements and the minimum monthly routine coliform sampling requirements are contained in WAC 246-290-300. DOH also provided the City with an annual summary of all required water quality testing. The City currently performs all routine coliform sampling throughout the distribution system. Further discussion of the water quality monitoring program is contained in **Chapter 6** and **Appendix J**.

Cross-Connection Control

The City has adopted a cross-connection control program to comply with WAC 246-290-490 pertaining to contamination of potable water due to cross connections. The City's Cross-Connection Control Program is included in **Appendix G**. Backflow prevention devices are required at service connections where a potential for contamination exists, as outlined in the City's Municipal Code.

Recordkeeping and Reporting

DOH has enacted regulations for recordkeeping and reporting that may be found in WAC 246-290-480. The regulations identify recordkeeping and reporting procedures for operations and water quality testing.

Records are compiled and stored by each respective department that is responsible for the activity being documented. The department maintains records of capital projects, records of water quality programs, drinking water regulatory records, and records of water distribution system operation and maintenance/repairs. The department also maintains records of purchasing, bidding (non-capital projects), and other miscellaneous records. Official capital project bidding and construction documents are maintained by the Public Works office. Records are maintained in accordance with the Washington State records retention regulations. The Public Works office works in conjunction with the City Clerk's office, who maintains the retention schedule of all documents citywide. Public Works Administration assists with records retention for Public Works, including Engineering, Water Quality, and Water Operations. The City Clerk's office and Public Works Department maintain a schedule of project files, file numbering system, and file storage location (generally capital projects only). Other records are stored locally at each department. Water operations, maintenance, and repair records are maintained electronically through the City's file system.

With computer network tracking, the City's Public Works Department has developed a filing system that breaks down the well sites, reservoirs, distribution system, water meters, and other necessary components that make up a service area. The City also involves department heads and supervisors to maintain and track their areas of responsibility. On an annual basis, maintenance records are reviewed for the annual report. The Public Works Director is responsible for submitting all State-required monthly forms to the appropriate agencies.

Recordkeeping

Records are kept for chlorine residual and other information as specified by DOH. DOH requires retention of critical records dealing with facilities and water quality issues summarized as follows:

- Bacteriological analysis results: 5 years.
- Chemical analysis results: for as long as the system is in operation.
- Daily source meter readings: 10 years.
- Other records of operation and analyses as may be required by DOH: 3 years.
- Documentation of actions to correct violations of primary drinking water standards: 3 years after last corrective action.
- Records of sanitary surveys: 10 years.
- Project reports, construction documents and drawings, inspection reports, and approvals: life of the facility.
- Construction completion reports: life of the facility.

Reporting

1. The City must report the following to DOH:
    - Within 48 hours: A failure to comply with the primary standards or treatment technique requirements specified in Chapter 246-290 WAC.
    - Within 48 hours: A failure to comply with the monitoring requirements specified in Chapter 246-290 WAC.
    - As soon as practical, but no later than 24 hours: All Tier 1 violations, including a violation of a primary maximum contaminant level (MCL). A complete list of Tier 1 violations is located in the Code of Federal Regulations (CFR) 141.202.
    - As soon as practical, but no later than 24 hours: A backflow incident per WAC 246-290-490(8)f.
2. The City must submit to DOH all applicable reports required by Chapter 246-290 WAC. Monthly reports are due by the tenth day of the following month, unless otherwise specified.
3. Daily source meter readings must be made available to DOH on request.

4. Total annual water production records for each source must be made available to DOH upon request.
5. A water facilities inventory (WFI) and report form must be submitted to DOH within 30 days of any change in name, category, ownership, or responsibility for management of the water system.
6. The City must notify DOH of the presence of:
    - Coliform in a sample within 10 days of notification by the testing laboratory; and
    - Fecal coliform or *E. coli* in a sample by the end of the business day in which the City is notified by the testing laboratory.
7. When a coliform MCL violation is determined, the City must:
    - Notify DOH within 24 hours of determining acute coliform MCL violations;
    - Notify DOH before the end of the next business day when a non-acute coliform MCL is determined; and
    - Notify water customers in accordance with WAC 246-290-495.
8. If volatile organic compound (VOC) monitoring is required, a copy of the results of the monitoring and any public notice must be sent to DOH within 30 days of receipt of the test results.

Other Reports

Several other reports are required for Washington State agencies, including the Department of Revenue, Department of Labor and Industries, Department of Social and Health Services, Department of Ecology, and the Employment Security Department. All these reports are completed according to their instructions and procedural mandates.

Operations and Maintenance Records

Records include, but are not limited to, the following.

- Water quality
- MCL violations
- Water quality complaints
- Backflow prevention
- Maintenance and construction
- O&M manuals
- Personnel records
- Flushing and distribution system
- Well operation monitoring

- Surface water treatment rule disinfection monthly report
- Water treatment plant monthly report

Safety Procedures and Equipment

Safety is a primary concern and responsibility of all water O&M staff. The City has taken steps toward educating its staff and providing resources to ensure a safe working environment. The City will strive to improve its safety program on an ongoing basis. The AWWA publishes a manual entitled *Safety Practices for Water Utilities (M3)* that describes safety programs and provides guidelines for safe work practices and techniques for a variety of water utility work situations.

The following identifies procedures to be followed for O&M tasks that involve the most common potential workplace hazards in the City's water system.

Use of Chlorine or Chlorine Products

Standard Procedure – Handle with care, provide adequate ventilation, and wear safety glasses and rubber gloves. Follow safety data sheets (SDS) and facility standard operating procedures.

Use of Water Treatment Chemicals

Standard Procedure – Follow SDS and facility standard operating procedures.

Working in Confined Spaces

Standard Procedure – Follow state requirements for confined space entry.

Working around Heavy Equipment

Standard Procedure – Obtain proper training and follow all safety procedures.

Working in Traffic Areas

Standard Procedure – Wear proper clothing and provide adequate signage and flagging for work area.

Working on or around Water Reservoirs

Standard Procedure – Follow proper safety harness procedures for working on tall structures.

Working in or around Pump Stations

Standard Procedure – Obtain proper training and follow all safety procedures for working on pumps and electrical equipment.

Working on Asbestos Cement Water Main

Standard Procedure – Obtain proper training and follow all safety procedures for working with asbestos materials.

The Public Works Department follows all appropriate Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations in its day-to-day operations and complies with the following State requirements:

- WAC 296-62-145 to 14529 Part M – Entry into confined spaces.
- WAC 296-155-650 to 66411 Part N – Shoring of open ditches.
- WAC 296-155-429 – Lockout-tagout for work on energized or de-energized equipment or circuits.
- Chapter 296-155 WAC Part C1 – Fall restraint for access to the top of the City's water reservoirs.
- *Manual on Uniform Traffic Control Devices* (MUTCD) – Traffic control for work in the public right-of-way.

Additional safety procedures are documented in the City's Safety Manual.

The City's operations and maintenance staff undergo regularly scheduled safety training. The list that follows details the City's safety training programs and the intervals at which they are completed.

- Heat safety (annual training)
- Accident prevention (upon employment, as changes are made)
- Employee safety orientation (upon employment, as changes are made)
- Bloodborne policy (upon employment, annually thereafter)
- Bloodborne pathogens (upon employment, annually thereafter)
- Hepatitis "B" vaccine offer/decision (upon employment)
- Airborne pathogens (upon employment, annually thereafter)
- First Aid/CPR/Automated External Defibrillator (AED) (every 2 years First Aid and CPR, annually AED)
- Flagger certification (every 3 years)
- Hearing conservation (annually)
- Hearing protection fitting (as needed)
- Forklift (every 3 years)
- Confined space (as needed)
- Air monitor training (annually)
- Trenching/excavating (as needed)
- Defensive driving (as needed)
- Trailer transports and tie downs (annually)

- Hazardous Communication/SDS (continually as changes are made)
- Fire extinguishers (annually)
- Electrical safety (as needed)
- Propane safety (as needed)
- Body mechanics (as needed)
- Personal Protective Equipment (PPE) policy (annually)
- Lockout/tagout policy (annually)
- Fall protection (annually)
- Portable ladders (annually)
- Power hand tools (annually)
- Hand tools (as needed)
- Compressed air safety (as needed)
- Chain saw hazards and tree removal (as needed)
- Machine guarding (annually)
- Aerial lifting equipment/scissors (every 3 years)
- Boom trucks (every 3 years)
- Portable generator training (annually)
- Cutting and welding (as needed)
- High pressure washer equipment (as needed)
- Railroad safety awareness (as needed)
- Asbestos cement workplace practices (as needed)
- Job safety analysis (as needed)
- Tailgate safety meetings (as needed)

EMERGENCY OPERATIONS

Capabilities

The City is well equipped to accommodate short-term system failures and abnormalities in accordance with WAC 246-290-420. Its capabilities are as described in the sections that follow.

Multiple Supply Capability

The City could lose the operation of one of its water treatment trains or Ranney Wells without adversely impacting its ability to provide emergency supply to customers.

Multiple Reservoirs

Water storage is provided by two active reservoirs that are located at Scott Hill. Routine cleaning and maintenance of the reservoirs typically is performed by divers without draining the tanks. In an emergency, either of the tanks may be taken out of service for limited periods without disruption of service.

Distribution System

The City has attempted to loop water mains wherever possible to improve water circulation (i.e., water quality) and minimize impacts to the system if a portion of the distribution system must be taken out of service for maintenance or repairs.

Emergency Equipment

The City is equipped with the necessary tools to deal with common emergencies. If a more serious emergency should develop, the City will hire a local contractor who has a stock of spare parts necessary to make repairs to alleviate the emergency condition.

Auxiliary Power

The City's WTP was upgraded in 2019, which included demolition of the existing emergency backup generator and the installation of a new 350 kilowatt diesel generator. This generator is sized to provide backup power for the WTP and the Scott Hill Booster Station located on the same site.

Emergency Telephone

During the regular workday, water emergencies are routed to the appropriate department. After-hours water emergencies are routed to the standby duty person. After-hours messaging on the City phone tree (main phone lines for Public Works Administration and City Hall) instructs the caller to dial 911 and report the emergency (can be other than water emergency). Calls made to 911 are received by the City of Woodland Police Department, which is in operation 24 hours a day, 7 days a week year-round. Police records personnel make direct contact with the standby duty person and relay the emergency information.

On-Call Personnel

The on-call person (standby duty person) is available 24 hours a day, 7 days a week year-round. They are equipped with a service vehicle and generally can respond to a call within 15 minutes. A list of emergency telephone numbers is provided to each on-call employee.

In the event of an after-hours emergency, the standby duty person responds, assesses the situation, and takes appropriate action to resolve the emergency situation. Appropriate action may include calling out other qualified, knowledgeable, or appropriately certified individuals. The standby duty person notifies the Public Works Superintendent about all water emergencies as they occur.

New employees are not placed on-call until they are familiar with the water system and maintenance procedures and have met the minimum standards, certification, and qualifications.

Material Readiness

Some critical repair parts, tools, and equipment are on-hand and kept in fully operational condition. As repair parts are used, they are re-ordered. Inventories are kept current and adequate for most common emergencies that reasonably can be anticipated. The City has ready access to an inventory of repair parts, including parts required for repair of each type and size of pipe within the service area.

Risk and Resilience Assessment and Emergency Response Plan

Per America's Water Infrastructure Act (AWIA), which was enacted in 2018, the City is required to complete an all-hazards risk and resilience assessment (RRA) and emergency response plan (ERP). The City's deadline to complete the RRA and submit a certification letter to the EPA is June 30, 2021. The ERP must be completed within 6 months of the RRA certification. The City plans to commence work on the RRA and ERP in 2021.

Public Notification

The Federal Safe Drinking Water Act (SDWA) and WAC 246-290-495 require purveyors to notify their customers if any of the following conditions occur:

- Failure to comply with a primary MCL described under WAC 246-290-310.
- Failure to comply with a surface water treatment technique.
- Failure to comply with monitoring requirements under Chapter 246-290 WAC.
- Failure to comply with testing requirements.
- Failure to comply with a DOH order.
- Failure to comply with a variance or exemption schedule from DOH.
- If the system is identified as a source of waterborne disease outbreak.
- If DOH issues the system a category red operating permit.
- If DOH issues an order.
- If the system is operating under a variance or exemption.

Specific notice content, distribution channels, and time limit requirements, as specified in WAC 246-290-495, must be in compliance when notification is required.

PREVENTIVE MAINTENANCE

Maintenance schedules that meet or exceed manufacturer's recommendations have been established for all critical components in the City's water system. Water quality and

maintenance technicians conduct daily inspections and perform preventive/corrective maintenance on pump stations, reservoirs, control valves, and other distribution system components. Job standards have been developed for most maintenance tasks/activities performed by these technicians and are on file with the City.

The following schedule lists key preventive maintenance tasks and the intervals at which they are performed.

Ranney Well Collector and Bryant Pump Station

Daily	Inspect site and equipment; take daily pump readings; take chlorine sample.
Annually	Pump overhaul (once per year, rotating schedule).
As Needed	Building maintenance and repair. Pit and lateral cleaning.

Transmission Line: Ranney Well to WTP

Quarterly	"Pig" the line.
As Needed	Repairs as needed.

Water Treatment Plant

Daily	• Record raw water meter readings from intake pump hour run time and a finish water meter reading. • Decant flow and backwash totals. • Record chemical levels and fill chemical solution tanks as needed. • Walk through and visually check on chemical feed pumps, tubing, etc. • Collect and test water samples for iron level, pH, turbidity, temperature, alkalinity, and chlorine residuals. • Calculate chlorine contact time (CT) compliance. • Record water quality results on monthly DOH reports. • Check turbidimeters and charts. • Check transfer and finish water pump operations.
Weekly	• Observe backwash pumps, clarifier flush, and filter backwash. • Verify turbidity meter accuracy.
Monthly	• Complete and mail monthly reports for chlorination, WTP production, and CT compliance to DOH. • Check all water quality equipment turbidimeters, chlorine analyzer, and pH meters. • Test lagoon effluent/decant for National Pollutant Discharge Elimination System permit compliance.

Quarterly	• Calibrate turbidimeters. • Flush and clean chlorine analyzer sample chamber.
Annually	• Clean lagoons as needed.
As Needed	General repairs.

Reservoir No. 2

Daily	Record reservoir level.
Weekly	Inspect hatches for tampering or damage.
Monthly	Inspect valves and survey for leaks.
Annually	Inspect and service (as required) the level sensor/transmitter, high level float switch, and check valves.
As Needed	Clean/rebuild control valves.

Reservoir No. 3

Daily	Record reservoir level.
Weekly	Inspect hatches for tampering or damage.
Monthly	Inspect valves and survey for leaks.
Annually	Inspect and service (as required) the level sensor/transmitter, high level float switch, and check valves.
As Needed	Clean/rebuild control valves.

Scott Hill Booster Station (Future; Estimated Online by December 2020)

Daily	N/A
Weekly	• Visit site and evaluate security. • Check pumps for proper operation. • Observe piping for visible leaks.
Annually	• Exercise high flow pumps (or semi-annually). • Exercise valves. • Change oil every 3 months (2,000 operating hours).
As Needed	• Lubricate and repair pumps as needed. • Inspect pump seals and discharge pressure. • Check and tighten bolts. • Replace valve stems, discs, seats, bushings, seals, etc.

Other Components of Distribution System

Water Mains	
As Needed	Repair and flush as needed due to breaks and/or complaints.
Hydrants	
Three-Year	Perform hydrant testing, flushing, and maintenance. Maintain vegetation surrounding hydrants; test hydrants; check accessibility and configuration of auxiliary valve. Note hydrants in need of pressure washing or painting.
As Needed	Repairs; pressure washing and painting of hydrants.
Valves	
Three-Year	Exercise all valves. Report malfunctioning valves and issue maintenance work orders for repair or replacement.

Meters

Construction Hydrant Meters

The City owns approximately ten water meters that are rented out for temporary water sales.

Location	*Installation Date*	*Notes*
Various locations as needed	Varies	Replace as needed

Customer Meters

All 2-inch and above water meters (commercial/industrial) have been replaced in the last 3 years. Residential water meters are replaced as needed based on utility billing concerns and/or visible leaks. The average meter replacement per month is two to three.

STAFFING

The preventive maintenance procedures, as well as the normal and emergency operations of the utility, are described in the previous sections. The hours of labor and supervisory activity required to effectively provide this ongoing maintenance and operations schedule forms the basis for determining adequate staffing levels.

Current Staff

The current staff includes supervisory personnel, technicians, maintenance workers, and office personnel engaged in operating and maintaining the water system. There are currently

two full-time employees supporting and seven full-time employees assisting in support of the water system.

Recommended Staff Level

A water system is a complex assortment of equipment and parts that require both operation and maintenance. The estimated level of effort required to provide effective operation and maintenance in this document is based on a compilation of national standards, such as those provided by the AWWA, and the pro-forma standards provided by similar water systems in the Pacific Northwest.

The available hours of a person during a year are not the total hours worked. There are many hours spent in training, non-work status, and other activities that deduct from the 2,080 hours in pay status during a year. The total available hours are typically reduced to 1,540, as shown in **Table 8-4**.

Table 8-4

Annual Available Hours per Person

Time Available Per Year Per Person	
Beginning Hours Available	2,080
Less average vacation of 3 weeks per year	-120
Less average sick leave of 2 weeks per year	-80
Less holidays of 10 days per year	-80
Less average training of 40 hours per year	-40
Less average small tasks other than above of 1 hour per day	-220
Net Total Available Hours Per Year Per Person	1,540

Preventive maintenance is the work performed to keep the water system in the condition necessary to provide the expected service. Preventive maintenance needs are based on the physical composition of the water system. Each component has a preventive maintenance need that ranges from minor to significant. **Table 8-5** provides the detail of the recommended staffing level for the water system's preventive maintenance program. As shown in **Table 8-5**, approximately 1.4 full-time employees are recommended for the preventive maintenance program.

Table 8-5

Preventive Maintenance Staff Needed

Description	Total Units in System	Frequency (Times/Year)	Time/Unit (Hours)	Time/Year (Hours)
Hydrants	486	0.33	0.33	53
Isolation Valves, Hydrant Valves	1,020	0.33	0.33	111
Source Meters	2	1	2	4
Leak Survey of Water Mains	42 miles	1	4	168
Flushing of Water Mains	42 miles	0.33	24	333
Booster Pump Stations	1	12	0.5	6
Water Treatment Facilities	1	365	1	365
Reservoirs	2	52	0.5	52
Telemetry and Control System	1	52	20	1,040
Total Hours Required				2,132
Total Full-Time Staff Required (Based on 1,540 hours per year per person)				**1.4**

The other component of O&M staffing is operations. Operations includes all activities other than preventive maintenance, such as water meter reading and repair of broken water mains. As a system ages, many of these activities can be expected to increase. Some operations staff demands can be reduced by replacing infrastructure with more efficient technology. Each technology or equipment upgrade should be analyzed for cost effectiveness. **Table 8-6** provides the recommended staffing level for the water system's operations program. As shown in **Table 8-6**, approximately 2.7 full-time employees (FTEs) are recommended for the operations program.

Table 8-6

Operations Staff Needed

Description	Total Units in System	Frequency (Times/Year)	Time/Unit (Hours)	Time/Year (Hours)
Monitor System	4	365	0.33	482
False Alarm Response	1	24	2	48
Meter Reading	4,150	1*	0.25	1,038
Groundskeeping	1	12	2	24
Inventory	1	1	40	40
Meter Repair/Replace	1	100	4	400
Main Breaks/Repair	1	3	16	48
Hydrant/Blowoff Repairs	1	2	8	16
Utility Locates	1	120	2	240
Service Connections	1	20	4	80
Main Connections	1	10	24	240
Water Quality Sampling	4	12	1	12
Administration	1	185	8	1,480
Total Hours Required				4,148
Total Full-Time Staff Required (Based on 1,540 hours per year per person)				**2.7**

To achieve the level of operations and maintenance shown in **Table 8-7**, approximately 4.1 full-time personnel are required for the water system alone. The City has 2 full-time water system employees, leaving a shortage of 2.1. The City utilizes 7 positions to fulfill 1.75 FTE for the shortage of full-time equivalents needed. Those positions are:

- Public Works Director – 0.10;
- Public Works Superintendent – 0.33;
- Two Utility Service Worker II – 0.66;
- Mechanic – 0.10;
- Engineering Aid – 0.33; and
- Clerk II – 0.33.

This still leaves a shortage of 0.25 FTE to meet these requirements. In addition, as the water system expands in the future, additional review of staffing needs will be required. The City plans to add staff to optimize preventive maintenance and meet the additional requirements from system expansion as the budget allows.

Table 8-7

Total Staffing Recommendation

Preventive Maintenance Hours	**2,132**
Operations Hours	4,148
Total Hours	6,280
Total Full-Time Staff Required (based on 1,540 hours per year per person)	**4.1**

ASSET MANAGEMENT

The City does not currently have an asset management program in place. The City has been in the process of evaluating computerized maintenance management system (CMMS) software over the past few years and is working towards selecting a program that will fit the City's needs. As of now, the asset management is kept in Excel spreadsheets and updated yearly for reporting.

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