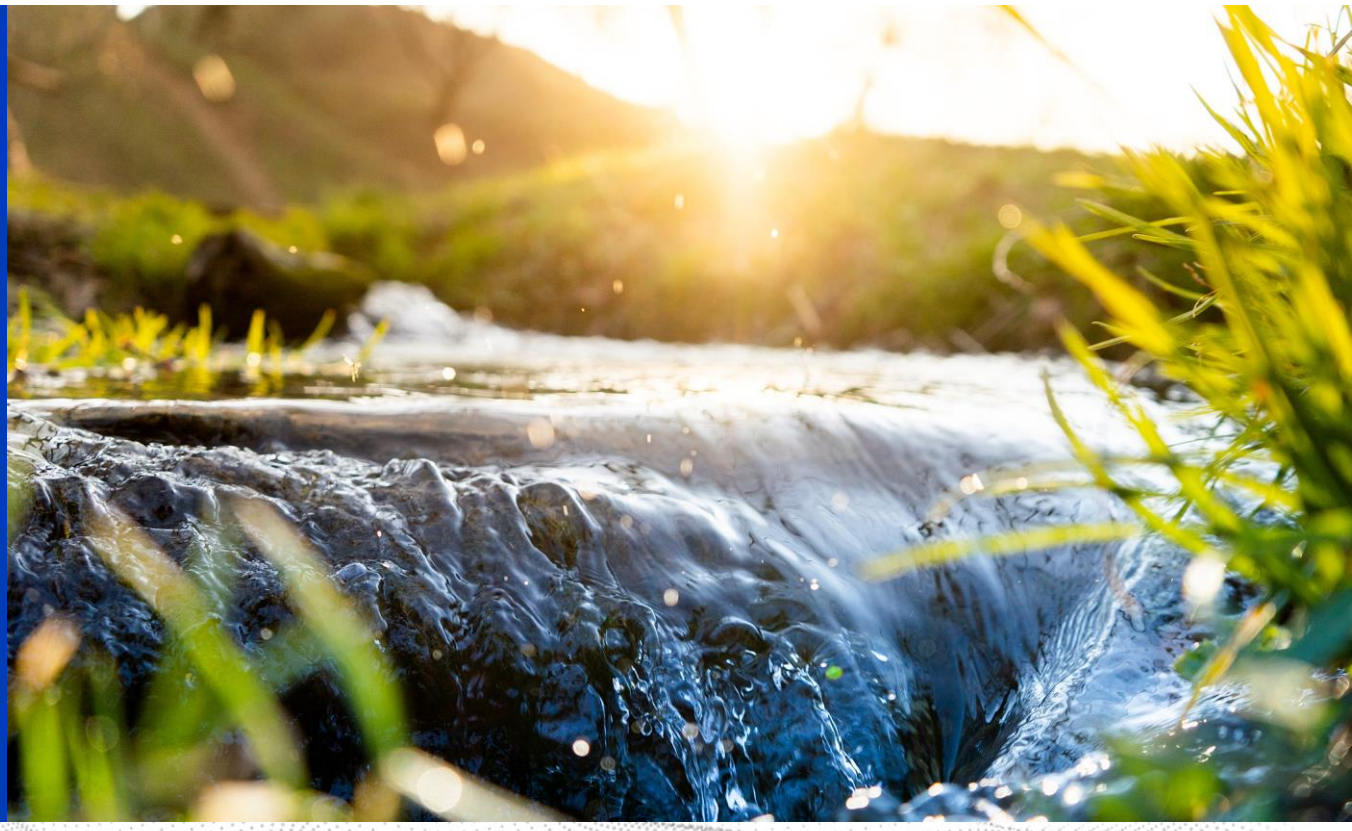
WSP PFAS Supplement



WSP PFAS Amendment

DRAFT / August 2024

WSP PFAS Supplement

WSP PFAS Amendment

DRAFT / August 2024

1200 FIFTH AVENUE, SUITE 900 ▪ SEATTLE, WASHINGTON 98101 ▪ P 206-684-6532

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EXECUTIVE SUMMARY

ES.7 - Water Quality

This content replaces the second paragraph of the section.

The City is currently in compliance with existing state regulations regarding PFAS sampling and public notification requirements under Part 4 of WAC 246-290. The City is currently planning for compliance with federal regulations related to per- and polyfluoroalkyl substances (PFAS). These changes and the City's associated planning efforts are described more in Chapter 7.

CHAPTER 7 – WATER QUALITY

Table 7.1 - Drinking Water Regulations, Water System Plan Update, City of Camas

Table to include new Row for State Action Levels, which shall be placed in second row under National Primary and Secondary Drinking Water Standards.

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
State action levels (SAL) and state maximum contaminant levels (MCL) and Follow-up action	N/A; state specific.	Part 4, 315, and 320	Select per- and polyfluoroalkyl substances (PFAS)	1/1/22 (for rules and updates applicable to PFAS)
PFAS National Primary Drinking Water Regulation	40 CFR Parts 141 and 142	Part 4, 315, subsection (8).	Select per- and polyfluoroalkyl substances (PFAS)	4/10/2024

Table to include 2 new rows to list UCMR 4 and UCMR 5

Rule	CFR	WAC 246-290	Affected Contaminants	Publication Date of Final Rule
Unregulated Contaminants Monitoring Rule	N/A	N/A	Various contaminants considered for future regulations	▪ UCMR 1 Promulgated 1999 ▪ UCMR 2 Promulgated 2007 ▪ UCMR 3 Promulgated May 2, 2012 ▪ UCMR 4 Promulgated December 20, 2016 ▪ UCMR 5 Promulgated December 27, 2021

Section 7.3.8 - Unregulated Contaminant Monitoring Rule

This content replaces the last paragraph of the section and adds new content.

The UCMR is used as a tool for the USEPA to collect data, and ultimately establish regulations, for contaminants that are suspected to be present in drinking water but do not have health-based standards set under the Safe Drinking Water Act (SDWA).

The second cycle (UCMR 2) of monitoring was published in the Federal Register on January 4, 2007. The UCMR 2 required monitoring for 25 contaminants using five analytical methods during 2008- 2010. The third cycle (UCMR 3) of monitoring was published on May 2, 2012. UCMR 3 required monitoring for 30 contaminants: 28 chemicals, and 2 viruses. Monitoring occurred during 2012 to 2015. The fourth cycle (UCMR 4) of monitoring was published on December 20, 2016. UCMR 4 required monitoring for 30 chemicals, which included nine cyanotoxins and one cyanotoxin group; two metals; nine pesticides; three brominated haloacetic acid disinfection byproducts groups, three alcohols, and three semi-volatile organic chemicals. Monitoring occurred during 2018 to 2020. The fifth cycle (UCMR 5) was published on December 27, 2021 and is currently ongoing, requiring monitoring for applicable systems between 2023 and 2025. UCMR 5 requires monitoring for 29 different PFAS and lithium.

From 2013 to 2015, USEPA's third installment of UCMR sampling efforts measured for six PFAS. These included perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), two of the most notable and prevalent PFAS compounds. At the time, there were limited detections nationwide, but laboratory analysis methods could not measure levels low enough to reflect the presence at very low concentrations of these compounds across the United States. For the 2023 to 2025 period, the 29 different PFAS compounds can now be measured at relatively low levels through advancements in laboratory analysis methods.

Results from UCMR 5 are currently being reported and compiled as of the date of this report. As of August 2023, around 20 percent of systems have reported results so far and around 8 percent of those systems have seen detections of PFOA and PFOS. However, these results are from Quarter 1 of four quarterly reporting requirements, so some public water systems with no detections may show detections in later reports.

Section 7.3.8.1 - Monitoring Requirements

This content replaces the section.

The City has conducted monitoring as required for the previous UCMRs. For systems required to sample under UCMR 5 with a groundwater source (including the City), sampling must occur two times during a consecutive 12-month monitoring period, where sampling events occur 5-7 months apart. For systems with a surface water source, a groundwater source under the direct influence of surface water, or a mixed-source system, sampling must occur four times during a consecutive 12-month monitoring period. Sampling events must occur 3 months apart (quarterly sampling). The City's efforts for UCMR 5 sampling efforts are currently ongoing. The City expects to comply with all monitoring requirements of UCMR 5.

Section 7.3.9 - State Action Levels and State Maximum Contaminant Levels

This is an entirely new section to be added to the report.

The State of Washington's Department of Health (DOH) has primacy to establish state action levels (SAL) and state maximum contaminant levels (MCL) that set more stringent or more encompassing requirements for public water systems than federal requirements. The basis on which SALs or State MCLs may be established is described in WAC 246-290-315.

DOH considers establishment of SALs when human exposure to the contaminant in question can occur through drinking water, and when the contaminant is known or likely to occur in public water systems at levels of public health concern.

DOH may develop a SAL based on the following:

- Evaluation of available peer-reviewed scientific literature and government publications on fate, transport, exposure, toxicity and health impacts of the contaminant and relevant metabolites;
- An assessment based on the most sensitive adverse effect deemed relevant to humans and considering susceptibility and unique exposures of the most sensitive subgroup such as pregnant women, fetuses, young children, or overburdened and underserved communities; and
- Technical limitations to achieving the SAL such as insufficient analytical detection limit achievable at certified drinking water laboratories.

SAL exceedance requires follow-up action as described in WAC 246-290-320.

A State MCL may be established by DOH in specific cases where:

- Regulating the contaminant in question presents a meaningful opportunity to reduce exposures of public health concern for persons served by public water systems.
- Where there is a need for an enforceable limit to achieve uniform public health protection in Group A public water systems.
- The need for an enforceable limit to support source water investigation and clean-up of a contaminant in drinking water supplies by responsible parties.

State MCLs would require treatment for the contaminant in question, whereas SALs require specific follow-up actions as described in WAC 246-290-320. DOH has not yet established any State MCLs but has established a series of SALs at the beginning of 2020. These SALs are summarized below in Table 7.6.1.

Contaminant or Group of Contaminants	SAL
PFOA	10 ng/L
PFOS	15 ng/L
PFHxS	65 ng/L
PFNA	9 ng/L
PFBS	345 ng/L

Notes:
ng/l - nanograms per liter, or parts per trillion (ppt).

These contaminants are all PFAS. DOH considered the prevalence of these PFAS in UCMR 3 reporting results and the non-enforceable health advisory levels set by the USEPA in 2022. Their associated follow-up requirements per WAC 246-290-320 are described in the following Section 7.2.9.1 - Monitoring Rules.

The WAC states that upon a federal adoption of an MCL for any contaminant with a WA SAL or State MCL, the federal MCL will supersede a SAL or a less stringent state MCL, and the associated requirements, including for monitoring and public notice. If the federally adopted MCL is less stringent than a SAL or State MCL, DOH may adopt the federal MCL or adopt a state MCL at least as stringent as the federal MCL (WAC 246-290-315, Subsection [8]). Discussion of federal regulations associated with PFAS is described in Section 7.3.10 – PFAS National Primary Drinking Water Regulation.

Section 7.3.9.1 - Monitoring Requirements

This is a new section to be added to the report.

The City is in compliance with all monitoring rules associated with constituents subject to SALs. WAC 246-290-300 describes the monitoring requirements for contaminants subject to DOH SALs. These requirements are summarized in Table 7.6.2 below.

Contaminant or Group of Contaminants	Initial Sampling	Routine Sampling Frequency	Sampling Location
PFAS with prescribed SALs (see Table 7.6.1)	One sample on or before December 31, 2025	Once every three years	Per the locations described in WAC 246-290-300.7b.

While one sample is required before the end of 2025, sampling requirements for UCMR 5 will generally fulfill this requirement for large public water systems, as is the case for Camas. UCMR 5 sampling requirements (described in Sections 7.3.8 and 7.3.8.1) include the 5 PFAS that are subject of the WA SALs. However, sampling for contaminants with SALs may bring specific follow-up actions. These follow up actions generally include notification of the result to DOH, and public notification. There are also follow-up requirements for samples that do not exceed the SALs, but result in a certain percentage of the SAL. Figure 7.1 describes a flow chart, developed by DOH, to guide public water systems in determining the required follow-up action after sampling for constituents with SALs.

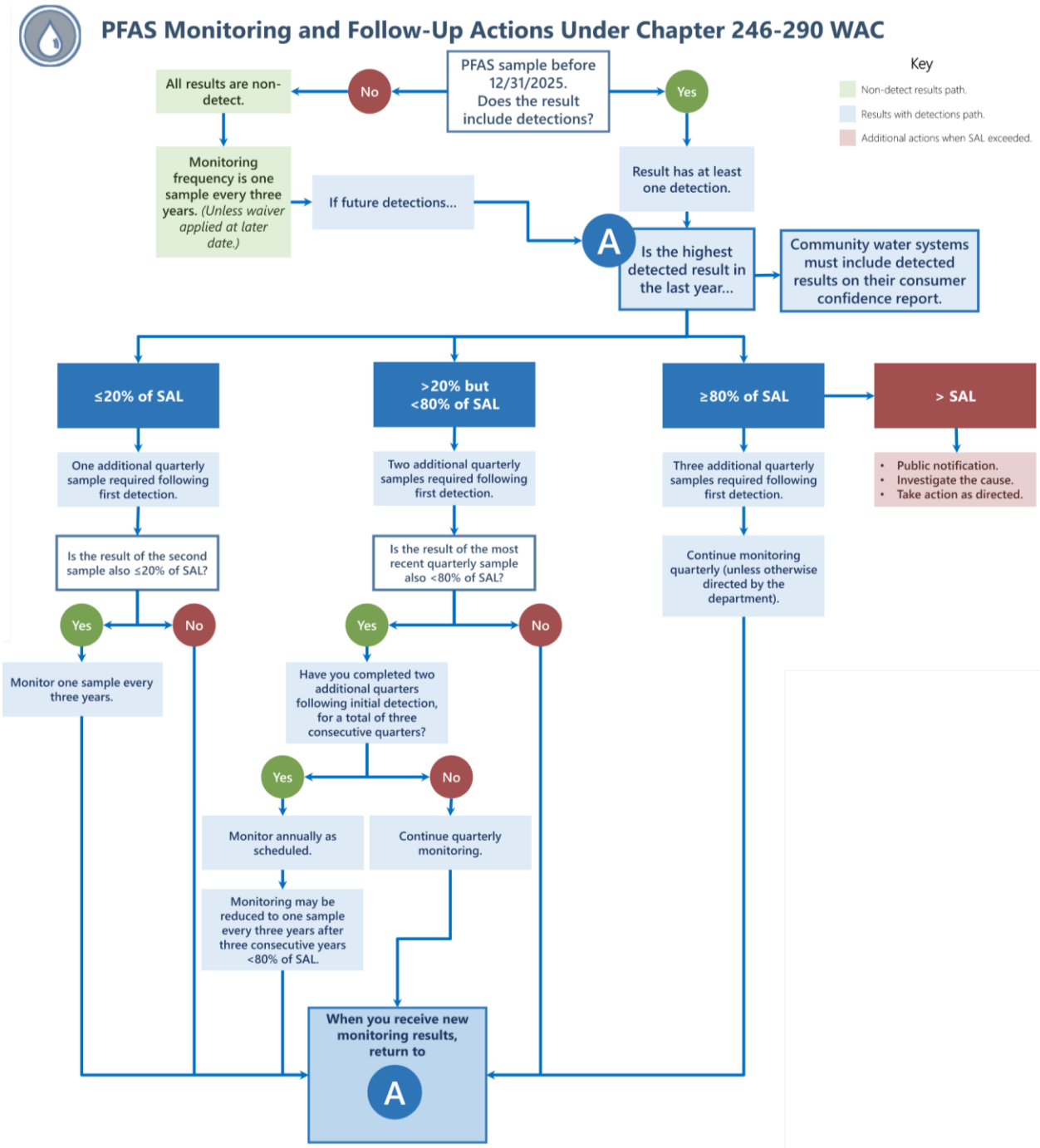


Figure 7.1 PFAS SAL Monitoring Follow-Up Action Flowchart Developed by WA DOH

Upon a federal adoption of an MCL for any contaminant with a WA SAL, the federal MCL will supersede the SAL, and its associated requirements, including for monitoring and public notice. Therefore, any monitoring requirements described in this section will be superseded by monitoring requirements described in any future federal MCLs associated with the PFAS listed in Table 7.6.1.

Section 7.3.9.2 - Compliance

This is a new section to be added to the report.

The City is currently in compliance with existing state regulations regarding PFAS sampling and public notification requirements under WAC 246-290-320. Sampling efforts at Well 13 on August 5, 2022 showed PFAS levels above the SALs. As a result, the City has taken follow-up actions in accordance with WAC 246-290-320. Follow-up sampling efforts at Well 13 on December 5, 2022 and July 13, 2022 also showed exceedance with the SALs, but five other sampling efforts showed results below the SAL threshold. The City plans to continue compliance with the required follow-up actions. Sampling at other well sites showed no SAL exceedances.

Although a SAL exceedance does not trigger the need for treatment, the City is currently planning for changes to federal regulations around per- and polyfluoroalkyl substances (PFAS) which may require treatment if levels are at or above an MCL. These changes and the City's planning efforts are described more in Section 7.6.

Section 7.3.10 - PFAS National Primary Drinking Water Regulation

This is an entirely new section to be added to the report.

Prior to issuance of the UCMR 5, USEPA concluded there was enough data on the health effects of PFAS to begin the process of regulating certain PFAS compounds. The following describes the sequence of key actions taken by USEPA related to PFAS.

- In February 2021, USEPA issued notice for its intent to enforce limits on PFAS in drinking water to safeguard communities from PFAS contamination, specifically PFOA and PFOS.
- In June 2022, USEPA announced new health advisory levels (HAL) for four PFAS: PFOA, PFOS, hexafluoropropylene oxide dimer acid (HFPO-DA, commonly known as GenX), and perfluorobutane sulfonic acid (PFBS). This was the first time HALs had been issued for PFBS and GenX. For PFOA and PFOS, these new HALs are several orders of magnitude below the HAL announced in 2016 (i.e., 70 ng/L for PFOA and PFOS combined). The new HALs for PFOA and PFOS were labelled "interim" because the USEPA's draft analysis of health studies for PFOA and PFOS were still undergoing review by the Science Advisory Board at the time of the announcement.
- On March 14, 2023, USEPA announced a proposed National Primary Drinking Water Regulation (NPDWR) to establish legally enforceable levels for not only PFOA and PFOS but also perfluorononanoic acid (PFNA), GenX, perfluorohexane sulfonic acid (PFHxS), and PFBS.
- On April 10, 2024, EPA announced the final National Primary Drinking Water Regulation (NPDWR) for six PFAS. Under the NPDWR, the EPA established MCLs for six PFAS in drinking water: PFOA, PFOS, PFHxS, PFNA, and HFPO-DA as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water. EPA also finalized health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these PFAS. A summary of these levels is provided in Table 7.8. An explanation of the Hazard Index approach follows the table.

Table 7.8 MCLs and MCLGs for Specific PFAS Compounds in Drinking Water

Compound	Proposed MCLG	Proposed MCL (Enforceable Levels)
PFOA	Zero	4.0 ppt(1)
PFOS	Zero	4.0 ppt(1)
PFNA	10 ppt	10 ppt
PFHxS	10 ppt	10 ppt
HFPO-DA (GenX)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	Hazard Index of 1.0 (unitless).	Hazard Index of 1.0 (unitless).

Notes:

» In aqueous matrixes, ppt can also be expressed as ng/l.

ppt - parts per trillion.

While PFOA, PFOS, PFNA, PFHxS, and GenX have their own individual MCLs and MCLGs under the NPDWR, a Hazard Index (HI) of less than 1.0 must also be met to comply with the rule. The HI is used to reduce the risk of health impacts from a chemical mixture. The HI is calculated via a sum of fractions. Each fraction compares the level of each PFAS measured in the water to the health-based water concentration. The equation below summarizes the HI calculation. It includes indexes for PFHxS, PFNA, and GenX (all of which have their own individual limits as MCLs) and PFBS (which does not have its own individual limit as an MCL).

With the HI approach, the concentration of each of these four PFAS would be divided by a corresponding health-based value (10ppt for PFHxS, PFNA, and GenX; 2000ppt for PFBS). The sum of these fractions needs to be below 1.0 to comply with the NPDWR. Note, however, that an exceedance must be triggered by two or more chemicals. For example, a GenX concentration of 11ppt alone would not cause a HI exceedance, but it would cause an MCL exceedance. A PFBS concentration of over 2,000ppt alone would not cause a HI exceedance unless another chemical within the calculation exceeded 10ppt.

$$HI = \frac{[PFHxS]}{10ppt} + \frac{[GenX]}{10ppt} + \frac{[PFNA]}{10ppt} + \frac{[PFBS]}{2000\ ppt}$$

Hazard Index Calculation

Section 7.3.10.1 - Monitoring Requirements

This is a new section to be added to the report.

Under the NPDWR, public water systems (PWS) will be required to take initial monitoring samples at all entry points to the distribution system based on the frequency outlined in Table 7.9. Systems with appropriate, previously acquired monitoring data from UCMR 5, state-led, or other applicable monitoring programs using USEPA Methods 533 or 537.1, will not be required to conduct separate initial monitoring for regulated PFAS.

Table 7.9 PWS Sampling Requirements under USEPA's Proposed PFAS Rule

PWS Type	Monitoring Frequency
Groundwater Systems serving >10,000 persons	Monitor regulated PFAS quarterly within a 12-month period
Groundwater Systems serving ≤ 10,000 persons	Monitor regulated PFAS twice within a 12-month period, with sampling events conducted at least 90 days apart
Surface Water Systems	Quarterly within a 12- month period. Samples are required to be collected 2 to 4 months apart

After initial monitoring, PWS must monitor for rule compliance on a quarterly basis at each entry point to the distribution system. However, based on the initial monitoring results, agencies may reduce compliance monitoring frequency if the monitoring results are below the rule trigger level (RTL). The RTL is half of the MCLs or HI (i.e., 2 ng/L for specific PFAS with an MCL, or an HI of 0.5). Primacy agencies (states) have the flexibility to reduce monitoring to annually or triennially for systems that are consistently below RTLs. Any results above the RTL automatically require a reversion back to quarterly sampling.

For systems required to monitor quarterly, compliance will be determined by running annual averages at the sampling point. When calculating the running annual averages, if a sample result is less than the practical quantitation level for the monitored PFAS, the PWS may use zero as the result on that sample to calculate the average for compliance purposes.

Section 7.3.10.2 - Compliance

This is a new section to be added to the report.

The PFAS NPDWR has a 5-year compliance window from its year of inception (2024) with specific requirements throughout this timeframe.

- Within three years of rule promulgation (2024 – 2027):
  - Initial monitoring must be complete.
- Starting three years following rule promulgation (2027 – 2029):
  - Results of initial monitoring must be included in Consumer Confidence Reports (i.e., Annual Water Quality Report).
  - Regular monitoring for compliance must begin, and results of compliance monitoring must be included in Consumer Confidence Reports.
  - Public notification for monitoring and testing violations.
- Starting five years following rule promulgation (starting 2029):
  - Public notification for MCL violations.
  - Comply with all MCLs (including performing mitigation measures or installing PFAS treatment as required to comply with the MCLs).

All requirements described in this section will supersede current DOH SALs related to PFAS as per the WAC 246-290-315 Subsection (8) unless the State of Washington enacts more stringent or additional requirements beyond those listed in the PFAS NPDWR.

Due to the timeframe in which the PFAS NPDWR requirements are rolled out, the WAC 246-290-315 is temporarily more stringent than the PFAS NPDWR until 2027. Currently in Washington, PWS must report exceedances of certain PFAS above SALs (summarized previously in Table 7.6.1 and Section 7.3.9.1.). The City of Camas has conducted its required initial monitoring as required by the PFAS NPDWR, but will also continue to comply with monitoring and reporting requirements under WAC 246-290-315 and 246-290-320 until 2027, when the reporting requirements under the PFAS NPDWR become more stringent (unless the State of Washington enacts more stringent requirements).

Based on PFAS sampling data collected and reported by the City, certain wells within the City's water supply will likely need some form of PFAS mitigation to comply with the PFAS NPDWR by 2029. Refer to Section 7.7.1 for recommendations for the City to plan and prepare for PFAS MCL compliance. Costs associated with these recommendations are presented in Chapter 10.

Section 7.6 - Future Regulatory Requirements

This text is intended to replace the first paragraph of this section.

Anticipated future regulatory requirements are summarized in Table 7.9. This table includes ongoing programs to introduce new regulatory requirements, under the UCMR and the Contaminant Candidate List (CCL), as well as specific rules and regulations currently under consideration.

The City does not anticipate issues with meeting the other future regulatory requirements listed in the table based on the limited available information. The City will revisit each proposed rule when specific requirements are published. A brief description of anticipated requirements under each rule is provided herein.

Table 7.9 - Future Regulatory Requirements Water Quality Analysis, City of Camas

Modify Table 7.9's first row to correct the UCMR number to 6. All other text in the table remains unchanged.

Table 7.9 Future Regulatory Requirements Water Quality Analysis, City of Camas

Proposed Rule	Affected Contaminants	Proposed Publication Date(1)
Unregulated Contaminant Monitoring Regulations	Unregulated Contaminants	UCMR 6 - Unknown
Contaminant Candidate List	Unregulated Contaminants	CCL4 - Unknown
Radon Rule	Radon	Unknown
Perchlorate	Perchlorate	Unknown
Lead and Copper Rule Revisions	Lead, Copper	Unknown
Carcinogenic VOC Rule	cVOCs	Unknown

Notes:
(1) Effective and compliance dates were obtained from the Federal Register and USEPA's Drinking Water Hotline and represent the best information available as of the date of this report.

Section 7.6.1 - Unregulated Contaminant Monitoring Rule

This text is intended to replace the existing section.

The USEPA's UCMR is used to collect occurrence data for contaminants suspected to be present in drinking water, but do not yet have health-based standards. The current UCMR was discussed in Section 7.3.8. UCMR 5 is currently ongoing, and the City is in compliance with all sampling requirements. The UCMR is updated every five years, so a sixth UCMR can be expected in approximately five years. While no issue date for UCMR 6 has been published by the USEPA at this time, the City expects no issues with compliance.

Section 7.7 - Summary and Recommendations

This text is intended to replace the section.

The City seeks to maintain high quality water for its customers from the source to the tap. While the City currently complies with all DOH monitoring and reporting requirements, the upcoming PFAS MCLs (described in Section 7.6.7) compel the City to develop a plan to mitigate PFAS to maintain its commitment to providing high quality water.

Section 7.7.1 - Recommendations for Upcoming PFAS MCLs

This text, including subsequent subsections, is new content to be added to the WSP.

The actions recommended in this section are intended to help the City plan PFAS mitigation measures and plan for compliance with the PFAS NPDWR.

Based on PFAS sampling data as of the date of this report, Wells 5, 6, 11, 13, and 14 have reported PFAS levels that exceed the PFAS NPDWR MCLs. Well 5 and 13 are individual wells. Wells 6 and 14 combine before their EPTDS, comprising Wellfield East. Wells 7, 8, 10, 11, and 12 combine before their EPTDS, comprising Oak Park Wellfield.

For the purposes of developing planning-level estimates for PFAS mitigation, it was assumed that Well 13, Oak Park Wellfield, and Wellfield East would require treatment to achieve PFAS levels below the proposed MCLs. While Well 5 did record PFAS levels above EPA's proposed MCL's, its use has been limited since August of 2022. Due to the size of the parcel where Well 5 is located, PFAS treatment is not an option. Therefore, this source will likely be used as an emergency source only. Well 5's water rights may be utilized at the City's Lower Wellfield if additional source is developed.

Because only certain wells within Oak Park Wellfield have shown PFAS levels above the MCLs, treatment may not be required for the full flow of Oak Park Wellfield. However, due to the uncertainty around PFAS fate and transport within the aquifer below the wells, the remaining wells at Oak Park may become impacted. For the purposes of cost planning, mitigation costs for Oak Park are presented as a range to cover the mitigation costs that may be required given what the City currently knows about the PFAS levels, and to cover the mitigation costs that may be required if all wells in Oak Park become impacted. Further cost assumptions are described in Section 10.2.8.

The City is currently under contract to design and construct PFAS treatment at Well 13, given it has shown the highest levels of PFAS throughout the wellfield.

It is recommended that an adaptive PFAS response plan be adopted by the City to strategically plan for PFAS mitigation. The goal of a PFAS response plan will be to develop a roadmap to compliance with the

MCLs by USEPA's proposed deadline of 2029. The table below summarizes the major elements of the response plan. The following sections describe these elements in more detail.

Table 7.11 PFAS Response Plan Components

Actions		2024 - 2026	2026 - 2029	
1.	Risk Assessment	Confirm and fast track priority risks, build treatment at Well 13.	Continue to develop and modify risk assessment as PFAS mitigation progresses.	
2.	PFAS Mitigation Screening	Evaluation of alternatives to mitigate PFAS system wide by 2026.	Act on mitigation efforts and adapt plan accordingly based on results from PFAS Monitoring efforts.	
3.	Treatment design and construction	Ongoing efforts for treatment, including design, construction, and operations optimization as needed based on results from Risk Assessment and PFAS Mitigation Screening efforts.		
4.	PFAS Monitoring	Develop PFAS Monitoring Plan, continue sampling.	Continued monitoring.	
5.	Source Management	Source Identification Plan.	Identify Sources.	Source Control (if needed).
6.	Capital Needs Planning	Track funding and financing opportunities.		
7.	Communications	Develop and build upon a communications strategy that conveys efforts and progress to obtain and maintain stakeholder support, including from the public and City Council.		
8.	Advocacy	Partner with other agencies when available to advocate for science-based decisions, funding, and innovative treatment solutions. Help support regional efforts to reduce PFAS treatment costs.		

Section 7.7.1.1 - Risk Assessment

It is recommended that the City develop a risk assessment that will serve to identify immediate and near-term actions that can be taken to mitigate PFAS and maintain the City's commitment to providing high-quality water by ranking the highest risks facing the City with respect to PFAS. The risk assessment will incorporate system PFAS goals, infrastructure evaluations from all City wells, and latest hydrogeological information, and PFAS sampling results. The resulting risk register will serve to guide and prioritize efforts moving forward, but will be adjustable over time to accommodate new information and the rapidly-changing landscape associated with PFAS.

This effort will work concurrently with design of treatment at Well 13, while establishing actions that could be done in tandem to increase system resiliency against PFAS. It is intended that this risk assessment be updated by the City over time to adapt to changes in PFAS concentration and build upon progress from mitigating the highest risks identified.

Section 7.7.1.2 - PFAS Mitigation Screening

This effort includes ongoing evaluations to find the best alternative for PFAS mitigation system wide in a manner that will ensure compliance by USEPA's proposed deadline of 2029. Screening options will generally be divided into the categories of treatment-based mitigation or operational-based mitigation. An evaluation of treatment-based mitigation efforts should include a technology evaluation, comparing the efficacy of typical treatment technologies for PFAS: granular activated carbon (GAC), ion exchange (IX), and reverse osmosis (RO). Treatment efficacy depends on many site-specific factors, including water quality, system hydraulics, and site constraints. Depending on water quality, pre- or post-treatment may

be needed, for example. Operational-based mitigation efforts may include source identification, alternative sources of supply, or upgrading the capacity at well stations if PFAS results are below the USEPA's reporting limit at those well stations. Any impacts to operations will need to consider the impacts to the overall system and allow the City to maintain its high level of service to its customers.

The optimal solution for the City will likely be a combination of both technological and operational-based mitigation measures. The plan to screen alternatives and implement recommendations will likely need support from design services, hydrogeological services, and other support. It is intended that this effort be adaptive and updated over time based on latest PFAS sampling results and successful implementation of fast-track measures described in the Risk Assessment section.

Evaluations that involve changes to the hydraulics of a well (introducing treatment may increase headloss and lower pump yield, for example) should consider impacts and changes to the overall system. These considerations may include upgrading well pumps to maintain capacity with higher headloss, or a change of well operational strategies to maintain the same overall yield.

Section 7.7.1.3 - Treatment Design and Construction

This effort plans for and executes tasks necessary for the construction of PFAS treatment systems. Should the Risk Assessment or Mitigation Screening efforts identify treatment to be the optimal solution at a well station, this task will be utilized. The design process may vary depending on the well site, procurement approach, and treatment goals, but will generally include some similar elements.

- Site evaluation efforts will review site hydraulic, electrical, and infrastructure capacities.
- Basis of design reports will develop a treatment plan for the site, including any pre- or post-treatment (corrosion control) requirements based on water quality data.
- Design deliverables, such as 30 percent, 60 percent, 90 percent and final design packages, including drawings and specifications (deliverables may look different if the procurement approach allows for a fast-track delivery).
- Permitting and regulatory support.
- Engineering services during construction, including supporting startup, commissioning, and operations optimization.
- Ongoing systems integration support. This effort will monitor treatment performance and overall PFAS reduction system wide to help guide next steps for the system.

Section 7.7.1.4 - PFAS Monitoring

An ongoing PFAS monitoring plan should be developed that allows the City to continue to build insight on the fate and transport of PFAS in the aquifers, while also allowing the City to track progress from mitigation measures that have been implemented. This allows for the overall PFAS response plan to adapt to any changes in PFAS concentration. The monitoring program will also ensure compliance with monitoring requirements listed under the PFAS NPDWR.

Section 7.7.1.5 - Source Management

A PFAS source identification plan should be developed to gain insight on any potential sources of PFAS. This plan may include additional sampling efforts and can be modified as needed to the needs of the City.

The City can follow guidance provided in the Water Research Foundation Report 5082, "Investigation of Alternative Management Strategies to Prevent PFAS from Entering Drinking Water Supplies and Wastewater" to support source identification or source management measures.

Section 7.7.1.6 - Capital Planning Needs

Efforts to track funding opportunities will be important to minimize impacts on ratepayers. These efforts should track all available opportunities and ensure the City is in compliance with funding requirements.

Section 7.7.1.7 - Communications

Stakeholder engagement and community outreach will be important throughout these PFAS mitigation efforts to obtain and maintain support. This may include continuing upon the City's public outreach efforts or providing updates to City Council on current PFAS status.

Section 7.7.1.8 - Advocacy

The PFAS response plan should also include an advocacy component. Actions under this effort could include developing partnerships with neighboring utilities to coordinate sampling efforts or supporting regional efforts within the industry to advocate for utility support and funding for PFAS.

CHAPTER 10 - CAPITAL IMPROVEMENTS PLAN

Section 10.2.1 – Cost Estimate Level

This text is intended to replace the existing section.

The CIP cost estimates presented in this chapter are American Academy of Cost Engineers (AACE) Class 4 estimates for all projects except PFAS mitigation projects (described further in Section 10.2.8), which are presented as AACE Class 5 estimates. Actual costs may vary from these estimates by -30 percent to +50 percent for Class 4 estimates, and -50 percent to +100 percent for Class 5 estimates. All costs were estimated based on the City's and Consultant's perception of current conditions at the project locations, but are not guaranteed and are subject to change.

Costs are presented in December 2016 dollars, with the exception of PFAS mitigation projects, which are in January 2024 dollars. Procedures for cost estimating PFAS mitigation projects are described in Section 10.2.8 as they differ from cost estimating procedures used by other projects described in this Water System Plan.

The Engineering News-Record (ENR) US 20-City Construction Cost Index for December 2016 is 10,530. The ENR US 20-City Construction Cost Index for January 2024 is 13,515. The RS Means City Cost Index for Construction is 104.4 for Vancouver, WA, the area listed closest to the City. All estimates are subject to change as a given project design matures. Cost of labor, materials, and equipment may vary in the future.

Section 10.2.8 - PFAS Mitigation Costs

New section to be added to report.

The costs developed for PFAS mitigation projects were developed with a different methodology than cost estimates developed for other projects identified in this WSP. The enactment of EPA's PFAS NPDWR in April of 2024 provided guidance on PFAS mitigation goals for PWS. With established MCLs and monitoring and enforcement deadlines (described in Section 7.3.10.), PFAS mitigation project costs for a PWS can be better estimated. Therefore, costs associated with PFAS mitigation projects for the City were estimated based on the consultant's previous experience costing and designing PFAS mitigation projects with a similar scope. Capital cost estimates for PFAS mitigation projects were scaled from previous projects that were estimated in January 2024 dollars using the Handy Whitman Index of Public Utility Construction Costs. The flow rate of the example projects ranged between 900 gallons per minute (gpm) to 7,200 gpm and estimated treatment cost based on both ion exchange (IX) and granular activated carbon (GAC), two of the most common municipal-scale PFAS treatment technologies. The capital costs from the example projects ranged from $4.4M to $26M, resulting in capital cost per gpm values ranging from approximately $3,600 to $6,300. These capital cost per gpm estimates were adjusted based on the project location using the RS Means City Cost Index for Construction. Based on the example project locations, a location adjustment multiplier of 1.21 was added for projects in Camas. Further, the example project cost estimates did not account for specific electrical and well pump upgrades that would be required for PFAS treatment projects in Camas. In most cases, adding PFAS treatment increases headloss within the system, which will reduce the production of a groundwater well pump if no improvements are made. An additional cost adjustment multiplier of 1.20 was added to the estimates to account for well pump improvements (and associated electrical upgrades) to allow the well sites with PFAS treatment to maintain their existing capacity. Therefore, the estimated capital costs per gpm treated for Camas PFAS projects range from $5,300 to $9,150. The specific PFAS mitigation projects within Camas are discussed below.

Based on PFAS sampling data as of the date of this report, Wells 5, 6, 13, and 14 have reported at least one PFAS sample that has exceeded the PFAS NPDWR MCLs. Well 11 has reported PFAS levels just below the MCL. Well 5 and 13 are individual wells. Wells 6 and 14 combine before their EPTDS, comprising Wellfield East. Wells 7, 8, 10, 11, and 12 combine before their EPTDS, comprising Oak Park Wellfield. A PFAS sample taken at the combined finished water location of Oak Park Wellfield has shown a value above the MCL once.

All individual wells and well stations may require treatment except Well 9, but other mitigation measures could negate the need for treatment at certain locations. While Well 5 did record PFAS levels above EPA's proposed MCL's, its use has been limited since August of 2022. Due to the size of the parcel where Well 5 is located, PFAS treatment is not an option. Therefore, this source will likely be used as an emergency source only. Well 5's water rights may be utilized at the City's Lower Wellfield if additional source is developed.

Capacity-based PFAS mitigation measures or well blending strategies could negate the need for treatment at certain locations in the future. However, due to the uncertainty around the PFAS fate and transport within the aquifers the City uses, the appropriate planning level assumption is to assume that Well 13, Oak Park Wellfield, and Wellfield East would require treatment to achieve PFAS levels below the EPA's MCLs.

Cost estimates for PFAS treatment projects in Camas were estimated based on the range of capital cost per gpm presented above. These values ranged from $5,300 to $9,150. A value within this range was selected for 3 PFAS projects: treatment at Well 13, treatment at Wellfield East, and treatment at Oak Park.

For treatment at Well 13, a capital cost of $7,200 per gpm was assumed because this value is the average of the high and low estimates developed from the example projects. With a capacity of 1,325 gpm, an estimated, planning-level capital cost for PFAS treatment at Well 13 is approximately $10M. The City is currently under contract to design and construct PFAS treatment at Well 13, given it has shown the highest levels of PFAS throughout the wellfield.

For treatment at Wellfield East, a capital cost of $7,200 per gpm was assumed because this value is the average of the high and low estimates developed from the example projects. With Well 6 and Well 14's combined capacity of approximately 2,000 gpm, an estimated planning-level capital cost for PFAS treatment at Wellfield East is approximately $15M. Future evaluations for treatment at Wellfield East should consider treatment location and a cost-benefit analysis of locating treatment closer to Oak Park if treatment is required at that location as well.

For treatment at Oak Park Wellfield, cost estimates for treatment are presented as a range due to the uncertainty around future PFAS levels. Based on current available data, the wells from Oak Park wellfield may have PFAS at levels near or slightly above the MCLs. More sampling and analysis is needed to determine the true prevalence, and if these PFAS levels are from one well or multiple wells. The low range estimate assumes treatment for Wells 11 and 12. Although Well 12 has not reported a PFAS level above the MCLs, it is located within the same building and at a similar depth to Well 11. The high range estimate assumes treatment for all wells within Oak Park wellfield, plus an additional 500 gpm (2,100 gpm total) to account for the transfer of Well 5's instantaneous water rights should the City decide to use them in Oak Park under their current water right umbrella. The low range estimate assumes a capital cost of $7,200 per gpm because this value is the average of the high and low estimates developed from the example projects. The high range estimate assumes a capital cost of $5,300 per gpm, recognizing there would be efficiency of scale in building treatment for the full wellfield (5,800 gpm with 500 gpm from Well 5). Therefore, the capital cost estimate for treatment at Oak Park ranges from $16M to $30M.

These planning-level costs are based on the current understanding of water quality and treatment requirements, but are subject to change as more information on these projects develops.

Costs are also assumed for development and execution of planning efforts associated with a PFAS mitigation response. These activities may include actions such as development of a system-wide PFAS response plan, a refined PFAS sampling plan, laboratory sampling and analysis, technology testing, communications and funding support, and other actions identified in Chapter 7. Planning-level costs for PFAS mitigation planning efforts are estimated at $1,000,000. This cost was based on estimates developed by neighboring utilities for their PFAS planning efforts, and from the consultant's experience developing level of efforts for PFAS planning projects with a similar scope.

Section 10.3 – CIP Project Sheets and Cost Summary

New paragraph added at the end of existing text.

Costs associated with PFAS treatment projects are based on the AWWA PFAS National Cost Model Report as described in Section 10.2.8. Costs for PFAS treatment and planning are in January 2024 dollars.

Section 10.3.1 – Supply Project Sheets

New paragraph added at the end of existing text.

To meet federal water quality regulations related to PFAS, mitigation efforts, including planning and treatment, will be required. As described in Section 7.7.1 and 10.2.8, it was assumed that Well 13, Oak Park Wellfield, and Wellfield East would require treatment to achieve PFAS levels below the EPA MCLs. The treatment projects are designated as supply projects as they will help the City maintain a high-quality supply of drinking water for its customers. The project sheets have been added to this document:

- S-8 – PFAS Treatment at Well 13.
- S-9 – PFAS Treatment at Wellfield East.
- S-10 – PFAS Treatment at Oak Park Wellfield.
- S-11 – PFAS Mitigation Planning Efforts.

MODIFICATIONS TO TABLES WITHIN CHAPTER 10

Table 10.7

The following rows are to be inserted into the Table, following Project No. S-7.

Table 10.7 CIP Project Summary
Water System Plan Update
City of Camas

Capital Improvement Program Summary																		
Project No.	SDC Area	Project Name	Developer Share	Total CIP Cost Estimate	CIP Phasing										Project Type		
					2017	2018	2019	2020	2021	2022	2023	2024-2026	2026-2029	2029-2036	Capacity	Upgrade	R&R
Supply																	
S-8	Common	PFAS Treatment at Well 13	0%	$10,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$10,000,000	$ -	$ -	0%	100%	0%
S-9	Common	PFAS Treatment at Wellfield East	0%	$15,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$15,000,000	$ -	0%	100%	0%
S-10	Common	PFAS Treatment at Oak Park Wellfield	0%	$16,000,000-30,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$16,000,000-30,000,000	$ -	0%	100%	0%
S-11	Common	PFAS Mitigation Planning Efforts	0%	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$500,000	$500,000	$ -	0%	100%	0%

Note: Cost estimates shown are in Jan 2024 dollars.

PROJECT SHEETS

The following Project Sheets (beginning on the next page) are to be inserted into the document after Page 10-25, following the last "Supply" project sheet

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification:	S-8	**SDC Area**	Common
Project Name:	PFAS Treatment at Well 13		
Facility Type:	Treatment system		

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 10,000,000	$ 10,000,000
Non-capacity:	0%	$ -	

Project Description:

Treatment system at Well 13 to remove PFAS from the water supply to comply with the federal maximum contaminant levels for PFAS. Treatment would likely be in the form of contact vessels filled with granular activated carbon or ion exchange resin to remove PFAS.

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Project Cost	Developer Share
				30%	25%	20%	10%		
PFAS Treatment at Well 13								$ 10,000,000	

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification: S-8 **SDC Area** Common
Project Name: PFAS Treatment at Well 13
Facility Type: Treatment system

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 10,000,000	$ 10,000,000
Non-capacity:	0%	$ -	

Notes on Cost Estimation:

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Location:

Trigger:

Level of Service Goal	Trigger	Value	Anticipated Need
Water Quality	Promulgation of federal maximum contaminant levels on PFAS and exceedance of maximum contaminant limits.	Water Quality	Short-term

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification:	S-9	**SDC Area**	Common
Project Name:	PFAS Treatment at Wellfield East (Wells 6 & 14)		
Facility Type:	Treatment system		

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 15,000,000	**$ 15,000,000**
Non-capacity:	0%	$ -	

Project Description:

Treatment system at Wellfield East to remove PFAS from the water supply to comply with the federal maximum contaminant levels for PFAS. Treatment would likely be in the form of contact vessels filled with granular activated carbon or ion exchange resin to remove PFAS.

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Project Cost	Developer Share
				30%	25%	20%	10%		
PFAS Treatment capacity at Wellfield East								$ 8,900,000	

City of Camas
Water System Plan Update
Capital Improvement Program

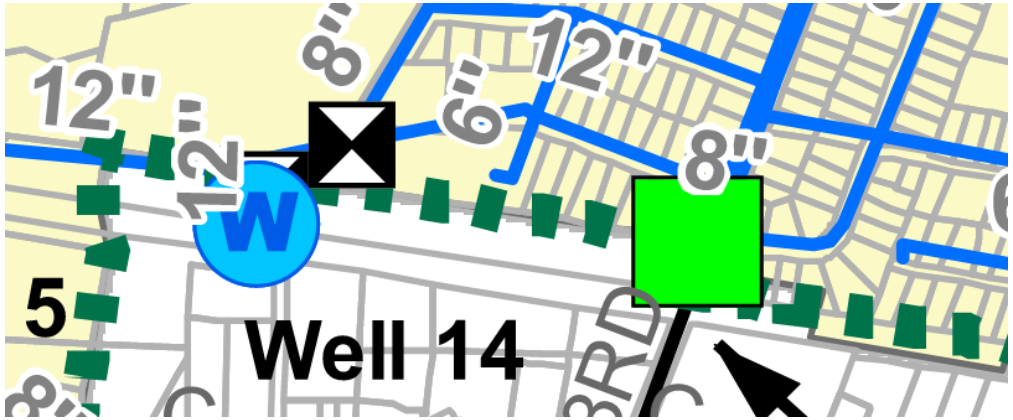
Project Identification:	S-9	**SDC Area**	Common
Project Name:	PFAS Treatment at Wellfield East (Wells 6 & 14)		
Facility Type:	Treatment system		

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 15,000,000	$ 15,000,000
Non-capacity:	0%	$ -	

Notes on Cost Estimation:

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Location:



Trigger:

Level of Service Goal	Trigger	Value	Anticipated Need
Water Quality	Promulgation of federal maximum contaminant levels on PFAS and exceedance of maximum contaminant limits.	Water Quality	Short-term

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification:	S-10	**SDC Area**	Common
Project Name:	PFAS Treatment at Oak Park Wellfield (Wells 7, 8, 10, 11, 12)		
Facility Type:	Treatment system		

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	$ 16,000,000 - 30,000,000
Upgrade:	100%	$ 16M - 30M	
Non-capacity:	0%	$ -	

Project Description:

Treatment system at Oak Park Wellfield to remove PFAS from the water supply to comply with the federal maximum contaminant levels for PFAS. Treatment would likely be in the form of contact vessels filled with granular activated carbon or ion exchange resin to remove PFAS.

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Project Cost	Developer Share
				30%	25%	20%	10%		
PFAS Treatment capacity at Oak Park Wellfield								$ 8,900,000	

City of Camas
Water System Plan Update
Capital Improvement Program

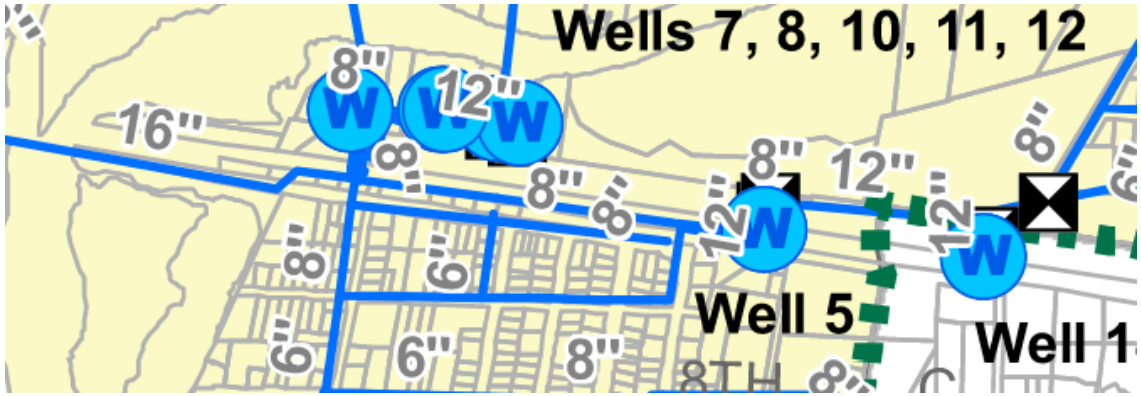
Project Identification: S-10 **SDC Area** Common
Project Name: PFAS Treatment at Oak Park Wellfield (Wells 7, 8, 10, 11, 12)
Facility Type: Treatment system

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	$ 16,000,000 - 30,000,000
Upgrade:	100%	$ 16M - 30M	
Non-capacity:	0%	$ -	

Notes on Cost Estimation:

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Location:



Trigger:

Level of Service Goal	Trigger	Value	Anticipated Need
Water Quality	Promulgation of federal maximum contaminant levels on PFAS and exceedance of maximum contaminant limits.	Water Quality	Mid-term

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification: S-11 **SDC Area** Common
Project Name: PFAS Mitigation Planning Efforts
Facility Type:

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 1,000,000	**$ 1,000,000**
Non-capacity:	0%	$ -	

Project Description:

PFAS mitigation planning efforts may include actions such as development of a system-wide PFAS response plan, a refined PFAS sampling plan, laboratory sampling and analysis, technology testing, communications and funding support, and other actions identified in Chapter 7.

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Project Cost	Developer Share
				30%	25%	20%	10%		
PFAS Mitigation Planning Efforts								$ 1,000,000	

City of Camas
Water System Plan Update
Capital Improvement Program

Project Identification:	S-11	**SDC Area**	Common
Project Name:	PFAS Mitigation Planning Efforts		
Facility Type:			

Cost Allocation	Percent	Cost	Total Cost
Capacity:	0%	$ -	
Upgrade:	100%	$ 1,000,000	**$ 1,000,000**
Non-capacity:	0%	$ -	

Notes on Cost Estimation:

See Section 10.2.8 for cost estimating information, including cost estimating methodologies and contingency factors.

Project Location:

Trigger:

Level of Service Goal	Trigger	Value	Anticipated Need
Water Quality	Promulgation of federal maximum contaminant levels on PFAS and exceedance of maximum contaminant limits.	Water Quality	Short-term and mid-term