

## Technical Memorandum 2 Water Quality Sampling Protocol

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City of Longview

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Subject: City of Longview  
Design of Groundwater Source and Regional Water Treatment Facilities  
Project Task B.2 Deliverable  
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The purpose of this memorandum is to present the water quality sampling protocol described in project Task B.2 in the project scope of work.

Task B.2 requires development of a water quality sampling protocol suitable for the pilot study, the hydrogeology work, and the broader Environmental Risk Assessment described in Task B.7. The City requested, in discussion and decisions made at the inception of this project, that Kennedy/Jenks investigate all feasible raw water sources, Columbia River, Cowlitz River and deep aquifer, for potential regulated contaminants and a prudent listing of other potential contaminants including those of emerging concern to public health. This effort is required by the City to thoroughly, and on an even basis, evaluate contaminant presence and, if present, potential human health risk as described in project Task B.7. This memo presents the water quality sampling and analysis protocol that will be used to collect the data for use in the Environmental Risk Assessment.

### Water Quality Sampling Protocol

Three different types of samples will be collected to support the Environmental Risk Assessment: Phase II Environmental Site Assessment (ESA) samples, groundwater samples, and potential raw water source samples. The objectives and approach for each of these sample types are discussed below.

#### **Phase II ESA Samples**

As part of the Phase II ESA, soil and groundwater samples will be collected from specific locations within the former Mint Farm area. The objective of these samples is to identify potential contaminants in the vicinity of the proposed production wells associated with historical activities at the former Mint Farm. The results from these samples will be used to evaluate potential human health risks associated with the downward migration of potential contaminants to the deep groundwater and to inform the design of the production wells, as appropriate.

The locations of the Phase II ESA samples were identified based on the results of the Phase I ESA, which involved aerial photo and file reviews, interviews, and site visits to identify potential environmental impacts associated with historic activities at the Mint Farm. Based on the Phase I ESA, eleven boring locations are proposed for the Phase II ESA samples. These boring locations are shown on Figure 1 (figures follow report text). At each boring location, shallow (zero to six inches below ground surface) and deep (just above groundwater, approximately 10 to 20 feet below ground surface) soil samples will be collected. A reconnaissance groundwater sample from the first encountered groundwater (i.e., shallow groundwater) will also be collected.

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## **Groundwater Samples**

Shallow and deep groundwater sentinel wells are being installed at specific locations in and around the former Mint Farm area. Seven shallow sentinel wells have already been installed. Eight deep sentinel wells are being installed. The seven shallow sentinel wells will be paired with a deep sentinel well. An additional deep sentinel well will be installed at the location of one of the proposed production wells. The locations of the shallow and deep sentinel wells are shown on Figure 2 (figures follow report text).

One sample will be collected from each of the sentinel wells to characterize shallow and deep groundwater quality in the Mint Farm area. While shallow groundwater is not a drinking water source, the data for the shallow wells will be used in evaluating potential downward migration of contaminants from the shallow to the deep groundwater. In addition to the samples collected for purposes of the Environmental Risk Assessment, the sentinel wells will be used to monitor shallow and deep groundwater quality in the future.

## **Potential Raw Water Source Samples**

One sample will be collected from each of the potential raw water sources for the City to provide a comparison of potential human health risks associated with each of the water sources. The objective of this sampling is to provide comparative concentration data for the same potential contaminants for each of the potential water sources. The three feasible raw water sources available to the City shall be tested under this protocol: Columbia River surface water, Cowlitz River surface water (the current City raw water source) and deep aquifer groundwater. Each of the water sources will be sampled once, with the sampling of all three sources occurring at the same time to avoid potential differences due to seasonal variability.

The Columbia River water sample shall be taken at the Weyerhaeuser intake. This sample should be representative of the surface water quality of the Columbia River, if the City were to use it as a drinking water source. The City previously evaluated the feasibility of installing an intake at another location on the Columbia River near the Longview Fibre intake and found it to be cost prohibitive. Therefore, a single sample from the Weyerhaeuser intake is considered sufficient for purposes of evaluating the Columbia River surface water.

The Cowlitz River water sample shall be taken at the Regional Water Treatment Plant. This sample represents the water quality for the current City raw water source.

The deep aquifer water shall be taken at the Mint Farm Energy well. The Mint Farm Energy well is an active well screened in the deep groundwater at similar depths as and in proximity to the proposed production wells. As such, this existing well should provide a characterization of groundwater quality that is anticipated to be similar to that from the proposed production wells. In addition, a sample will be collected from an active Chinook Ventures production well, if access can be obtained. While the sample from the Chinook Ventures well may not be representative of groundwater conditions within the Mint Farm area, it should provide information about potential contaminants in the deep groundwater located down-gradient from the proposed production wells.

## **Sample Analysis**

Kennedy/Jenks will be the responsible party initiating chain of custody procedures for all samples described above. In this capacity Kennedy/Jenks staff or subconsultants shall conduct all sampling and deliver samples to the laboratory for analysis. At this time the project laboratory preferred by the City is Columbia Analytical Services (CAS). CAS will analyze all samples with the exception of radionuclides and asbestos, which CAS will send to a subcontracting laboratory. CAS has agreed to return sample analytical results

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within three weeks from receipt. Should CAS consistently fail to meet the turn-around deadline, and to avoid serious impact to the project schedule, a different analytical service will be secured for remaining testing.

## Analytes for Water Quality Testing

In order to thoroughly address public health risk and affirm due diligence investigation to the City and the drinking water consuming public in the City, we have organized the sample analyses into three tiers. These tiers were developed to meet the objectives of the different sample types. The three tiers are as follows:

- Tier 1 – Contaminants of concern potentially to be found due to historic activities at the former Mint Farm
- Tier 2 – Contaminants of concern potentially to be found in shallow and deep groundwater samples
- Tier 3 - Contaminants of concern potentially to be found in raw water source samples.

### **Tier 1 Analytes**

The Tier 1 analytes are listed in Table 1. These analytes were identified based on the results of the Phase I ESA, which identified potential environmental impacts associated with historical activities at the Mint Farm. This list of analytes includes petroleum products, volatile and semi-volatile organics, pesticides and herbicides, and metals. The Phase II ESA samples will be analyzed for the Tier 1 analytes.

### **Tier 2 Analytes**

The Tier 2 analytes are listed in Table 2. This list includes analytes regulated by the State of Washington Department of Health (DOH) Office of Drinking Water. Because raw water sources are being sampled and analyzed, disinfection byproducts are not included as analytes. Also included is an extended list of synthetic organic chemicals that will be analyzed in the same analytical runs as the regulated synthetic organics, as well as other contaminants that may potentially be present in shallow and/or deep groundwater due to historic activities in the area. Analytes and methods are listed in the attached Tier 2 summary table. The groundwater samples collected from the shallow and deep sentinel wells and the potential raw water source samples will be analyzed for the Tier 2 analytes.

### **Tier 3 Analytes**

The Tier 3 analytes are listed in Table 3. This list includes unregulated contaminants that may be present in drinking water sources, in general, but are not specifically related to historic or current activities in the Mint Farm area. Because this list includes a variety of contaminants with different potential sources, for clarity, the Tier 3 analytes have been divided into four categories:

Category 1 - Synthetic organic chemicals that are not included in extensions of the analytical methods for regulated chemicals

Category 2 - Compounds that are endocrine disruptors and personal care products that are primary indicators of potential wastewater impacts

Category 3 - Additional endocrine disruptors and personal care products

Category 4 – Compounds that are in a class of flame-retardant chemicals currently under regulatory scrutiny (but are not regulated), termed polybrominated diphenyl ethers.

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## Cost of Analysis

Tables 1 through 3 also show CAS cost of analysis for the analytes included in each tier. The following table summarizes the costs for each of the proposed sample types.

**Table 4: Summary of Sampling and Analysis Costs**

Analyte Tier	Sample Types ( <i>Sites Sampled</i> )	Cost
1	Phase II ESA Samples (10 borings – shallow and deep soil, groundwater)	\$34,127
2	Groundwater Samples (7 shallow and 8 deep sentinel wells)	\$65,535
2 and 3	Potential Raw Water Source Samples (2 surface water, Mint Farm Energy well, and Chinook Ventures well samples)	\$28,616
	Grand Total =	\$128,278

Kennedy/Jenks has requested data from CAS in an electronic data deliverable (EDD) format. Ideally, CAS will provide the data in the EQUIS database EDD format. Kennedy/Jenks is currently in dialogue with CAS on the data formats and any costs associated with this form of data delivery. We believe that any initial, extra cost for this data formatting will be offset by cost savings in producing deliverables for the City and maintaining overall quality control.

## Additional Monitoring

The data collected under the water quality sampling and analysis protocol described in this memo will support the Environmental Risk Assessment. The data will be used to evaluate whether chemicals in soil and groundwater could result in unacceptable risks to human health if the Mint Farm groundwater were used as a drinking water source for the City. Additional sampling and analysis protocols will be developed based on the results of this initial sampling. Because the additional monitoring will be dependent on the outcome of the initial sampling, specific sample types, numbers, and analytes have not yet been determined. However, it is anticipated that the additional monitoring will include ongoing sampling of at least some of the sentinel wells after the production wells are in use to assess potential contaminant migration towards the production wells. Additional monitoring could also include further sampling of the sample types included in the initial sampling for confirmation and statistical purposes, modification of analyte lists based on the results of the initial sampling, or installation of additional sentinel wells based on the results of the groundwater model. The exact nature of the additional monitoring will depend on the results of the initial sampling and the upcoming modeling efforts. The additional monitoring will be informed by available data and will evolve, as necessary, as additional data become available.



# Proposed Well Monitoring and Development at the Mint Farm Water Treatment Plant







 Deep and Shallow Monitoring Wells	 Proposed Mint Farm Risk Assessment Study Area
 Deep Monitoring Wells Only	 Preliminary Location of Production Wells

FIGURE 2