REQUEST FOR PROPOSALS (RFP) FOR GROUNDWATER AND SURFACE WATER MONITORING AT COUNTY OWNED MUNICIPAL SOLID WASTE FACILITIES
RFP NO. 2024 – PW2

PROPOSAL DUE DATE: September 12, 2024, prior to 3:00 P.M. *Pacific Time*, Kelso, Washington, USA.

Faxed or E-mailed bids will not be accepted.

ESTIMATED TIME PERIOD FOR CONTRACT: October 14, 2024 – December 31, 2026.
The County reserves the right to extend the contract for two (2) additional one-year periods at the sole discretion of the County.

CONSULTANT ELIGIBILITY: This procurement is open to those consultants that satisfy the minimum qualifications stated herein and that are available for work in Washington State.

CONTENTS OF THE REQUEST FOR PROPOSALS:

TABLE OF CONTENTS

TABLE OF CONTENTS – continued

IV. EVALUATION AND CONTRACT AWARD

V. RFP EXHIBITS

**Numbered independently

I. INTRODUCTION

A. PURPOSE

Cowlitz County is hereby soliciting proposals to establish pricing for landfill groundwater and surface water detection monitoring services. Services will include but not limited to landfill groundwater and surface water detection monitoring of the active and closed cells within the two County owned municipal solid waste landfills.

The County intends to award one (1) agreement to provide services outlined in this RFP.

B. QUALIFICATIONS AND MINIMUM REQUIREMENTS

All firms submitting proposals under this RFP shall demonstrate the knowledge, skills, and experience necessary to meet or exceed the following minimum requirements:

1. Must be registered to conduct business in Washington State;
2. Must be bonded and insured;
3. Must provide all personnel, mobile equipment, transportation, supplies, tools, and materials necessary to successfully perform the services detailed in this RFP in accordance with all national, state and/or local rules that apply;
4. Must obtain and maintain the required materials, equipment, and resources necessary to perform the services outlined in the Scope of Work. The Proposer shall be directly responsible for completion of no less than 35% of the work to be performed.

C. SCOPE OF WORK

The consultant will provide all management, materials, equipment, labor and other items necessary to provide various testing services for permit compliance of the County owned landfills as needed. The quantity and duration of testing services will depend on the County's requirements and needs for these services.

The services to be provided include but are not limited to, any or all of the following:

1) Project Management and Coordination
   a) Provide a designated Project Manager for the duration of any task order.
   b) Scheduling and coordination of services to meet sampling and reporting frequencies and deadlines.
   c) Provide test reports for inclusion into the project files.
   d) Provide final reports to the County.

2) Sampling and Analysis Plans

Sampling and Analysis Plans have been prepared by Bright Fields Groundwater, Inc. for Cowlitz County's Tennant Way Landfill, and the Headquarters Landfill. These Sampling and Analysis Plans have been approved by the Cowlitz County Environmental Health Unit and the Washington State Department of Ecology.

3) Groundwater and Surface Water Monitoring

The Consultant shall perform all sampling, data management, and reporting in accordance with the approved Sampling and Analysis Plans.

4) Billing

a) Proposer will bill Cowlitz County Public Works, 1600 13th Ave S, Kelso, WA 98626 monthly for any work performed in the calendar month, not later than 14 days after the end of the billing month.

b) Billing must be calculated in strict accordance with the pricing provided by the Proposer.

D. COOPERATIVE PURCHASING

Cowlitz County has made this Request for Proposal subject to Washington State statute RCW 39.34. Therefore, the proposer may, at the proposers' option, extend identical prices and services to other public agencies wishing to participate in this RFP. Each public agency wishing to utilize the contract that results from this RFP will be binding only their agency. Each contract is between the proposer and the individual agency with no liability to Cowlitz County.

E. PERIOD OF PERFORMANCE

The period of performance of any contract resulting from this RFP is tentatively scheduled to begin on or about October 14, 2024, and continue through December 31, 2026. The County reserves the right to extend the contract for up to two (2) additional one-year periods at the sole discretion of the County.

F. CONTRACTING WITH FORMER WASHINGTON PUBLIC EMPLOYEES

Washington State Department of Retirement System reporting requirements apply to public entities contracting with former Washington public employees pursuant to WAC 415-02-110, DRS Email 13-011 and DRS Email 09-001. Proposers should familiarize themselves with these reporting requirements to the County before submitting a proposal that includes former public employees. Information regarding these requirements can be found on the WA Department of Retirement System's Independent Contractor Verification and State Retirement Status Reporting Form located on the last page of this document.

G. DEFINITIONS

Definitions for the purposes of this RFP include:
Apparent Successful Contractor – The consultant selected as the entity to perform the anticipated services, subject to completion of contract negotiations and execution of a written contract.

COUNTY – COWLITZ is the COUNTY in the state of Washington that is issuing this RFP.

Proposal – A formal offer submitted in response to this solicitation.

Proposer - Individual or company that submits a proposal in order to attain a contract with the COUNTY. May also be seen in this document as Vendor, Contractor, Consultant, Licensee, etc.

Request for Proposals (RFP) – Formal procurement document in which a service or need is identified but no specific method to achieve it has been chosen. The purpose of an RFP is to permit the consultant community to suggest various approaches to meet the need at a given price.

H. ADA

Cowlitz County in accordance with Section 504 of the Rehabilitation Act (Section 504) and the Americans with Disabilities Act (ADA), commits to nondiscrimination on the basis of disability, in all of its programs and activities. This material can be made available in an alternate format by emailing Cowlitz County Department of Public Works at Publicworks@cowlitzwa.gov or by calling 360-577-3030.

I. TITLE VI STATEMENT

Cowlitz County in accordance with provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

II. GENERAL INFORMATION FOR CONSULTANTS

A. RFP COORDINATOR

The RFP Coordinator is the sole point of contact in the County for this procurement. All communication between the Consultant and the County upon release of this RFP shall

be with the RFP Coordinator, as follows:

Name	Roger Maurer
E-mail Address	Maurerr@cowlitzwa.gov
Mailing Address	1600 13th Avenue S, Kelso, WA 98626
Phone Number	360-577-3030
Fax Number	N/A

Any other communication will be considered unofficial and non-binding on the County. Consultants are to rely on written statements issued by the RFP Coordinator. Communication directed to parties other than the RFP Coordinator may result in disqualification of the Consultant.

B. ESTIMATED SCHEDULE OF PROCUREMENT ACTIVITIES

Issue Request for Proposals	August 14, 2024
Question & answer period ends	August 29, 2024
Issue last addendum to RFP	September 5, 2024
Proposals due	September 12, 2024
Begin contract work	October 14, 2024

The County reserves the right to revise the above schedule.

C. PRE-PROPOSAL CONFERENCE

There will be NO pre-proposal conference held for this RFP.

The County will be bound only to the County's written answers to questions. Questions arising in subsequent communication with the RFP Coordinator will be documented and answered in written form. A copy of the questions and answers will be sent to each prospective Consultant that has made the RFP Coordinator aware of its interest in this procurement.

D. SUBMISSION OF PROPOSALS

Proposers are required to submit five (5) copies of their proposal. Two copies must have original signatures. The proposal, whether mailed or hand delivered, must physically arrive at the COUNTY and to the below noted person and location, no later than **3:00 PM** Pacific Time on **September 12, 2024**.

The proposal is to be sent the address noted below. The envelope should be clearly marked:

Attn: Roger Maurer
GROUNDWATER AND SURFACE WATER MONITORING
AT COUNTY OWNED MUNICIPAL SOLID WASTE FACILITIES
RFP No. 2024 - PW2
1600 13th Avenue S.
Kelso, WA 98626

Consultants mailing proposals should allow normal mail delivery time to ensure timely receipt of their proposals by the RFP Coordinator. Consultants assume the risk for the method of delivery chosen. The County assumes no responsibility for delays caused by any delivery service. Proposals may not be transmitted using email or facsimile transmission.

Late proposals will not be accepted and will be automatically disqualified from further consideration. All proposals and any accompanying documentation become the property of the County and will not be returned.

E. PROPRIETARY INFORMATION/PUBLIC DISCLOSURE

Proposals submitted in response to this competitive procurement shall become the property of the County and shall be deemed public records as defined in Chapter 42.56 of the Revised Code of Washington (RCW).

Any information in the proposal that the Consultant desires to claim as proprietary and exempt from disclosure under the provisions of Chapter 42.56 RCW, or other state or federal law that provides for the nondisclosure of your document, must be clearly designated. The information must be clearly identified and the particular exemption from disclosure upon which the Consultant is making the claim must be cited. Each page containing the information claimed to be exempt from disclosure must be clearly identified by the words “Proprietary Information” printed on the lower right-hand corner of the page. Marking the entire proposal exempt from disclosure or as Proprietary Information will not be honored.

If a public records request is made for the information that the Consultant has marked as "Proprietary Information," the County will notify the Consultant of the request and of the date that the records will be released to the requester unless the Consultant obtains a court order enjoining that disclosure. If the Consultant fails to obtain the court order enjoining disclosure, the COUNTY will release the requested information on the date specified. If a Consultant obtains a court order from a court of competent jurisdiction enjoining disclosure pursuant to Chapter 42.56 RCW, or other state or federal law that provides for nondisclosure, the County shall maintain the confidentiality of the Consultant's information per the court order.

A charge will be made for copying and shipping, as outlined in RCW 42.56. No fee shall be charged for inspection of contract files, but twenty-four (24) hours' notice to the RFP Coordinator is required. All requests for information should be directed to the RFP Coordinator.

F. REVISIONS TO THE RFP

In the event it becomes necessary to revise any part of this RFP, addenda will be provided via e-mail to all individuals who have made the RFP Coordinator aware of their interest. Addenda will also be published on http://www.co.cowlitz.wa.us/bids.aspx. For this purpose, the published questions and answers and any other pertinent information shall be provided as an addendum to the RFP and will be placed on the website. If you downloaded this RFP from the County website you are responsible for sending your name, e-mail address, and telephone number to PublicWorks@cowlitzwa.gov in order for your organization to receive any RFP addenda.

The County also reserves the right to cancel or to reissue the RFP in whole or in part, prior to execution of a contract.

G. MINORITY & WOMEN-OWNED BUSINESS PARTICIPATION

Cowlitz County encourages participation in all of its contracts by firms certified by the Office of Minority and Women's Business Enterprises (OMWBE). Participation may be either on a direct basis in response to this solicitation or on a subcontractor basis. However, no preference will be included in the evaluation of proposals, no minimum level of MWBE participation shall be required as a condition for receiving an award, and proposals will not be rejected or considered non-responsive on that basis.

H. ACCEPTANCE PERIOD

Proposals must provide 60 days for acceptance by County from the due date for receipt of proposals.

I. RESPONSIVENESS

All proposals will be reviewed by the RFP Coordinator to determine compliance with administrative requirements and instructions specified in this RFP. The Consultant is specifically notified that failure to comply with any part of the RFP may result in rejection of the proposal as non-responsive.

Proposers must respond to all sections to be considered. The County also reserves the right at its sole discretion to waive minor administrative irregularities.

J. AMBIGUOUS STATEMENTS

All responses to Proposal requirements should be stated as concisely as possible. Ambiguous statements such as "all reasonable effort to provide" and the like may be grounds to declare the proposal non-responsive.

K. BACKGROUND INVESTIGATION

By submitting a proposal in response to this Request for Proposals, you are giving permission to the County to investigate your company and background with regard to any matter bearing on the desirability of the County doing business with you. The results of the investigation may be taken into consideration by the County in making its decision.

L. MOST FAVORABLE TERMS

The County reserves the right to make an award without further discussion of the proposal submitted. Therefore, the proposal should be submitted initially on the most favorable terms which the Consultant can propose. There will be no best and final offer procedure. The County does reserve the right to contact a Consultant for clarification of its proposal.

The Apparent Successful Contractor should be prepared to accept this RFP for incorporation into a contract resulting from this RFP. Contract negotiations may incorporate some or all of the Consultant's proposal. It is understood that the proposal will become a part of the official procurement file on this matter without obligation to the County, and that the public may view proposal documents.

M. CONTRACT AND GENERAL TERMS & CONDITIONS

The apparent successful contractor will be expected to enter into a contract which is substantially the same as the sample of County's standard services agreement and in accordance with the general terms and conditions therein, attached as Exhibit C to this solicitation. The County may enter into negotiation discussions on the services agreement with the objective of reaching agreement on all provisions, including contract terms and conditions within the sample services agreement. In the event such negotiations are not successful, the next highest ranked firm will be contacted for negotiations. This process may be continued until a contract is successfully negotiated or the County rejects all proposals. The Consultant may submit proposed exceptions as allowed in the Certifications and Assurances form, Exhibit B to this solicitation. All exceptions to the contract terms and conditions must be submitted by Consultant as an attachment to Exhibit B, Certifications and Assurances form, or the terms and conditions of the sample standard contract shall be deemed accepted, as attached. **The County will review requested exceptions and accept or reject the same at its sole discretion in awarding the contract.**

N. ORAL AGREEMENTS

No oral agreement or conversation with the County or any official, employee, or agent of Cowlitz County, either before or after execution of a contract, shall affect, modify, or add to any of the terms or obligations contained in the contract documents. Any such oral agreement or conversation shall be considered as unofficial information and in no way binding upon Cowlitz County, unless subsequently put in writing.

O. COSTS TO PROPOSE

The County will not be liable for any costs incurred by the Consultant in preparation of a proposal submitted in response to this RFP, in conduct of a presentation, or any other activities related to responding to this RFP.

P. NO OBLIGATION TO CONTRACT

This RFP does not obligate the County to contract for services specified herein.

Q. REJECTION OF PROPOSALS

The County reserves the right at its sole discretion to reject any and all proposals received without penalty and not to issue a contract as a result of this RFP.

R. COMMITMENT OF FUNDS

The Board of County Commissioners or duly elected official are the only individual(s) who may legally commit the County to the expenditures of funds for a contract resulting from this RFP. No cost chargeable to the proposed contract may be incurred before receipt of a fully executed contract.

S. ELECTRONIC PAYMENT

Cowlitz County prefers to utilize electronic payment such as EFT (Electronic Funds Transfer) or ACH (Automated Clearing House) in its transactions. The successful contractor will be provided a form to complete with the contract to authorize such payment methods.

T. INSURANCE COVERAGE

The Contractor is to furnish the County with a certificate(s) of insurance executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements set forth below.

The Contractor shall, at its own expense, obtain and keep in force insurance coverage which shall be maintained in full force and effect during the term of the contract. The Contractor shall furnish evidence in the form of a Certificate of Insurance that insurance shall be provided, and a copy shall be forwarded to the County within fifteen (15) days of the contract effective date.

The Contractor shall maintain in full force and effect during the term of this Agreement, and until final acceptance of the work, public liability and property damage insurance with companies or through sources approved by the state insurance commissioner pursuant to RCW Title 48, as now or hereafter amended. The County, its appointed and elected officials, agents and employees, shall be specifically named as additional insureds in a policy with the same company which insures the Contractor or by endorsement to an existing policy or with a separate carrier approved pursuant to RCW

Title 48, as now or hereafter amended, and the following coverages shall be provided:

☒ COMPREHENSIVE GENERAL LIABILITY:		
Bodily injury, including death, property damage	$1,000,000	per occurrence
	$2,000,000	aggregate
☒ WORKERS COMPENSATION:	Statutory amount	
☒ AUTOMOBILE LIABILITY: coverage on owned, limit non-owned, rented and hired vehicles. Including bodily injury, death and property damage	$1,000,000	combined single
☒ EMPLOYER'S LIABILITY/STOP GAP	$1,000.000	per occurrence
Can be endorsement or standalone policy		
☒ UMBRELLA LIABILITY	$5,000,000	
Applies over all liability policies without exception		
☒ POLLUTION AND ASBESTOS LIABILITY	$1,000,000	combined
single limit Bodily injury, property damage, environmental damage including related clean-up costs		

All Contractor's and Contractor's subcontractors' insurance policies and additional named insured endorsements shall provide primary insurance coverage and be non-contributory.

Any insurance, self-insured retention, deductible, risk retention or insurance pooling maintained or participated in by the County shall be excess and not contributory to such insurance policies. All Contractor's and Contractor's subcontractors' liability insurance policies must be endorsed to show this primary coverage.

Upon request, the Contractor shall provide a full and complete certified copy of all requested insurance policies to the County. The County reserves the right, but not the obligation, to revise any insurance requirement, not limited to limits, coverages and endorsements, or to reject any insurance policies which fail to meet the requirements of this Agreement. Additionally, the County reserves the right, but not the obligation, to review and reject any proposed insurer providing coverage based upon the insurer's financial condition or licensing status in Washington. Any deductibles and/or self-insured retentions exceeding $10,000, stop loss provisions, and/or exclusions contained in such policies must be approved by the County in writing. For any deductibles or self-insured retentions exceeding $10,000 or any stop-loss provisions, the County shall have the right to request and review the Contractor's most recent annual financial reports and audited financial statements as a condition of approval.

Contractor hereby agrees to waive subrogation with respect to each insurance policy maintained under this Agreement. When required by an insurer, or if a policy condition does not permit Contractor to enter into a pre-loss agreement to waive subrogation without an endorsement, then Contractor agrees to notify the insurer and obtain such endorsement. This requirement shall not apply to any policy which includes a condition expressly prohibiting waiver of subrogation by the insured or which voids coverage

should the Contractor enter into such a waiver of subrogation on a pre-loss basis.

With the exception of Professional Liability coverage, the County, its departments, elected and appointed officials, employees, agents and volunteers shall be named as additional insureds on Contractor's and Contractor's subcontractors' insurance policies by way of endorsement for the full available limits of insurance maintained by the Contractor and subcontractor, and all coverage shall be primary and non-contributory. A statement or notation of additional insured status on a Certificate of Insurance shall not satisfy these requirements. [This endorsement shall not be required if the Contractor is a governmental entity and is insured through a governmental entity risk pool authorized by the State of Washington.]

The Contractor shall, for each required insurance policy, provide a Certificate of Insurance, with endorsements attached, evidencing all required coverages, limits, deductibles, self-insured retentions, and endorsements and which is conditioned upon the County receiving thirty (30) days prior written notice of reduction in coverages, cancellation or non-renewal. Each Certificate of Insurance and all insurance notices shall be provided to: ATTN: Risk Manager, Cowlitz County Administrative Svc., 207 4th Ave. N., Kelso, WA 98626. This Agreement shall be void ab initio if the proof of coverage is not timely supplied.

The insurance maintained under this Agreement shall not in any manner limit or qualify the liabilities or obligations of the Contractor under this Agreement. All insurance policy deductibles and self-insured retentions for policies maintained under this Agreement shall be paid by the Contractor.

Compensation and/or payments due to the Contractor under this Agreement are expressly conditioned upon the Contractor's strict compliance with all insurance requirements. Payment to the Contractor shall be suspended in the event of non-compliance. Upon receipt of evidence of Contractor's compliance, payments not otherwise subject to withholding or set-off will be released to the Contractor. This Agreement shall be void ab initio if the proof of coverage is not timely supplied.

If the Errors and Omissions or Professional Liability insurance obtained is an occurrence policy as opposed to a claims-made policy, the Extended Reporting Period Endorsement is not required.

The Contractor will at all times comply with all applicable workers' compensation, occupational disease, and occupational health and safety laws, statutes, and regulations to the full extent applicable. The County will not be held responsible in any way for claims filed by the Contractor or their employees for services performed under the terms of this contract.

The fact that insurance (including, without limitation, self-insurance) is obtained by Licensee shall not be deemed to release or diminish the liability of Licensee, including, without limitation, liability under the indemnity provisions of this License. Damages recoverable by Licensor shall not be limited by the amount of the required insurance coverage.

III. PROPOSAL CONTENTS

Interested companies shall submit a proposal which exhibits and substantiates extensive knowledge of and experience providing the detailed scope of services to clients. Proposals must be clear, concise, and shall not exceed fifteen (15) pages, excluding resumes, coversheet, and cost proposal. The proposal shall include all items below, in the following order:

A. COVER SHEET/CERTIFICATIONS AND ASSURANCES

The Cover Sheet (Exhibit A to this RFP) and Certifications and Assurances form (Exhibit B to this RFP) must be signed and dated by a person authorized to legally bind the Consultant to a contractual relationship, e.g., the President or Executive Director if a corporation, the managing partner if a partnership, or the proprietor if a sole proprietorship.

B. PROJECT TEAM

Please provide business/individual resumes, year's company has been in service, and how long your key staff have been with the company, any relevant certifications, or licenses that are held by the business or staff and up to three (3) references that demonstrate similar work (e.g., work for a local government agency or work of a similar nature).

The Contractor shall provide a list of all subcontractors to be used, if any; and what percentage of the work will be performed by each subcontractor. Subcontractor information should include the company name, UBI number, address, phone number, email, and contact person.

Prime contractors must perform at least 35 percent of the work in the contract.

C. RELEVANT PROJECT EXPERIENCE

List at least three (3) specific projects completed by the firm within the past five (5) years that are similar to the services requested in this solicitation. For each project listed, provide: a brief description, the names of the project manager and key personnel, project start and end dates, initial budget and final cost, and client name and contact information.

D. REFERENCES

Provide a list of references consisting of at least three (3) clients to which the firm has provided services within the last five (5) years. For each client listed, identify the specific services provided and the inclusive dates doe provision of services (contract period). Also provide for each client listed a valid contact name to be used as a reference, company and department name, title, full mailing address, email and telephone number. Note that references for government and/or public agencies are preferred. The County reserves the right to check other references that were not submitted.

E. COST PROPOSAL

Proposers shall complete and submit a table that includes the following:

- Quarterly Sampling.
- Quarterly Data Management and Reporting (Quarters 1, 2 and 3).
- Fourth Quarter Data Management and Annual Reporting.
- Billing Rates for Additional Tasks.

IV. EVALUATION AND CONTRACT AWARD

A. EVALUATION PROCEDURE

Responsive proposals will be evaluated strictly in accordance with the requirements stated in this solicitation and any addenda issued. The evaluation of proposals shall be accomplished by an evaluation team(s), to be designated by the County, which will determine the ranking of the proposals.

The County, at its sole discretion, may elect to select the top-scoring firms as finalists for an oral presentation. The RFP Coordinator may contact the Consultant for clarification of any portion of the Consultant's proposal.

B. EVALUATION WEIGHTING AND SCORING

The following weighting and points will be assigned to the proposal for evaluation purposes:

Technical and Management Proposal - 65% of total score			**65**	**points**
Qualifications and Capability of the Firm and Key Personnel	25	maximum points		
Firm's Experience on similar projects for Groundwater and Surface Water Testing and Monitoring	20	maximum points		
References	10	maximum points		
Ability to respond as needed and proximity	5	maximum points		
Responsiveness	5	maximum points		
Cost Proposal - 35% of total score			**35**	**points**
TOTAL			**100**	**points**

The County reserves the right to award the contract to the Consultant whose proposal is deemed to be in the best interest of the County.

C. ORAL PRESENTATIONS (MAY BE REQUIRED)

The County may, after evaluating the written proposals, elect to schedule oral presentations of the finalists. Should oral presentations become necessary, the County will contact the top-scoring firm(s) from the written evaluation to schedule a date, time and location. Commitments made by the Consultant at the oral interview, if any, will be considered binding.

The oral presentation will determine the apparent successful contractor OR the scores from the written evaluation and the oral presentation combined together will determine the apparent successful contractor.

D. NOTIFICATION TO PROPOSERS

The County will notify the Apparently Successful Contractor of their selection in writing upon completion of the evaluation process. Individuals or firms whose proposals were not selected for further negotiation or award will be notified separately by e-mail.

E. DEBRIEFING OF UNSUCCESSFUL PROPOSERS

Any Consultant who has submitted a proposal and been notified that they were not selected for contract award may request a debriefing. The request for a debriefing conference must be received by the RFP Coordinator within three (3) business days after the Unsuccessful Consultant Notification is e-mailed or faxed to the Consultant. Debriefing requests must be received by the RFP Coordinator no later than 5:00 PM, local time, in Kelso, Washington on the third business day following the transmittal of the Unsuccessful Consultant Notification. The debriefing must be held within three (3) business days of the request.

Discussion at the debriefing conference will be limited to the following:

1. Evaluation and scoring of the firm's proposal;
2. Critique of the proposal based on the evaluation;
3. Review of proposer's final score in comparison with other final scores without identifying the other firms.

Comparisons between proposals or evaluations of the other proposals will not be allowed. Debriefing conferences may be conducted in person, virtually, or on the telephone and will be scheduled for a maximum of one hour.

F. PROTEST PROCEDURE

Protests may be made only by Consultants who submitted a response to this solicitation document and who have participated in a debriefing conference. Upon completing the debriefing conference, the Consultant is allowed three (3) business days to file a protest of the acquisition with the RFP Coordinator. Protests must be received by the RFP Coordinator no later than 4:30 PM, local time, at 1600 13th Avenue S, Kelso, WA 98626 on the third business day following the debriefing. Protests may be submitted by e-mail but must then be followed by the document with an original signature.

Consultants protesting this procurement shall follow the procedures described below. Protests that do not follow these procedures shall not be considered. This protest procedure constitutes the sole administrative remedy available to Consultants under this procurement.

All protests must be in writing, addressed to the RFP Coordinator, and signed by the protesting party or an authorized Agent. The protest must state the RFP number, the grounds for the protest with specific facts and complete statements of the action(s) being protested. A description of the relief or corrective action being requested should also be included.

Only protests stipulating an issue of fact concerning the following subjects shall be considered:

1. A matter of bias, discrimination or conflict of interest on the part of an evaluator;
2. Errors in computing the score;
3. Non-compliance with procedures described in the procurement document or County policy.

Protests not based on procedural matters will not be considered. Protests will be rejected as without merit if they address issues such as: 1) an evaluator's professional judgment on the quality of a proposal, or 2) County's assessment of its own and/or other agencies needs or requirements.

Upon receipt of a protest, a protest review will be held by the County. The County Purchasing Manager or an employee delegated by the Purchasing Manager who was not involved in the procurement will consider the record and all available facts and issue a decision within five (5) business days of receipt of the protest. If additional time is required, the protesting party will be notified of the delay.

In the event a protest may affect the interest of another Consultant that also submitted a proposal, such Consultant will be given an opportunity to submit its views and any relevant information on the protest to the RFP Coordinator.

The final determination of the protest shall:

1. Find the protest lacking in merit and uphold the County's action; or
2. Find only technical or harmless errors in the County's acquisition process and determine the County to be in substantial compliance and reject the protest; or
3. Find merit in the protest and provide the County options which may include:
4. Correct the errors and re-evaluate all proposals, and/or
5. Reissue the solicitation document and begin a new process, or
6. Make other findings and determine other courses of action as appropriate.

If the County determines that the protest is without merit, the County will enter into a contract with the apparently successful contractor. If the protest is determined to have merit, one of the alternatives noted in the preceding paragraph will be taken.

V. RFP EXHIBITS

EXHIBIT A – COVER SHEET

Legal Name of Company: _____

Address: _____

Contact Person: _____

Title: _____ **Phone:** _____

Email: _____

Unified Business Identifier (UBI) Number: _____

Receipt of Addenda
Contractor hereby acknowledges receipt and review of all Addenda through No. _____

Project Compliance
In compliance with the request for quotation, bidder hereby proposes to perform all work for this project in strict accordance with the contract documents, within the time set forth therein, and at the prices bid.

☐ YES ☐ NO

Specification Compliance
The Contractor certifies below that his proposal complies in all respects with the attached specification documents, including the minimum specifications. *If no, attached additional pages detailing deviations.

☐ YES ☐ NO

Beneficial Interest Disclosure Statement
In accordance with Chapter 42.23 RCW Contractors must disclose all personal relatives, or any relatives of the Contractor's employees or subcontractors, who are presently employed by Cowlitz County, or who stand to realize any financial gain, or beneficial interest, if this contract is awarded to the Contractor or any subcontractor of the bidder for the work of this request for proposals. The Contractor certifies below that there are no persons, meeting the criteria above, have any beneficial interest in this project. *If no, attach additional pages detailing the name of any person, organization, relationship, and/or interest.

☐ YES ☐ NO

I certify that to the best of my knowledge the information contained in this proposal is accurate and complete and that I have the legal authority to commit this agency to a contractual agreement. I realize the final funding for any service Is based upon funding levels, and the approval of the Board of County Commissions of Cowlitz County.

Signature of Authorized Person: _____

Print Name and Title: _____

Date: _____

EXHIBIT B – CERTIFICATIONS AND ASSURANCES

CERTIFICATIONS AND ASSURANCES

I/we make the following certifications and assurances as a required element of the proposal to which it is attached, understanding that the truthfulness of the facts affirmed here and the continuing compliance with these requirements are conditions precedent to the award or continuation of the related contract:

1. I/we declare that all answers and statements made in the proposal are true and correct.
2. The prices and/or cost data have been determined independently, without consultation, communication, or agreement with others for the purpose of restricting competition. However, I/we may freely join with other persons or organizations for the purpose of presenting a single proposal.
3. The attached proposal is a firm offer for a period of 60 days following receipt, and it may be accepted by the COUNTY without further negotiation (except where obviously required by lack of certainty in key terms) at any time within the 60-day period.
4. I/we understand that the COUNTY will not reimburse me/us for any costs incurred in the preparation of this proposal. All proposals become the property of the COUNTY, and I/we claim no proprietary right to the ideas, writings, items, or samples, unless so stated in this proposal.
5. Unless otherwise required by law, the prices and/or cost data which have been submitted have not been knowingly disclosed by the Proposer and will not knowingly be disclosed by him/her prior to opening, directly or indirectly, to any other Proposer or to any competitor.
6. I/we agree that submission of the attached proposal constitutes acceptance of the solicitation contents and the attached sample contract and general terms and conditions. If there are any exceptions to these terms, I/we have described those exceptions in detail on a page attached to this document.
7. No attempt has been made or will be made by the Proposer to induce any other person or firm to submit or not to submit a proposal for the purpose of restricting competition.
8. I/we grant the COUNTY the right to contact references and other, who may have pertinent information regarding the ability of the Consultant and the lead staff person to perform the services contemplated by this RFP.
9. If any staff member(s) who will perform work on this contract has retired from the State of Washington under the provisions of the 2008 Early Retirement Factors legislation, his/her name(s) is noted on a separately attached page.

We (circle one) **are / are not** submitting proposed Contract exceptions. (See Section II, Contract and General Terms and Conditions.) If Contract exceptions are being submitted, I/we have attached them to this form.

On behalf of the Consultant submitting this proposal, my name below attests to the accuracy of the above statement.

Signature of Proposer

Title

Date

EXHIBIT C– SAMPLE PERSONAL SERVICES AGREEMENT

PERSONAL SERVICES AGREEMENT

Contract Number:

THIS AGREEMENT is entered into between COWLITZ COUNTY, a political subdivision of the State of Washington, (hereinafter called "County" or "Cowlitz County") and

Name:

Address:

Phone No.:

(hereinafter called "Contractor").

This Agreement is comprised of:

☐ Attachment A – Scope of Work

☐ Attachment B – Compensation

☐ Attachment C – General Conditions

☐ Attachment D – Special Terms and Conditions and Retirement Status Form (signature required)

☐ Attachment E – (specify)

copies of which are attached hereto and incorporated herein by this reference as if fully set forth.

The term of this Agreement shall commence on the day of 20 and shall, unless terminated as provided elsewhere in the Agreement, terminate on the day of , 20 .

IN WITNESS WHEREOF, the parties have executed this Agreement on this day of 20 .

CONTRACTOR:

_____

Print name:

Title:

Date: 20

(Optional for Commissioner Approval

ATTEST:

_____

Kelly Dombrowsky, Clerk of the Board

COWLITZ COUNTY:

_____

Richard R. Dahl, Chairman

_____

Arne Mortensen, Commissioner

_____

Dennis P. Weber, Commissioner

(BOCC approval subject to Board ratification or authorization)

CONTRACT HAS BEEN APPROVED AS TO FORM BY COWLITZ COUNTY PROSECUTING ATTORNEY

[2014_ver. 3]

SCOPE OF WORK

The Contractor agrees to complete the professional services work for Cowlitz County, as described below (or in the attached document), including the following elements:

In the event the Contractor, or its agents or assigns, are unable to complete their work as scheduled, the contract period and compensation may be adjusted by mutual agreement of the County and Contractor.

COMPENSATION

1. ☐ **a**. **FIXED FEE FOR SERVICE:** For services rendered, the County shall pay to the Contractor a fixed fee of DOLLARS ($) for the completed work set forth in Attachment "A.". Payments for completed tasks shall be made no more frequently than ☐ bi-monthly; ☐ quarterly; ☐ semi-annually; ☐ annually; ☐ at completion of project; ☐ other (specify):

Each request for payment shall be supported by an invoice specifying the tasks completed up to the request for payment and the payment amount requested. In no event shall payment be sought in an amount which represents a percentage of the fee greater than the percentage of completed tasks.

OR

☐ **b. HOURLY RATES:** For services rendered, the County shall compensate the Contractor at the following hourly rates:

Name/Position	***Hourly Rate***

Payments for completed tasks shall be made no more frequently than ☐ monthly; ☐ quarterly; ☐ semi-annually; ☐ annually; ☐ at completion of project; ☐ other (specify):

Each request for payment shall be supported by an invoice specifying: the name/position of the Contractor's employee if two or more are identified above; number of hours worked; completed tasks for which compensation is sought and; payment amount requested.

In no event shall Contractor be compensated in excess of DOLLARS for the completed work set forth in Attachment "A."

2. AND

☐ **a.** The compensation set forth herein includes, without limitation: labor, materials, equipment, travel, telephone, computer, copiers and the like.

OR

☐ **b.** The County shall reimburse the Contractor for actual expenses incurred for travel, telephone, copiers and computer. Reimbursement for airfare, mileage, meals and/or accommodations shall be at the same rate as that applicable to county employees traveling on county business.

OR

☐ **c.** Other (specify) The County, in addition to the compensation herein set forth shall provide to the Contractor the following:

GENERAL CONDITIONS

1. Scope of Contractor's Services. The Contractor agrees to provide to the County services and materials set forth in the project narrative identified as Attachment A during the agreement period. No material, labor, or facilities will be furnished by the County, except as provided for herein.

2. Accounting and Payment for Contractor Services. Payment to the Contractor for services rendered under this Agreement shall be as set forth in Attachment B. Unless specifically stated in Attachment B, the County will not reimburse the Contractor for any costs or expenses incurred by the Contractor in the performance of this contract.

3. Delegation and Subcontracting. Contractor's services are deemed personal and no portion of this contract may be delegated or subcontracted to any other individual, firm or entity without the express and prior written approval of the County Project Manager.

4. Independent Contractor. The Contractor's services shall be furnished by the Contractor as an independent contractor and nothing herein contained shall be construed to create a relationship of employer/employee or master/servant.

   The Contractor acknowledges that the entire compensation for this Agreement is specified in Attachment B and the Contractor is not entitled to any county benefits including, but not limited to: vacation pay, holiday pay, sick leave pay, medical, dental or other insurance benefits, or any other rights or privileges afforded to Cowlitz County employees. The Contractor represents that it maintains a separate place of business, serves clients other than the County, will report all income and expense accrued under this contract with the Internal Revenue Service on a business tax schedule, and has a tax account with the State of Washington Department of Revenue for payment of all sales and use and Business and Occupation taxes collected by the State of Washington.

   In the event that either the state or federal government determines that an employer/employee or master/servant relationship exists rather than an independent contractor relationship such that Cowlitz County is deemed responsible for federal withholding, social security contributions, workers compensation and the like, the Contractor agrees to reimburse Cowlitz County for any payments made or required to be made by Cowlitz County. Should any payments be due to the Contractor pursuant to this Agreement, the Contractor agrees that reimbursement may be made by deducting from such future payments a pro rata share of the amount to be reimbursed.

   Notwithstanding any determination by the state or federal government that an employer/employee or master/servant relationship exists, the Contractor, its officers, employees and agents, shall not be entitled to any benefits which Cowlitz County provides to its employees.

5. No Guarantee of Employment. The performance of all or part of this contract by the Contractor shall not operate to vest any employment rights whatsoever and shall not be deemed to guarantee any employment of the Contractor or any employee of the Contractor or any subcontractor or any employee of any subcontractor by the County at the present time or in the future.

6. Regulations and Requirements. This Agreement shall be subject to all federal, state and local laws, rules, and regulations.

7. Right to Review. This contract is subject to review by any federal or state auditor. The County shall have the right to review and monitor the financial and service components of this program by whatever means are deemed expedient by the County Project Manager. Such review may occur with or without notice, and may include, but is not limited to, on-site inspection by County agents or employees, inspection of all records or other materials which the County deems pertinent to the Agreement and its performance, and any and all communications with or evaluations by service recipients under this Agreement. The Contractor shall preserve and maintain all financial records and records relating to the performance of work under this Agreement for six (6) years after contract termination, and shall make them available for such review, within Cowlitz County, State of Washington, upon request, during reasonable business hours.

8. Modifications. Either party may request changes in the Agreement. Any and all agreed modifications shall be in writing, signed by each of the parties.

9. Termination for Default. If the Contractor defaults by failing to perform any of the obligations of the

contract or becomes insolvent or is declared bankrupt or makes an assignment for the benefit of creditors, the County may, by depositing written notice to the Contractor in the U.S. Mail, postage prepaid, terminate the contract, and at the County's option, obtain performance of the work elsewhere. If the contract is terminated for default, the Contractor shall not be entitled to receive any further payments under the contract. Any extra cost or damage to the County resulting from such default(s) shall be deducted from any money due or coming due to the Contractor. The Contractor agrees to bear any extra expenses incurred by the County in completing the work, including all increased costs for completing the work, and all damage sustained, or which may be sustained by the County by reason of such default.

If a notice of termination for default has been issued and it is later determined for any reason that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the Termination for Public Convenience paragraph hereof.

10. Termination for Public Convenience. The County may terminate the contract in whole or in part whenever the County determines, in its sole discretion that such termination is in the interests of the County. Whenever the contract is terminated in accordance with this paragraph, the Contractor shall be entitled to payment for actual work performed for completed items of work. An equitable adjustment in the contract price for partially completed items of work will be made, but such adjustment shall not include provision for loss of anticipated profit on deleted or uncompleted work. Termination of this contract by the County at any time during the term, whether for default or convenience, shall not constitute a breach of contract by the County.

11. Termination Due to Insufficient Funds. If sufficient funds for payment under this contract are not appropriated or allocated or are withdrawn, reduced, or otherwise limited, the County may terminate this contract upon thirty (30) days written notice to the Contractor. No penalty or expense shall accrue to the County in the event this provision applies.

12. Termination Procedure. The following provisions apply in the event that this Agreement is terminated:

    (a) The Contractor shall cease to perform any services required hereunder as of the effective date of termination and shall comply with all reasonable instructions contained in the notice of termination, if any.

    (b) The Contractor shall provide the County with an accounting of authorized services provided through the effective date of termination.

    (c) If the Agreement has been terminated for default, the County may withhold a sum from the final payment to the Contractor that the County determines necessary to protect itself against loss or liability.

13. Defense and Indemnity Agreement. To the fullest extent permitted by law and except to the extent caused by the sole negligence of the County, the Contractor shall indemnify, defend and hold the County and its appointed and elected officers, agents and employees, and volunteers, harmless from and against any and all claims for any injuries, death or damage to persons or property (including any loss of use resulting therefrom), directly or indirectly arising out of, resulting from, or in connection with performance of this Agreement. Contractor's obligation to indemnify, defend and hold harmless includes any claim by Contractor's agents, employees, representatives, or any subcontractor or its employees. Contractor expressly agrees to indemnify, defend and hold harmless the County from any claims arising out of or incident to either Contractor's or its Subcontractor's performance or failure to perform the Agreement.

    It is further agreed by and between the parties that in no event shall any County appointed or elected officer, agent, employee, or volunteer, when executing their official duties in good faith, be in any way personally liable or responsible for any agreement or performance contained herein, whether express or implied, nor for any statement or representation made herein or in any connection with this Agreement.

14. Industrial Insurance Waiver. With respect to the performance of this Agreement and as to claims against the County, its appointed and elected officers, agents and employees, the Contractor expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, as now or hereafter amended, or other worker's compensation act, disability benefit act, or other employee benefit act of any jurisdiction otherwise applicable, for injuries to its employees and agrees that the obligations to indemnify, defend and hold harmless provided in this Agreement extend to any claim brought by or on behalf of any employee of the Contractor. Along with the other provisions of this Agreement, this waiver

is mutually negotiated by the parties to this Agreement.

15. Venue and Choice of Law. In the event that any litigation should arise concerning the construction or interpretation of any of the terms of this Agreement, the venue of such action shall be in the courts of the State of Washington in and for the County of Cowlitz. This Agreement shall be governed by the law of the State of Washington.

16. Withholding Payment. In the event the County Project Manager determines that the Contractor has failed to perform any obligation under this Agreement within the times set forth in this Agreement, then the County may withhold from amounts otherwise due and payable to Contractor the amount determined by the County as necessary to cure the default, until the County Project Manager determines that such failure to perform has been cured. Withholding under this clause shall not be deemed a breach entitling Contractor to termination or damages, provided that the County promptly gives notice in writing to the Contractor of the nature of the default or failure to perform, and in no case more than ten (10) days after it determines to withhold amounts otherwise due. A determination of the County Project Manager set forth in a notice to the Contractor of the action required and/or the amount required to cure any alleged failure to perform shall be deemed conclusive, except to the extent that the Contractor acts within the times and in strict accord with the provision of the Disputes clause of this Agreement. The County may act in accordance with any determination of the County Project Manager which has become conclusive under this clause, without prejudice to any other remedy under the Agreement, to take all or any of the following actions: (1) cure any failure or default,
(2) to pay any amount so required to be paid and to charge the same to the account of the Contractor, (3) to set off any amount paid or incurred from amounts due or to become due the Contractor. In the event the Contractor obtains relief upon a claim under the Disputes clause, no penalty or damages shall accrue to the Contractor by reason of good faith withholding by the County under this clause.

17. Rights and Remedies. The duties and obligations imposed by this Agreement and the rights and remedies available hereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available bylaw.

18. Contractor Commitments, Warranties and Representations. Any written commitment received from the Contractor concerning this Agreement shall be binding upon the Contractor, unless otherwise specifically provided herein with reference to this paragraph. Failure of the Contractor to fulfill such a commitment shall render the Contractor liable for damages to the County. A commitment includes, but is not limited to any representation made prior to execution of this Agreement, whether or not incorporated elsewhere herein by reference, as to performance of services or equipment, prices or options for future acquisition to remain in effect for a fixed period, or warranties.

19. Patent/Copyright Infringement. Contractor will defend, indemnify and save harmless County, its appointed and elected officers, agents and employees from and against all loss or expense, including but not limited to claims, demands, actions, judgments, settlements, attorneys' fees and costs by reason of any and all claims and demands upon the County, its elected or appointed officials or employees for damages because of the Contractor's alleged infringement on any patent or copyright. The Contractor will pay those costs and damages attributable to any such claims that are finally awarded against the County, its appointed and elected officers, agents and employees in any action. Such defense and payments are conditioned upon the following:

    (a) That Contractor shall be notified promptly in writing by County of any notice of such claim.

    (b) Contractor shall have the right, hereunder, at its option and expense, to obtain for the County the right to continue using the information, in the event such claim of infringement, is made, provided no reduction in performance or loss results to the County.

20. Disputes.

    (a) General. Differences between the Contractor and the County, arising under and by virtue of the contract documents shall be brought to the attention of the County at the earliest possible time in order that such matters may be settled or other appropriate action promptly taken. The records, orders, rulings, instructions, and decision of the County Project Manager shall be final and conclusive thirty (30) days from the date of mailing unless the Contractor mails or otherwise furnishes to the County Project Manager a written notice of appeal. The notice of appeal shall include facts, law, and argument as to why the conclusions of the County Project Manager are in error.

In connection with any appeal under this clause, the Contractor and County shall have the opportunity to submit written materials and argument and to offer documentary evidence in support of the appeal. Oral argument and live testimony will not be permitted. The decision of the County Project Manager for the determination of such appeals shall be final and conclusive. Reviews of the appellate determination shall be brought in the Superior Court of Cowlitz County within fifteen (15) days of mailing of the written appellate determination. Pending final decision of the dispute, the Contractor shall proceed diligently with the performance of this Agreement and in accordance with the decision rendered.

(b) Notice of Potential Claims. The Contractor shall not be entitled to additional compensation or to extension of time for (1) any act or failure to act by the County Project Manager or the County, or (2) the happening of any event or occurrence, unless the Contractor has given the County a written Notice of Potential Claim within ten (10) days of the commencement of the act, failure, or event giving rise to the claim, and before final payment by the County. The written Notice of Potential Claim shall set forth the reasons for which the Contractor believes additional compensation or extension of time is due, the nature of the cost involved, and insofar as possible, the amount of the potential claim. Contractor shall keep full and complete daily records of the work performed, labor and material used, and all costs and additional time claimed to be additional.

(c) Detailed Claim. The Contractor shall not be entitled to claim any such additional compensation, or extension of time, unless within thirty (30) days of the accomplishment of the portion of the work from which the claim arose, and before final payment by the County, the Contractor has given the County a detailed written statement of each element of cost or other compensation requested and of all elements of additional time required, and copies of any supporting documents evidencing the amount or the extension of time claimed to be due.

21. Ownership of Items Produced and Public Disclosure. All writings, programs, data, art work, music, maps, charts, tables, illustrations, records or other written, graphic, analog or digital materials prepared by the Contractor and/or its consultants or subcontractors, in connection with the performance of this Agreement shall be the sole and absolute property of the County and constitute "work made for hire" as that phrase is used in federal and/or state intellectual property laws and Contractor and/or its agents shall have no ownership or use rights in the work. Except as to data or information in the public domain or previously known to Contractor or required to be disclosed by law, subpoena or other process, the following shall apply:

(a) Correspondence, emails, reports and other electronic or written work product will be generated between the Contractor and County during the course of this Contract. This Contract and such work product in the possession of Contractor may be deemed public records subject to disclosure under the Washington State Public Records Act, Chapter 42.56 RCW (Public Records Act). Thus, the County shall be required, upon request, to disclose this Contract and all documents related to it unless an exemption under the Public Records Act or other laws applies. Contractor shall fully cooperate with and assist the County with respect to any request for public records received by the County related to the services performed under this Contract.

(b) Should County receive a request for disclosure, County agrees to provide Contractor ten (10) days written notice of impending release, and to cooperate with any legal action which may be initiated by Contractor to enjoin or otherwise prevent such release, provided that all expense of any such litigation shall be borne by Contractor, including any damages, attorney's fees or costs awarded by reason of having opposed disclosure, and further provided that County shall not be liable for any release where notice was provided and Contractor took no action to oppose the release of information. Notice of any proposed release of information pursuant to Chapter 42.56 RCW, shall be provided to Contractor according to the "Notice" provision herein. If the Contractor has not obtained an injunction and served the County with that injunction by the close of business on the tenth business day after the County sent notice, the County will then disclose the record unless it makes an independent determination that the record is exempt from disclosure. Notwithstanding the above, the Contractor must not take any action that would affect (a) the County's ability to use goods and services provided under this Contract or (b) the Contractor obligations under this Contract. The Contractor will fully cooperate with the County in identifying and assembling records in case of any public disclosure request.

(c) Contractor's failure to timely provide such records upon demand shall be deemed a material breach of this Contract. To the extent that the County incurs any monetary penalties, attorneys' fees, and/or any other expenses as a result of such breach, Contractor shall fully indemnify and hold harmless County as set forth in Section 13. For purposes of this section, the terms "public records" and

"agency" shall have the same meaning as defined by Chapter 42.56 RCW, as said chapter has been construed by Washington courts. The provisions of this section shall survive the expiration or termination of this Agreement.

22. Recovery of Payments to Contractor. The right of the Contractor to retain monies paid to it is contingent upon satisfactory performance of this Agreement, including the satisfactory completion of the project described in the Scope of Work (Attachment A). In the event that the Contractor fails, for any reason, to perform obligations required of it by this Agreement, the Contractor may, at the County Project Manager's sole discretion, be required to repay to the County all monies disbursed to the Contractor for those parts of the project that are rendered worthless in the opinion of the County Project Manager by such failure to perform.

    Interest shall accrue at the rate of 12 percent (12%) per annum from the time the County Project Manager demands repayment of funds.

23. Project Approval. The extent and character of all work and services to be performed under this Agreement by the Contractor shall be subject to the review and approval of the County Project Manager. For purposes of this Agreement, the County Project Manager is:

    Name:
    Title:
    Address:

    Phone:
    E-Mail:

    In the event there is a dispute with regard to the extent and character of the work to be done, the determination of the County Project Manager as to the extent and character of the work to be done shall govern subject to the Contractor's right to appeal that decision as provided herein.

24. Non-Discrimination. The Contractor shall not discriminate against any person on the basis of race, creed, political ideology, color, national origin, sex, marital status, sexual orientation, age, or the presence of any sensory, mental or physical handicap.

25. Subcontractors. In the event that the Contractor employs the use of any subcontractors, the contract between the Contractor and the subcontractor shall provide that the subcontractor is bound by the terms of this Agreement between the County and the Contractor. The Contractor shall insure that in all subcontracts entered into, County is named as an express third-party beneficiary of such contracts with full rights as such.

26. Third Party Beneficiaries. This agreement is intended for the benefit of the County and Contractor and not for the benefit of any third parties.

27. Standard of Care. The Contractor shall perform its duties hereunder in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession as Contractor currently practicing under similar circumstances. The Contractor shall, without additional compensation, correct those services not meeting such a standard.

28. Time is of the Essence. Time is of the essence in the performance of this contract unless a more specific time period is set forth in either the Special Terms and Conditions or Scope of Work.

29. Notice. Except as set forth elsewhere in the Agreement, for all purposes under this Agreement, except service of process, any notices shall be given by the Contractor to the County Project Manager. Notice to the Contractor for all purposes under this Agreement shall be given to the person executing the Agreement on behalf of the Contractor at the address identified on the signature page.

30. Severability. If any term or condition of this contract or the application thereof to any person(s) or circumstances is held invalid, such invalidity shall not affect other terms, conditions or applications which can be given effect without the invalid term, condition or application. To this end, the terms and conditions of this contract are declared severable.

31. Precedence. In the event of inconsistency in this Agreement, unless otherwise provided herein, the inconsistency shall be resolved by giving precedence in the following order:

(a) Applicable federal, state and local statutes, ordinances and regulations;
(b) Scope of Work (Attachment A) and Compensation (Attachment B);
(c) Special Terms and Conditions (Attachment D); and
(d) General Conditions (Attachment C).

32. Waiver. Waiver of any breach or condition of this contract shall not be deemed a waiver of any prior or subsequent breach. No term or condition of this contract shall be held to be waived, modified or deleted except by an instrument, in writing, signed by the parties hereto.

33. Attorney Fees. In the event that litigation must be brought to enforce the terms of this agreement, the prevailing party shall be entitled to be paid reasonable attorney fees.

34. Construction. This agreement has been mutually reviewed and negotiated by the parties and should be given a fair and reasonable interpretation and should not be construed less favorably against either party.

35. Survival. Without being exclusive, Paragraphs 4, 7, 13-19, 21-22 and 30-35 of these General Conditions shall survive any termination, expiration or determination of invalidity of this Agreement in whole or in part. Any other Paragraphs of this Agreement which, by their sense and context, are intended to survive shall also survive.

36. Contract Documents. The Contract Documents for this Agreement, except for modifications issued after execution of this Agreement, form a contract and all are as fully a part of the contract as if attached to this Agreement or repeated herein. The contract represents the entire and integrated Agreement between the parties and supersedes any prior statements, discussions or understandings between the parties except as provided herein. An enumeration of the contract documents is set forth below:

    1. Notice of Award; and
    2. Addenda; and
    3. Agreement; and
    4. Conditions of Cowlitz County Request For Proposals No. ; and
    5. Quoted proposal of Contractor dated .

SPECIAL TERMS AND CONDITIONS AND RETIREMENT STATUS FORM

1. Reporting. The Contractor shall submit written progress reports to the County Project Manager as set forth below:

   ☐ With each request for payment. ☐ Monthly.

   ☐ Quarterly.

   ☐ Semi-annually. ☐ Annually.

   ☐ Project completion. ☐ Other (specify):

   Progress reports shall include, at a minimum, the following:

   Reports shall include any problems, delays or adverse conditions which will materially affect the Contractor's ability to meet project objectives or time schedules together with a statement of action taken or proposed to resolve the situation. Reports shall also include recommendations for changes to the Scope of Work, if any. Payments may be withheld if reports are not submitted.

2. Insurance. The Contractor shall maintain in full force and effect during the term of this Agreement, and until final acceptance of the work, public liability and property damage insurance with companies or through sources approved by the state insurance commissioner pursuant to RCW Title 48, as now or hereafter amended. The County, its appointed and elected officials, agents and employees, shall be specifically named as additional insureds in a policy with the same company which insures the Contractor or by endorsement to an existing policy or with a separate carrier approved pursuant to RCW Title 48, as now or hereafter amended, and the following coverages shall be provided:

   ☐ COMPREHENSIVE GENERAL LIABILITY:
   Bodily injury, including death. $1,000,000 Per occurrence
   Property damage $1,000,000 Aggregate

   ☐ ERRORS AND OMISSIONS or PROFESSIONAL LIABILITY with an Extended Reporting Period Endorsement (two year tail). $1,000,000 Per occurrence
   $2,000,000 Aggregate

   ☐ WORKERS COMPENSATION: Statutory amount

   ☐ AUTOMOBILE: coverage on owned, non-owned, rented and hired vehicles
   Bodily injury, including death, and property damage $1,000,000 Combined Single Limit

   All Contractor's and Contractor's subcontractors' insurance policies and additional named insured endorsements shall provide primary insurance coverage and be non-contributory. Any insurance, self-insured retention, deductible, risk retention or insurance pooling maintained or participated in by the County shall be excess and not contributory to such insurance policies. All Contractor's and Contractor's subcontractors' liability insurance policies must be endorsed to show this primary coverage.

   Upon request, the Contractor shall provide a full and complete certified copy of all requested insurance

policies to the County. The County reserves the right, but not the obligation, to revise any insurance requirement, not limited to limits, coverages and endorsements, or to reject any insurance policies which fail to meet the requirements of this Agreement. Additionally, the County reserves the right, but not the obligation, to review and reject any proposed insurer providing coverage based upon the insurer's financial condition or licensing status in Washington. Any deductibles and/or self-insured retentions exceeding $10,000, stop loss provisions, and/or exclusions contained in such policies must be approved by the County in writing. For any deductibles or self-insured retentions exceeding $10,000 or any stop-loss provisions, the County shall have the right to request and review the Contractor's most recent annual financial reports and audited financial statements as a condition of approval.

Contractor hereby agrees to a waive subrogation with respect to each insurance policy maintained under this Agreement. When required by an insurer, or if a policy condition does not permit Contractor to enter into a pre-loss agreement to waive subrogation without an endorsement, then Contractor agrees to notify the insurer and obtain such endorsement. This requirement shall not apply to any policy which includes a condition expressly prohibiting waiver of subrogation by the insured or which voids coverage should the Contractor enter into such a waiver of subrogation on a pre-loss basis.

The County, its departments, elected and appointed officials, employees, agents and volunteers shall be named as additional insureds on Contractor's and Contractor's subcontractors' insurance policies by way of endorsement for the full available limits of insurance maintained by the Contractor and subcontractor, and all coverage shall be primary and non-contributory. A statement or notation of additional insured status on a Certificate of Insurance shall not satisfy these requirements. [*This endorsement shall not be required if the Contractor is a governmental entity and is insured through a governmental entity risk pool authorized by the State of Washington*.]

The Contractor shall, for each required insurance policy, provide a Certificate of Insurance, with endorsements attached, evidencing all required coverages, limits, deductibles, self-insured retentions and endorsements and which is conditioned upon the County receiving thirty (30) days prior written notice of reduction in coverages, cancellation or non-renewal. Each Certificate of Insurance and all insurance notices shall be provided to: ATTN: Risk Manager, Cowlitz County Administrative Svc., 207 4th Ave. N., Kelso, WA 98626. This Agreement shall be *void ab initio* if the proof of coverage is not timely supplied. The insurance maintained under this Agreement shall not in any manner limit or qualify the liabilities or obligations of the Contractor under this Agreement. All insurance policy deductibles and self-insured retentions for policies maintained under this Agreement shall be paid by the Contractor.

Compensation and/or payments due to the Contractor under this Agreement are expressly conditioned upon the Contractor's strict compliance with all insurance requirements. Payment to the Contractor shall be suspended in the event of non-compliance. Upon receipt of evidence of Contractor's compliance, payments not otherwise subject to withholding or set-off will be released to the Contractor. This Agreement shall be *void ab initio* if the proof of coverage is not timely supplied.

If the Errors and Omissions or Professional Liability insurance obtained is an occurrence policy as opposed to a claims-made policy, the Extended Reporting Period Endorsement is not required.

2. Liquidated Damages. For delays in timely completion of the work to be done or missed milestones of the work in progress, the Contractor shall be assessed Dollars ($) per day as liquidated damages and not as a penalty because the County finds it impractical to calculate the actual cost of delays. Liquidated damages will not be assessed for any days for which an extension of time has been granted. No deduction or payment of liquidated damages will, in any degree, release the Contractor from further obligations and liabilities to complete the entire project.

3. Other (specify):

COUNTY RETAINS THIS FORM

Individual contractors and service providers must complete and sign

4. WA Department of Retirement Systems: Independent Contractor Verification and State Retirement Status Reporting Form [WAC 415-02-110; DRS Email 13-011; DRS Email 09-001]

SECTION 1: INDIVIDUAL CONTRACTOR COMPLETES THIS SECTION AND SIGNS:

Did you retire from one of the State of Washington Retirement Systems? ☐ **YES** ☐ **NO**
Did you retire before age 65 using the 2008 early retirement factors (ERF)? ☐ **YES** ☐ **NO**
Will you be receiving direct compensation for your services? ☐ **YES** ☐ **NO**
Will you be receiving indirect compensation for your services? ☐ **YES** ☐ **NO**

CONTRACTOR (Full, individual name of contractor):

Signature: _____ Social Security No. : Date:

SECTION 2: COUNTY COMPLETES THIS SECTION AND RETAINS FOR AUDIT PURPOSES:

[Use Member Reporting Verification (MRV) to verify the past retirement membership]

1. Contractor **has been** a member of a Washington State Retirement System ☐ **YES** ☐ **NO**
If **YES**, what system and plan?

☐ Teachers' Retirement System (TRS) ☐ Plan1 ☐ Plan 2 ☐ Plan 3
☐ School Employees' Retirement System (SERS) ☐ Plan 2 ☐ Plan 3
☐ Public Employees' Retirement System (PERS) ☐ Plan 1 ☐ Plan 2 ☐ Plan 3
☐ Public Safety Employees' Retirement System (PSERS) ☐ Plan 2
☐ Law Enforcement Officers' & Fire Fighters' Retirement System (LEOFF) ☐ Plan 1 ☐ Plan 2
☐ Washington State Patrol Retirement System (WSPRS) ☐ Plan 1 ☐ Plan 2
☐ Judicial Retirement System (JRS)

2. Is the contractor a retiree of a Washington State Retirement System? ☐ Yes ☐ No
3. Did the contractor retire before age 65 using the 2008 ERF? ☐ Yes ☐ No

I have verified the information above using MRV or by contacting DRS, and I have evaluated the individual Contractor, Independent Contractor or Service Provider under WAC 415-02-110 and/or DRS Form-MS 344 (R 5/09), and the Internal Revenue Service rules governing independent contractor status.

COUNTY OFFICIAL/DEPARTMENT REPRESENTATIVE:

Signature: _____ Date: _____

COUNTY RETAINS THIS FORM

EXHIBIT D – SAMPLING AND ANALYSIS PLANS

- **Headquarters Landfill**
- **Tennant Way Landfill**

Sampling and Analysis Plan
for the
Cowlitz County Headquarters Landfill

March 2024 Revision

Prepared for
Cowlitz County Department of Public Works
March 5, 2024

Prepared by

Bright Fields Groundwater, Inc.

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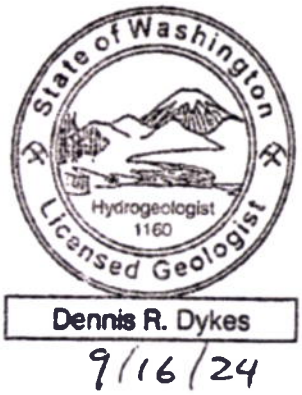
CONTENTS

CONTENTS (Continued)

FIGURES AND TABLES

The material and data in this report were prepared by or under the supervision and direction of the undersigned.

Sampling and Analysis Plan for the Cowlitz County Headquarters Landfill
Revised March 5, 2024



Bright Fields Groundwater, Inc.

Dennis R. Dykes, LHG
Senior Hydrogeologist

1 INTRODUCTION

This document is the revised Sampling and Analysis Plan (SAP) for the Cowlitz County Headquarters Landfill (HQLF). The HQLF is an active municipal solid waste landfill (MSWLF) located at 3434 Silver Lake Road, Castle Rock, Washington (see Figure 1). The landfill is owned and operated by the Cowlitz County Department of Public Works (DPW). This SAP revises and updates the SAP dated December 13, 2011 which was Appendix G of the landfill permit application. The SAP is being revised to update site conditions, update monitoring procedures, and review compliance with regulatory guidance.

The landfill is monitored in compliance with the Criteria for Municipal Solid Waste Landfills (CMSWL). The CMSWL are defined in WAC 173-351. The Cowlitz County Environmental Health Unit (EHU) is the jurisdictional health authority as defined in the applicable WACs. The Department of Ecology (Ecology) advises the EHU. The groundwater monitoring requirements are specified in WAC 173-351-430.

The HQLF includes one unit that to date includes nine cells.

1.1 SAP Purpose and Objectives

The purpose of this SAP is to provide background information for the monitoring program and describe procedures that when implemented assure compliance with *WAC 173-351-410 Groundwater sampling and analysis requirements*. The objectives are to describe the type and quality of data to be generated for this purpose as well as the procedures to be used to acquire and review the data. WAC 173-351-410(1) requires that "*The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells installed in compliance with WAC 173-351-400 and with this section*".

The data must be of sufficient quality and quantity to "*determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the particular groundwater monitoring program*" (WAC173-351-420(3)). The statistical procedures for determining the background conditions are described in Section 8 and the reports that will convey the documentation of the implementation of the monitoring program and interpretation of the data are described in Section 9.

The SAP also provides guidance to accomplish the required field tasks in a safe and efficient manner. Safety measures that are to be followed while on site are detailed in the Site Safety and Operations Plan (Appendix B).

1.2 Site Background

The HQLF is located within Sections 23, 24 and 26 of Township 7 North, Range 2 West of the Willamette Meridian. The landfill is located on the foothills of the Cascade Range about two miles south-southeast of Silver Lake. It is located in a roughly east-southeast-west northwest

trending valley that is a small tributary of Sucker Creek. It is surrounded by forest land. A site location map is presented as Figure 1.

The landfill began operations as a limited purpose landfill developed by the Weyerhaeuser Company in the early 1990s. It was purchased by the DPW and permitted as a MSWLF in 2013 and began receiving municipal waste in March 2014. The total permitted area for solid waste is 308 acres with an addition 305 acres identified as buffer (Figure 2). The landfill has 22 planned cells and are currently filling Cell 9. Cell 10 has been cleared and roughly contoured in preparation for future liner installation.

Groundwater, surface water, and leachate have been monitored at the landfill since 1994, however monitoring before 2014 differed from the CMSWL except the background data collected for the current permit in 2013. Groundwater levels have been measured during each sampling event. Water samples have been collected for analysis from the monitoring wells, surface water sites, and the leachate sites.

The monitoring system currently consists of four monitoring wells, 12 piezometers, one surface water sampling location, and one leachate sampling location (Table 1 and Figure 2). The monitoring well network at the landfill has been modified to allow construction Cells 7 and 8. This included abandonment of piezometers P-3, and -19 in 2014 and P-20 and 2017. Monitoring well construction details are listed on Table 2.

1.3 Geology and Hydrogeology

The vicinity of the landfill is underlain by the lower member of the Goble Volcanics. This member is generally comprised of intercalated tuffaceous sediments, lapilli breccias, ash flow tuffs, and basalt and basaltic andesite flows. The Goble Volcanics are uncomformably underlain in the site area by the Cowlitz Formation. This formation is composed of feldspathic sandstone interbedded with basalt flows and breccias of the Grays River Volcanics (Tuppan, 2012).

Investigations at the site describe the landfill as underlain by lithic tuffs with interbeds of tuff and basalt and basaltic andesite flows. The lithic tuff is described as containing up to 40% lithic fragments (pumice, basalt, and andesite scoria) in a tuffaceous silt to sand sized matrix. The lithic tuff is also described as including welded lithic tuff, pyroclastic flows, blast deposits, mudflows, lahars and lapilli tuff breccias. The lithic tuff was found to be deeply weathered at the site.

The tuff and basaltic interbeds are described as laterally discontinuous at the site with 10 and 57 feet thick flow sequences. They are described as highly weathered near contacts with fairly fresh interiors.

The geologic structure may include a gentle dip to the northeast although the lack of outcrops and apparent correlation between stratigraphic units between borings makes this somewhat uncertain. Joints and fractures are described as apparent in all the lithologies with oxides and clay filling as evidence of weathering. Fault zones with offset were not observed at the site (Tuppan, 2012).

The hydrogeology of the site area is described as including deep and shallow flow systems. The shallow flow system appears to be recharged by less than 1% or the incident precipitation and discharges as base flow of streams or to recharge the deep system (Tuppan, 2012). The shallow groundwater is present in and flows through fractures and the interstitial weathered spaces in the basaltic and volcaniclastic material. Groundwater flow appears to be influenced by the character of the rock type, degree of weathering, geometry of the layers and character of the fractures (spacing, width, weathering, interconnectedness).

The hydraulic gradient is generally steep (0.04 to 0.06 ft/ft) reflecting the natural topography of the site. The groundwater velocity is however generally low (20 to 35 ft/yr) because of the generally low hydraulic conductivity the aquifer material. The hydraulic gradient control system (HGCS) installed under each cell of the landfill collects any discharging groundwater thereby controlling the hydraulic gradient and contour under the landfill. Shallow groundwater flow is generally to the northwest under active part of the site (Cells 1 through 9) except in a portion in the south where flow is more northerly before curving to the west. The shallow zone is monitored by the detection monitoring program.

The deep system is present in fracture basaltic rock with little weathering. Wells exploiting the deep system are typically from 250 to over 400 feet deep with static water levels from 60 to over 120 feet bgs. The yield of deep wells is reported on well logs to be variable ranging from less than 2 to as much as 25 gpm. This appears to reflect the variable density of fractures in the rock. Pumping tests conducted in 1993 determined low aquifer transmissivity and storativity typical of fractured volcanic rock. Data collected in observation wells during these tests suggest limited connectedness of fractures. Information is not available to evaluate gradients and flow rates.

1.4 Surface Water

The site is located in the upper part of the Sucker Creek watershed. Landfilling to date (Cells 1 through 9) has occurred in the South Sucker Creek sub-watershed. The northern part of the site (future Cells 14 through 22) is in the North Sucker Creek sub-watershed. Sucker Creek flows to Silver Lake about 2⅓ miles northwest of the site.

A hydraulic gradient control system collects groundwater discharge under the landfill and discharges to South Sucker Creek. Surface water flow from south of the landfill is diverted around the landfill to South Sucker Creek. Storm water runoff from the landfill tarps and the undeveloped areas of the landfill footprint within the South Sucker Creek sub-watershed is diverted to the storm water management system which also discharges to South Sucker Creek after treatment and flow control.

2 SAMPLING LOCAITONS, FREQUENCY AND ANALYSIS

Groundwater, surface water and leachate at the landfill are monitored quarterly. The locations and frequency of sample collection and the sample analyses are described in this section.

2.1 Monitoring Locations

Groundwater is monitored at 4 monitoring wells and 12 piezometers at the HQLF (Table 1 and Figure 2). Groundwater downgradient of the filled and active part of the landfill are monitored by two monitoring wells (C-1 and -2) and upgradient grpundwater by the other two (P-9 and U-1). Groundwater levels in this part of the landfill are measured in each of these wells as well as three of the piezometers (MW-2, and P-10 and -15). These groundwater levels are used to define groundwater contours in the site area where groundwater flows toward South Sucker Creek. Five piezometers are located in the site area where flow is toward North Sucker Creek although no construction has occurred in this area. One of these piezometers is present but not actively measured because of probe fouling and little or no change in water level for over 20 years. The well construction details are listed on Table 2.

The hydraulic gradient control system (HGCS) is monitored at one location designated HGCS B1-P. The sample is collected from the 8 inch diameter pipe that is the main collection pipe of the HGCS under the landfill. Two 3 inch diameter pipe also daylight at this location but water has not been observed to discharge from them. The gravel bed of the HGCS is also present but discharge through the gravel is below grade and not sampleable.

Surface water samples are collected at one location in South Sucker Creek (Figure 2). This location is upstream of a large culvert on the 1300 Road about 4,000 feet downstream from the HGCS discharge pipes.

A leachate sample is collected at one location of the landfill's leachate collection system. The leachate sample is collected from the outfall to the leachate pond. Leachate from most of the landfill gravity flows to a point at the north end of Cell 2 and then on to the leachate pond. The leachate from Cell 1is collected in a sump and periodically pumped to the same outfall. The volume of leachate collected in the Cell 1 sump is typically a small portion of the leachate.

2.2 Monitoring Frequency

Groundwater, HGCS, surface water and leachate are sampled quarterly in January, April, July and October at the identified locations. Water levels are also measured quarterly before sampling a well or at a convenient time during the sampling event.

2.3 Sample Analyses

Groundwater, HGCS, surface water and leachate samples are analyzed as indicated on Table 4. Groundwater and HGCS samples are analyzed for the parameters listed in WAC 173-351-990 Appendices I and II. Leachate samples are analyzed for the same parameters. Surface water samples are analyzed for the inorganic parameters listed in Appendix I (metals, sulfate and

nitrate) plus iron, manganese and the leachate indicator parameters in Appendix II (ammonia, TOC and TDS). The analytical methods are described in Section 6.

Field parameters listed in WAC 173-351-990 Appendix II are measured in each sample. The oxidation reduction potential (ORP), turbidity, and dissolved oxygen are also field measured in groundwater as part of the sampling procedures and in the HGCS and surface water.

3 DECONTAMINATION PROCEDURES

This section describes the procedures for decontamination of equipment and handling and disposal of decontamination liquids. The low flow/low stress sampling method is used to sample groundwater at the HQLF. This method minimizes the equipment and materials that may contact the sample water. Leachate samples are collected using disposable bailers that do not require decontamination. Decontamination is therefore typically limited to the equipment used for field measurements and other occasionally used equipment or accidental spillage.

3.1 Decontamination

Pumps and other sample collection equipment do not typically require decontamination before use. When necessary the sampling equipment is decontaminated with a non-phosphatic detergent wash, distilled water rinse, a final distilled water rinse, and a sample rinse (before use). An exception is the pump and tubing at monitoring well U-1 which is removed from the well between sampling events because the valves stick when immersed in the groundwater of the well. This pump and tubing is stored in clean plastic between events. Rinsing with distilled water is recommended if necessary.

Disposable equipment, which is decontaminated by the manufacturer, is rinsed using sample water immediately prior to use. Disposable equipment and supplies are discarded after use.

3.2 Handling and Disposal of Decontamination Liquids

Decontamination liquids with potentially significant contamination are placed in appropriately sized containers for transfer to the HQLF leachate control system when quantities are significant. The containers will be sealed and labeled if stored more than a few hours. The label will include the date, sampler's name, contents of the container, and the source of the liquids (e.g., decontamination of bailer used in leachate sump). The HQLF is responsible for staging stored containers and disposing of the contents.

4 GROUNDWATER SAMPLING PROCEDURES

Groundwater sampling at the HQLF is conducted using the Low Flow (Low Stress) Purging and Sampling Procedure. In this method groundwater is pumped from the well at a rate that minimizes disturbance of the aquifer and static water column in the well.

Dedicated low flow GEO1.66SS18 bladder pumps manufactured by Geotech are installed in the sampled monitoring wells. The pump installations include Teflon lined dual tubing (air and sample water). Each pump hangs on its' tubing suspended on a plate that sets in a coupling at the wellhead. The plate includes a port for suspension of an approximately five foot long piece of tubing between sampling events. This tubing is withdrawn and attached to the pumps sample tubing and flow through cell during sampling.

Sampling is initiated by positioning the vehicle and sampling equipment at an appropriate location near the well. The well vicinity and well itself are observed and any unusual conditions noted on the Field Sampling Data sheet for the well and photographed if appropriate.

4.1 Water Level Measurement

Depth to water in each monitoring well and piezometer is measured to the nearest 0.01 foot using an electric water level measurement probe. Water levels are measured in the wells prior to and during sampling. Water levels are measured in the piezometers at a convenient time during a sampling event. Water levels are recorded on a Hydrology Field Sheet. An example of a field sheet is provided in Appendix A.

Measurements during purging and sampling are used to determine if flow rate adjustment is needed and to document the drawdown within the well thereby documenting low stress of the aquifer. An initial water level measurement is made after opening the well. At well U-1, the water level is measured again after completion of equipment set up and before initiation of pumping to evaluate water level stability. Water levels are measured at regular intervals during purging and sampling to document and evaluate drawdown stability. Measurements taken during sampling are recorded on the Field Sampling Data sheet for that well. A final measurement is taken shortly before turning the pump off. An example of a data sheet is provided in Appendix A. The type of well probe used is recorded in the field notes.

4.2 Groundwater Sampling Procedures

The pump inlets are set at a level two feet below the top of the screen in each monitoring well. A summary of the pump setting criteria is provided in Table 3.

At each monitoring well, the well security monument is opened and the cover over the well removed. The controller is also opened, the air tube connected to the controller and pump, and the power cable connected to a 12 volt power source. The sample tubing stored suspended in the well is withdrawn and connected to the pump and flow through cell. .

The Geotech bladder pumps are simple to operate and maintain. The controller includes two knobs, one (discharge) that sets the amount of time the air pump will pressurize the bladder and the other (fill) that sets the amount of time the bladder is allowed to fill between pressurizations. At each well the discharge and fill times are set as shown on Table 3. The pump is operated enough cycles to purge air from the pump and tubing and to fill the flow through cells. The flow rate is then checked by timing at least two fill/discharge cycles. The pumping rate can then be adjusted as necessary to achieve the pumping rate shown for the well. Drawdown in three of the four monitoring wells (C-1, C-2 and U-1) does not stabilize at less than the recommended 0.3 feet. The flow rates are however quite low and the drawdown change typically reduces to less than 0.01 to 0.02 feet per minute after 20 or so minutes of purging. This indicates a low stress on the aquifer and the sample water will be predominantly from the aquifer.

4.2.1 Purging and Field Measurements

The wells are purged prior to sample collection using the submersible pumps dedicated to each well. Purging is initiated by setting the controller and checking the pumping rate as described above. Controller settings for each well are shown on Table 3. Water level measurements are taken and recorded to document the drawdown. The flow rate is typically very stable and may not need to be checked during purging except in unusual conditions.

Historic samples from each well have not shown impacts from the landfill above a groundwater standard, therefore purge water is discharge to the ground away from the well.

Field parameters are measured in a flow through apparatus and used to determine when purging is complete and sample collection can begin. The pumps can be operated until 1½ to 2 liters of water have flown through the set up before field parameter measurement begins. Measurement of field parameters typically can begin after 10 to 30 minutes of pumping and are typically stable after three to six measurements. Field parameters are measured at intervals that allow the volume of water in the sampling equipment to be replaced at least three times. Parameters are generally recorded at three to nine minute intervals at the stable pumping rates. Purging is considered complete when the field parameters are stable for three successive measurements. The following parameters are measured and considered stable when within the indicated range:

Parameter	Stable Range
Temperature	+ or – 3%
Specific Conductance	+ or – 3%
pH	+ or – 0.1 unit
ORP	+ or – 10 millivolts
Dissolved Oxygen	+ or – 10%
Turbidity	+ or – 10% (if over 5 NTU)

Field parameter measurements are recorded on the field sheet for the well. Temperature can be affected by ambient conditions, a factor that should be considered when monitoring this parameter. Shading of the tubing and apparatus may be advisable under sunny conditions.

4.2.2 Sampling

Samples are collected immediately after purging and without stopping or adjusting the pumping rate. Samples are collected directly to the sample bottles from the tubing.

Samples for VOC and TOC analyses are collected first. Samples for inorganic analyses are collected second followed by total and dissolved metals analyses. The VOC and TOC bottles are filled completely, sealed with PTFE lined septum lids, and checked for the presence of air bubbles by inverting and tapping the bottles. If an air bubble is detected, the vial will be reopened and topped off so the sample is bubble free. The portion of the sample for dissolved metals analysis may be filtered in the field or in the local laboratory when the time before submitting is small. If field filtered, use a disposable inline 0.45 micron filter that is pre-wetted with sample water.

4.2.3 Post Sampling

After completion of sample collection the flow rate and depth to water in the well are measured and recorded. The pump is then turned off, the airline disconnected, the sample tubing removed from the well and flow through apparatus and allowed to drain, the tubing returned into the well, and well cover set on the well. The monument is then closed and locked. The flow through apparatus is rinsed with distilled water.

At monitoring well U-1 the pump and tubing is removed from the well and stored in clean plastic between sampling events. This is necessary because the groundwater chemistry causes the valves in the pump to become stuck if left submerged between events.

4.3 Sample Labeling and Handling

Sample containers are labeled with the site name, blind sample name, and date and time of collection. Samples are placed in coolers and delivered to the laboratory under chain-of-custody documentation at the end of the work day or the morning after the samples are collected. An example of a chain-of-custody form is included in Appendix A. Table 5 identifies the sampling containers, preservation requirements, and handling methods.

4.4 Quality Control Samples

Quality control procedures consist of collecting one duplicate sample and transporting volatile organic trip blanks provided by the laboratory. The duplicate is collected at random during each sampling event by alternating filling of two sets of sample bottles for each analysis.

5 SURFACE WATER, HGCS AND LEACHATE SAMPLING PROCEDURES

5.1 Sampling

The surface water sample is collected by immersing the sample bottles approximately 1-inch below the water surface while keeping bottles with a preservative in as near an upright position as possible. The HGCS sample is collected from the discharge flow. Field measurements of pH, temperature, specific conductance, dissolved oxygen and turbidity are made directly in South Sucker Creek and the HGCS dischatrge.

The leachate sample is collected directly from the flow at the outfall pipe. Field measurements of pH, temperature, and specific conductance are made in a beaker of the sample water. The beaker is rinsed three times with sample water before the measurements are taken.

The sample location, identifier, field conditions, bottles filled and the field measurements are recorded on Field Sampling Data sheets.

5.2 Sample Labeling and Handling

Sample containers are labeled and handled as described in the groundwater sampling section (see Table 4).

5.3 Quality Control Samples

The quality control procedures are completed in conjunction with the groundwater sampling.

6 ANALYTICAL METHODS

6.1 Field Methods

Each instrument used for field measurements is calibrated, maintained, and used according to the manufacturer's instructions. Calibrations are completed shortly before the beginning of a sampling event and reported in the sampling memorandum.

Groundwater samples are pumped through a flow through apparatus that has ports for the temperature, specific conductance, pH, ORP/Eh, and dissolved oxygen probes. A sample for turbidity measurement is collected at the flow through cell and placed in the turbidity meter for measurement.

Surface water and HGCS parameters are measured as for the groundwater although directly in the flow stream.

Leachate is collected in a decontaminated beaker where the temperature, specific conductance and pH are measured. The beaker is rinsed with leachate at least three times before filling with water to be tested. The leachate is discarded to the leachate pond after measurements have been taken. The field parameters are listed on Table 5.

6.2 Laboratory Methods

Specific analytical methods, method reporting limits (MRLs), and holding times are listed in Table 6. Analyses will be completed by an Ecology certified laboratory using the procedures specified by each analytical method. Certifications are noted on the laboratory report. The laboratory will also report method detection limits (MDLs) for metals and VOCs.

6.3 Laboratory Reporting

Laboratory reports include a cover letter, a case narrative when appropriate, the analytical results for the requested analyses, quality assurance/quality control (QA/QC) results, and the completed chain-of-custody forms. The QA/QC documentation will include dates of analysis, method blank results, surrogate recoveries for organic analyses, matrix spikes, laboratory duplicates and laboratory control samples. The laboratory will also provide an electronic data deliverable (EDD) in an EIM ready format.

7 QUALITY ASSURANCE, DATA VALIDATION, DATA REDUCTION AND CORRECTIVE ACTION

7.1 Quality Assurance for Field Procedures

7.1.1 Field Sampling Procedures Documentation

Sampling procedures, observations, decontamination, field data, and sample bottle preservatives and handling are documented on Field Sampling Data sheets completed for each sample. After completion of sampling, the sampler prepares a sampling memorandum that summarizes the field procedures. The Hydrology Field Sheet, Field Sampling Data sheets, Chain-of-Custody forms and other relevant documentation are attached to the memorandum. Samples are delivered daily to the laboratory. A chain-of-custody/analytical-request form is completed and signed by sampling and laboratory personnel. Examples of the forms are in Appendix A.

The precision of physical measurements, such as water-level measurements, is based on the general body of data for the instruments and procedures and is not specifically calculated. The accuracy of physical measurements is dependent on the instrument and procedure used for the measurement.

The accessibility and physical condition of each monitoring point is inspected during each monitoring event. Deficiencies are corrected or referred to HQLF for correction. If the function of a monitoring well declines (e.g., the yield declines or turbidity increases), redevelopment of the well will be recommended. Redevelopment typically will include mechanically surging the well casing and screen and purging of the well. Redevelopment will be completed soon after a sampling event to allow stabilization before the next event. If the well is determined to have failed, replacement of the well will be recommended.

7.1.2 Field Instrument Calibration and Maintenance

Field instruments are calibrated, used, and maintained according to manufacturer's recommendations. Instruments are calibrated a short time before the initiation of each sampling event.

7.2 Data Validation

7.2.1 Data Validation Review

Data validation review is performed and data qualifiers are assigned to sample results following procedures in *National Functional Guidelines for Organic Superfund Methods Data Review (USEPA, 2020)* and *National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020)*. The following items summarize QC criteria to be used in evaluating laboratory data:

- Holding times
- Blanks
- Surrogate recovery (organics only)
- Matrix spike/matrix spike duplicates
- Duplicates (inorganics only)
- Method Reporting Limits (MRLs)
- Laboratory Control Samples

Data qualifiers are assigned where appropriate. Occasionally used qualifiers include:

- U = not detected, MRL shown
- J = estimated concentration shown
- T = detected below the MRL, value is an estimate
- B1= blank corrected to the MRL
- B = detected in blank, concentration not corrected
- UB1 = detected in blank below MRL, MRL shown

The specified method reporting limits are listed in Table 6. The data validation review addresses laboratory precision, accuracy, and completeness requirements which are described below.

A memorandum describing the results of the data validation review is prepared and attached to the laboratory report.

Laboratory footnotes, cover letters, or case narratives may indicate difficulties or deviations from method procedures other than those listed above. These are addressed on a case-by-case basis in the data validation memorandum, should they occur.

7.2.2 Quality Assurance Objectives for Laboratory Data

The overall QA objective is to demonstrate that the data is of known and useable quality. This objective is documented in the validation memorandum using the following procedures and criteria. Typically, quality objectives are categorized under precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Definitions of each parameter follow. The precision and accuracy criteria for laboratory results are based on analytical method criteria.

Precision. Precision is the degree of agreement between replicate measurements of the same source or sample. Replicate measurements can be on the same sample or on two samples from the same source. Precision is generally assessed using a subset of the measurements made. The chemical analytical precision will be discussed in the data validation review based on method criteria.

Accuracy. Accuracy measures the level of bias that an analytical method or measurement exhibits. To measure accuracy, a known value is analyzed or measured and the result compared to the known value. For chemical analyses, the analytical method specifies the frequency and accuracy required for analysis of a spiked sample and will be addressed in the data validation review.

Representativeness. Representativeness is the degree to which data accurately and precisely represent a characteristic of the population, natural variation at a sampling point, and/or an environmental condition. There is no standard method or formula to evaluate representativeness. The field sampling plan is designed to allow collection of representative samples. The representativeness of the data is evaluated and used to identify potential data gaps, which are addressed in the annual report.

Completeness. Completeness is commonly expressed as a percentage of measurements that are valid and useable relative to the total number of related measurements made. The following formula is used to calculate completeness:

$$C = \frac{v}{n} \times 100$$

where, C = Percent completeness
n = Number of measurements
v = Number of valid measurements

USEPA recommends an 80 to 85 percent completeness criteria based on a nationwide historical database (USEPA, 1987). The 85 percent criteria will be used for laboratory analyses. Field data will have an 80 percent completeness criteria during each quarterly event.

Comparability. Comparability is a qualitative characteristic expressing the confidence with which one data set can be compared with another. The comparability goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. When precision and accuracy are known, the data sets can be compared with confidence. Comparability of data is used to evaluate the relative impacts of potential source areas and is addressed in the annual report.

7.3 Data Reduction

Data reduction is performed on field and laboratory data to assist in the interpretation of on-site conditions. Water level measurements, field water quality measurements, and laboratory data are entered into a computer spreadsheet or database after the laboratory data has been validated. Data may be further reduced for trend or other analysis.

The following procedures are followed for quality assurance of data reduction:

Computer Spreadsheets. Data entered into computer spreadsheets or a database are checked against laboratory reports and data validation memoranda. Discrepancies are identified and corrections to the computer files made. Data qualifiers are added where appropriate.

Statistical Analysis. Statistical methods and procedures are applied to groundwater data. The statistical methods and procedures are reviewed by a qualified person. The review includes a check for completeness and accuracy. Results indicating a significant difference in water quality with background are checked..

Quality Assurance for Computer-Generated Plots. Computer-generated plots may be used to illustrate trends in water quality data or to show water level contours. The quality of these plots is checked for completeness and errors by reviewing a copy of the data file used to create the plot. Assumptions made and methods used are recorded by the plot generator and reviewed by the project manager.

Formatting Compatible with Ecology EIM System. The analytical and water level data will be formatted in a manner suitable for submission to the Ecology EIM or other system specified by Ecology. This may include preparation of a computer spreadsheet in an appropriate format by the analytical laboratory or from a database. The spreadsheet must be carefully reviewed to accurately identify sample locations, include appropriate notes, include sample handling not reported by the laboratory (e.g. filtering, sample type) and correct miscellaneous entries or formats not compatible with the EIM. If a database is used the database may be used to generate an appropriately formatted csv formatted spreadsheet or cross walked to the EIM (or other specified database) in coordination with the database manager.

7.4 Corrective Action

Corrective action measures may result from non-conformance or non-compliance of analytical laboratories or field personnel with the specified procedures or criteria. The project manager will be informed of potential quality assurance problems and notified as soon as possible if field or laboratory quality assurance problems arise that may potentially jeopardize the use of collected data. Project personnel are responsible for reporting lapses in QA procedures.

Corrective steps will be addressed by the project manager when analytical data is found to be outside predetermined limits of acceptability. Corrective steps may include a procedural change, additional performance and system audits, meeting with laboratory personnel, and resampling. The designated HQLF contact will be notified if a corrective step is taken which results in a substantive deviation from the SAP.

Laboratories will be required to meet analytical method performance criteria and USEPA data validation guidelines as well as to provide documentation and annotation of data submitted.

8 BACKGROUND EVALUATION

Data collection by the detection monitoring programs at each landfill is designed to provide data that can be statistically evaluated quarterly to show whether the landfills have affected groundwater quality. The evaluations are designed to compare the most recent data to the background conditions in a statistically valid manner that minimizes the potential for false positive or false negative results. Background is defined as the natural condition of the groundwater unaffected by a release from the landfill. It is understood that background is not likely to be static so must be reevaluated periodically for both concentrations, variability and trends within the data.

This section describes the procedures that will be used to reevaluate background conditions. Background reevaluation can occur about every ten years. This allows for forty or more additional sampling events to generate data that may be used to reevaluate background. The procedures include three phases. First, the data quality will be reviewed to assure usefulness in the analysis. This review will include identifying outlier data, managing non-detections, determining sample independence and stationarity, and evaluating whether the populations are normally distributed.

Second, the data and site conditions will be evaluated using statistical tests. This will include selection of a subset of the monitoring parameters for statistical evaluation, evaluation of site specific hydrogeologic conditions, and further evaluation of the temporal and spatial variability of the data sets for effects on statistical tests. Monitoring locations at the landfill are described in Section 2-1 and site hydrogeologic conditions are described in Section 1-3. The identification of upgradient and downgradient wells is shown on Table 7. Third, the statistical evaluation method will be selected and implemented. Statistical Interval methods are appropriate for background to compliance point comparisons. A Prediction Limit Test method has been used at both landfills and is expected to be implemented at each landfill going forward.

Chapter 6 of *Guidance for Monitoring at Landfills and Other Facilities Regulated Under Chapter 173-304, 173-306, 173-350 and 173-351 WAC* as updated in 2018 describes the statistical analysis requirements and procedures to be used. This guidance document refers to the USEPA *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (*Unified Guidance*) document. The procedures described in this section comport with this guidance.

8.1 Data Quality Evaluation for Use in Statistical Tests

8.1.1 Outliers

The *Unified Guidance* defines a statistical outlier as "a value originating from a different statistical population than the rest of the sample" and provides several methods for evaluating data identified as potential outliers. It also suggests that effort should be made to determine

potential causes of data identified as potential outliers before deciding a course of action. Actions can include removing from or retaining the outlier in the dataset.

Cowlitz County has chosen to identify and evaluate potential outliers using lower and upper interquartile values determined using a spreadsheet function or box plots. The first lower and upper boundaries will be calculated using:

First Lower Boundary = first quartile ($x_{.25}$) - 1.5 x Interquartile Range (IQR)
First Upper Boundary = third quartile ($x_{.75}$) + 1.5 x IQR

The second lower and upper boundaries will be calculated using:

Second Lower Boundary = $x_{.25} - 3.0$ x IQR
Second Upper Boundary = $x_{.75} + 3.0$ x IQR

Data between the first and second boundaries are considered mild outliers. Data below the second lower or above the second upper boundaries are considered extreme outliers.

Possible causes of the outlier data will be evaluated including laboratory introduction or error, introduction during sampling or sample transport, unusual site conditions, and actual introduction from the landfill. If an outlier below or above the second lower or upper boundary, respectively, is not reproduced in subsequent samples from the location and/or a cause other than a release from the landfill is identified, the outlier datum is marked as such in the database and not used in the statistical evaluation.

8.1.2 Non Detections

Many parameters measured during monitoring are not detected at or above the analytical method quantitation limits. Parameters with a significant portion of non-detections are not selected for background evaluation because they do not meet the criterion of being shown to occur in natural water at the site. If the dataset for a parameter selected for evaluation includes a small proportion of non-detections, half the value of the detection limit will be used for these in the evaluation.

8.1.3 Statistical Independence

The regulations and guidance require that statistically independent data be used in the statistical evaluations. Since groundwater samples are collected at the same location (not spatially independent), independence is achieved by allowing enough time between sampling events for sufficient flow of groundwater past the well to assure different water is sampled (temporal independence). The *Unified Guidance* suggests that one to two months is typically sufficient but the amount of time needed depends on the local hydrogeologic conditions. The quarterly sampling program allows about three months between sampling events which is considered enough time between the samples for the analytical data generated to be independent.

8.1.4 Stationarity

Statistical tests typically require data that is spatially and temporally stationary. Spatial stationarity will be evaluated using the procedure described in Chapter 13 of the *Unified*

Guidance. This procedure includes two steps. The first step is to generate side by side box plots of the data from each well. If the box plots have largely overlapping interquartile ranges (boxes) and the medians are similar, the data is assumed to be spatially stationary. If box plots are not clearly similar, a parametric t-test or nonparametric Wilcoxon Rank Sum test may be completed to formally test spatial stationarity. If spatial variability is shown between some or all of the datasets then an intrawell statistical approach or a valid grouping of wells will be considered.

The data for the selected parameters at each well will be tested for temporal stationarity using the procedure described in Chapter 14 of the Unified Guidance. This procedure begins with generating time series plots of the data for parameters at each well. Plots of multiple parameters at single wells and single parameters at multiple wells will be evaluated to identify potential seasonal variations, autocorrelation and other trends. If these conditions appear to be described by the plots the cause of the variations will be evaluated. Further analysis using one-way ANOVA testing described in Chapter 14 will be considered to evaluate stationarity or if correction is appropriate.

8.1.5 Normal Distribution

Parametric tests have been used to evaluate data at the Cowlitz County landfills. These tests are appropriate for normally distributed data sets. The data for the selected parameters will be tested for normality. The Shapiro-Wilk Method will be applied to the data for selected parameters at each well after the outlier review. A statistics program and spreadsheet will be used to apply and document the determination of whether the null hypothesis is rejected (not normal) or not rejected (no evidence not normal) below or above, respectively, the p-value 0.05.

8.2 Statistical Test Considerations

8.2.1 Identify Parameters for Evaluation

The *Unified Guidance* suggests that evaluation of between 10 and 15 parameters should be an adequate number for most conditions. Downgradient compliance well concentrations of these parameters will be compared to background concentrations. Other parameters are reviewed after each sampling event to identify changes that might be of concern but are not routinely statistically compared to background.

The guidance suggests that the selected parameters should be expected to have the potential to be released from the landfill, mobile and stable in groundwater, and be at concentrations detectable in groundwater. The parameters listed in WAC 173-351 Appendices I and II are assumed to potentially meet these requirements for municipal solid waste landfills. The regulations require a minimum of eight observations be used to evaluate background using statistical tests.

Cowlitz County will choose the parameters for evaluation based on the data record. Most of the selected parameters are likely to be non-hazardous inorganic constituents and parameters that measure characteristics of water that are likely to change if the groundwater is affected by a landfill. The Headquarters Landfill has been monitored quarterly for about 10 years with few

outliers previously identified so the number of observations available may exceed 40 (including the background data period).

8.2.2 Evaluate Hydrogeologic Conditions of Each Well

The hydrogeologic conditions at each well will be reviewed to evaluate similarities and differences between wells. The geology penetrated, measured hydraulic conductivity, surrounding apparent hydraulic gradient, and groundwater flow direction to and away from each well will be summarized. This information will be used to evaluate the likelihood that the groundwater obtained from a well is similar to other wells.

8.2.3 Evaluate Temporal Variation of Selected Parameters

The data for the selected parameters at each well will be plotted and reviewed for temporal variations. Seasonal or other cyclic variations will be identified if present as well as rising or falling trends. This information will be used to describe natural variation in background conditions and other changes (e.g. improvement in laboratory reporting limits) that may affect the portion of the population that is useful for determining background for the selected parameters. If trends are suspected but not clear, trend tests may be applied.

8.2.4 Evaluate Natural Spatial Variation of Parameters

If the data was found to be spatial non-stationary, the differences between the mean and variance of each selected parameter will be determined. The location and magnitude of these differences will be evaluated with consideration of the hydrogeologic conditions to determine if interwell comparison of compliance well data with upgradient well data is valid. If not, an intrawell statistical approach will be evaluated.

Intrawell statistical evaluation of background appears to be reasonable for most data at the Headquarters Landfill because groundwater quality has not been shown to have been degraded. At the Headquarters Landfill some parameters in the identified upgradient background wells are known to differ from the compliance wells so an intrawell evaluation may be needed for these parameters. Fortunately the compliance wells do not appear to have been impacted by the landfill and the background well parameter levels are often higher than at the compliance wells indicating intrawell evaluation may be valid.

If an intrawell approach is indicated for a particular wells' data, the data will be evaluated to determine an appropriate look back period. The background level for this location will be determined from this period. An appropriate period will include no trends and minimal fluctuations in levels although use of clearly seasonal cycles may be needed to increase the reference sample size. If necessary this will include evaluation of the variance stationarity and potential affect on the distribution.

8.3 Determine Background Levels and Statistical Test Method

The guidance documents identify the Prediction Limit test as appropriate for comparison of compliance point and background groundwater data at landfills. Cowlitz County will continue using this method unless procedures described above indicate a different method should be used.

This method uses a prediction limit determined from background data to test future compliance data. The null hypothesis assumes that the background and compliance point data are identical so if a future datum exceeds a prediction limit it is statistically shown to not be from the background distribution and may indicate a release from the landfill.

Prediction limits will be determined using procedures described in the *Unified Guidance* (Chapter 18). The guidance describes procedures for normal and non-normal (parametric and non-parametric) data.

8.3.1 Determine Prediction Limits for Parameters

Normally Distributed (Parametric) Data

The previous evaluations of the hydrogeologic conditions and temporal and spatial variation of the data for the selected parameters at each well will be used to determine if interwell or intrawell comparisons will be used. The statistically useful portions of the background data for each parameter at each well will be identified. The number (n), mean ($\bar{x}$) and standard deviation (σ) of these data populations will be calculated.

The *Unified Guidance* provides the following equation for calculating the prediction limit for one constituent at one well:

$$Prediction\ Limit = \bar{x} + t_{(1-\alpha/m,n-1)}\, s\sqrt{(1 + 1/n)}$$

Where: t = Student's t-quantile taken from Table 16-1 of Appendix D of the *Unified Guidance*
m = one compliance data point compared to upper prediction limit
1-α = 0.05 confidence test level (95% confidence level)
n-1 = degrees of freedom for Student's test

This calculation will be completed using the appropriate data for each selected parameter from compliance wells using an intrawell test or a single background well.

Two background wells are at the Headquarters Landfill. If the data from these wells can be combined to determine the prediction limit, this equation will be applied:

$$Prediction\ Limit = \bar{x} + \kappa s$$

Where: κ = multiplier taken from Table 19-1 in Appendix D of the *Unified Guidance*

The κ-multipliers selected will be for interwell background data with the appropriate n and up to three wells (depending on spatial stationarity of the wells data). This is for 1-of-2 interwell prediction limits on observations for one constituent sampled quarterly.

Non-normal (Non-parametric) Data

If data is shown to be non-normal (non-parametric) the data will be sorted in ascending order and the second largest or other large datum will be selected as the prediction limit. The confidence level (1-α) predicted for the next compliance datum will be taken from Table 18-1 of Appendix D of the *Unified Guidance*. The confidence level for actual compliance data can be calculated as

n/n+m where m is the number of data points being compared to the prediction limit. Cowlitz County will be comparing one datum to what is expected to be a large background so ongoing comparisons of quarterly compliance data should meet the confidence level.

8.3.2 Determine Statistically Significant Increase (SSI) Criteria

Future compliance well parameter results will be compared to the prediction limits determined by these procedures. If a datum is above its' prediction limit, retesting will be performed. Retesting differs from verification sampling in that the resample data is incorporated in the statistical properties of the test. It therefore is assumed in the prediction limit determination where appropriate (e.g. interwell test using multiple background wells).

Retest data must be independent and the guidance suggests that this typically requires two months between samples depending on the hydrogeologic conditions at the well. In the context of a quarterly monitoring it is practical to use the datum from the next scheduled sampling event for the retest. This is because resampling is unlikely to be possible soon enough the datum and the next quarters' datum to be independent.

If the retest datum is below the prediction limit the test passes and there is no SSI. If the retest fails, an SSI occurs for that parameter at that well. The initial response will be to evaluate the potential for this SSI being a false positive and evaluate the site wide false positive rate (SWFPR) as described in Chapter 19.2 of the *Unified Guidance*. The parameter will be evaluated with consideration of whether SSIs have occurred in the past and/or SSIs have occurred for other parameters at that well. Actions may be required if SSIs have occurred for a significant number of parameters downgradient of the landfill area. A detailed review of the downgradient and background data for the landfill area will be complete as part of an initial action. This review will investigate if the SSIs are valid and evaluate the potential threat to environmental receptors.

WAC 173-351-440 requires assessment monitoring in response to an SSI. Should SSIs occur at the Headquarters Landfill, focusing of assessment monitoring is recommended. Many of the Headquarters Landfill monitoring wells are in bedrock with a very low hydraulic conductivity. This affects sampling conditions and potential contaminant transport. Focusing on the most likely constituents of concern and locations may be appropriate to facilitate sampling and provide comparable data between samplings.

9 REPORTING

The MSWLF specifies that quarterly and annual reports be prepared and transmitted to the jurisdictional health authority. The HQLF has elected to combine the annual report with the fourth quarter report.

9.1 Quarterly Reports

A report is submitted to the EHU and Ecology following validation and management of the data collected each quarter. The MSWLF specifies that the reports be submitted within 60 days of receipt of the analytical data. The content of the report follows Ecology guidance (Washington DOE, 2018) and includes the following:

- a form specified in WAC173-351-415 (see copy in Appendix A),
- documentation that the report was prepared by and under the supervision of a qualified licensed professional,
- statement and documentation that identifies the analytical laboratory and demonstrates that it is certified to perform the analyses in Washington,
- the field sampling memorandum,
- the data validation memorandum,
- laboratory reports,
- summary tables of the analytical data,
- statistical calculations and summaries,
- comparison of downgradient to background parameter data using a nonparametric prediction limit method or other method appropriate for the data set,
- depth to water measurements, water level elevations, water level contour plots, and gradient and flow rate estimates,
- notification of statistical increases in concentrations and concentrations above WAC173-200 criteria or other MCLs where criteria are not specified, and
- a discussion of results that describes the apparent groundwater flow conditions, geochemical conditions, and an evaluation of water quality conditions.

Statistical calculations include the following:

- mean
- variance
- standard deviation
- coefficient of variation
- standard error

9.2 Annual Reports

The annual report is integrated with the fourth quarter report. Sections are included in the report that summarize the results for the calendar year and describe variability between quarters. Trend analyses for various parameters are included.

9.3 Data Transmittal to Department of Ecology

Quarterly monitoring data will be transmitted to Ecology in a manner consistent with procedures specified by Ecology. The groundwater monitoring data will be submitted within 60 days of receipt from the analytical laboratory in an electronic form capable of being transferred into the Ecology data management system. Currently Ecology specifies the Environmental Information Management (EIM) System.

9.4 Background Data Evaluation

The occasional re-evaluation of background will be reported to the EHU and Ecology in a memorandum or letter report. These reports will include a summary description of significant changes and the cause of such changes if the cause is apparent as well as documentation of the procedures and statistical analyses. A re-evaluation will also be described in the quarterly and annual reports for the period during which it was completed.

REFERENCES

Tuppan, 2013a. *Hydrogeologic Report for the Proposed Cowlitz County Headquarters Landfill.* Revised June 14.

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Washington, State of, 1990. Chapter 173–200 WAC Water Quality Standards for Ground Waters of the State of Washington. October 31.

Washington, State of, 1988. Chapter 173-304 WAC Minimum Functional Standards for Solid Waste Handing.

Washington, State of, 2015. Chapter 173-351 WAC Criteria for Municipal Solid Waste Landfills. October 6.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others or the use of segregated portions of this report.

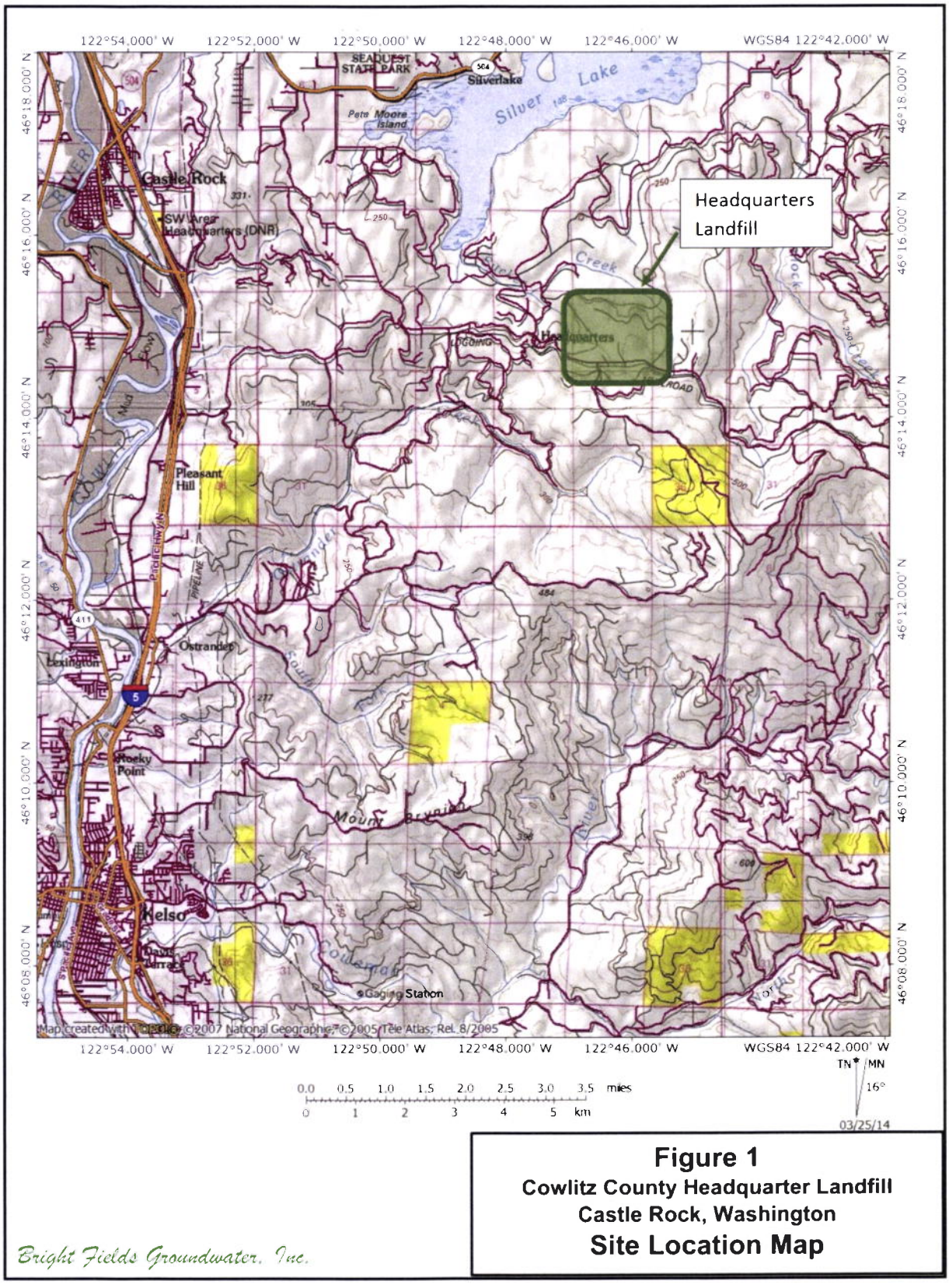


Figure 1
Cowlitz County Headquarter Landfill
Castle Rock, Washington
Site Location Map

Bright Fields Groundwater, Inc.

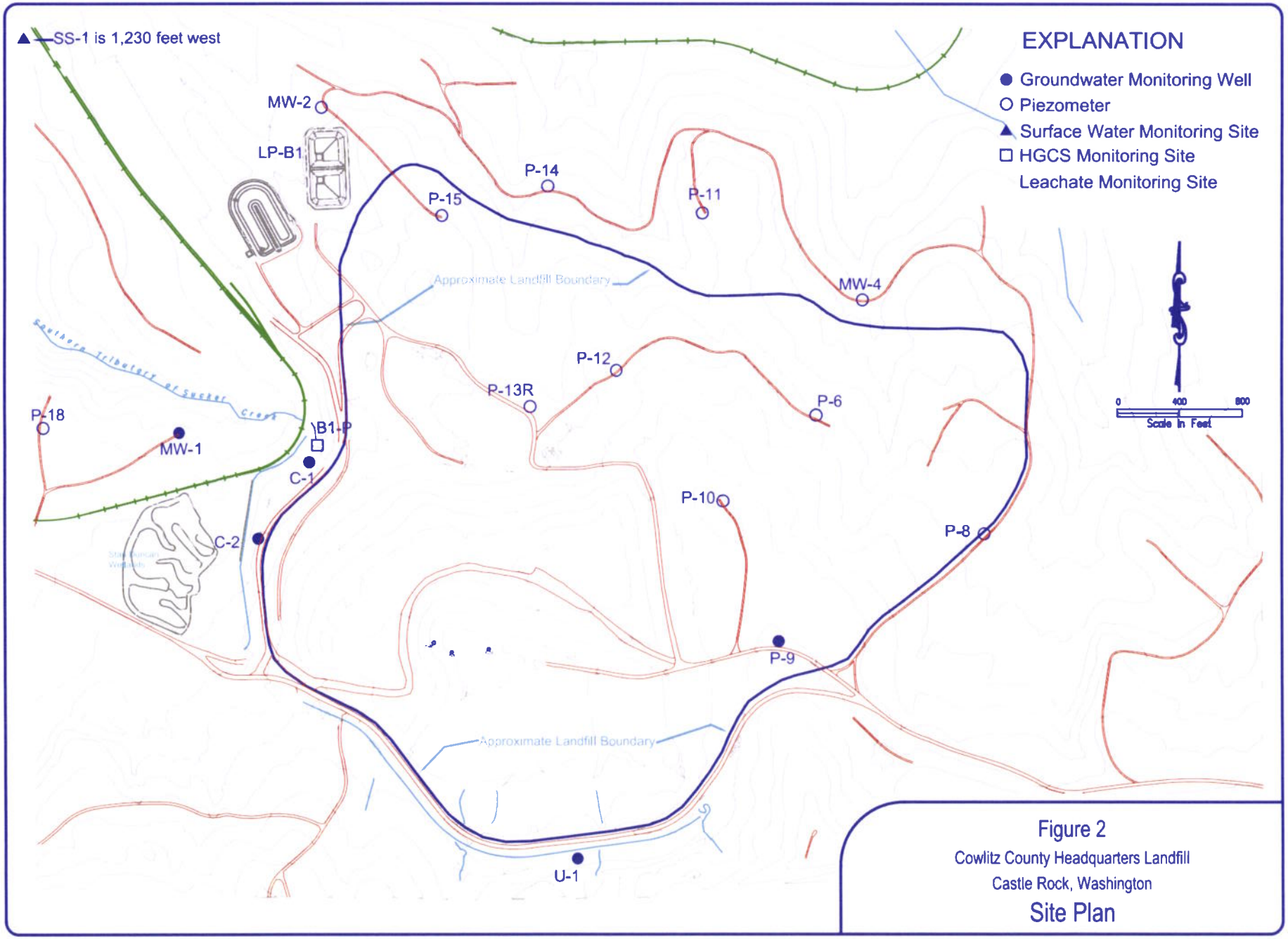


Figure 2

Cowlitz County Headquarters Landfill

Castle Rock, Washington

Site Plan

Table 1

Cowlitz County Headquarters Landfill
Monitoring Locations

Groundwater Monitoring Wells[1]	Water Level Measurements Only[2]	Hydraulic Gradient Control System	Surface Water Monitoring[3]	Leachate[3]
C-1	MW-1	HGCS	SS-1	LPN-B1
C-1	MW-2	B1-P		
P-9	MW-4			
U-1	P-6			
	P-8			
	P-10			
	P-11			
	P-12*			
	P-13R			
	P-14			
	P-15			
	P-18			

NOTE: [1]Samples will be collected and water levels measured in each of these wells.
[2]Water level measurements will be made in these piezometers.
[3]A sample will be collected at this location.
* Water level not measured to prevent fouling of probe.

Table 2

Cowlitz County Headquarters Landfill
Monitoring Well Construction Details

Well I.D.	Date Installed	Datum	Well Depth (feet btc)[1]	Top of Casing Elevation[2]	Top of Screen Depth (feet btc)[3]	Bottom of Screen Depth (feet btc)[3]	Screen Length (feet)[3]
C-1	1993	NAVD88	28.9	880.46	18.8	28.8	10.0
C-2	1994	NAVD88	54.8	928.05	38.6	53.6	15.0
U-1	1993	NAVD88	40.8	1051.40	31.3	40.8	9.5
MW-1	1989	NAVD88	40.3	860.80	30.40	39.40	9.0
MW-2	1989	NAVD88	32.0	893.21	22.1	26.1	4.0
MW-4	1989	NAVD88	13.6	859.08	12.9	13.6	0.7
P-6	1989	NAVD88	24.8	957.32	19.9	23.9	4.0
P-8	1989	NAVD88	16.8	961.85	12.9	15.9	3.0
P-9	1990	NAVD88	50.2	1079.65	45.2	50.2	5.0
P-10	1990	NAVD88	61.7	1079.30	56.7	61.7	5.0
P-11	1990	NAVD88	61.1	930.07	56.1	61.1	5.0
P-12*	1990	NAVD88	43.4	988.12	38.4	43.4	5.0
P-13R	2004	NAVD88	36.4	961.58	32.3	36.2	3.9
P-14	1990	NAVD88	28.7	877.70	23.7	28.7	5.0
P-15	1990	NAVD88	38.2	946.13	33.2	38.2	5.0
P-18	1990	NAVD88	66.0	888.85	61.0	66.0	5.0

NOTE:
1 = Depth as feet below top of casing measured in the background data wells in December 2012 following redevelopment. Depth of other wells taken from well logs and Table 2-2.
2 = Taken from Table 2-2 of the Hydrogeology Report (Tuppan, 2013), datum not cited in report.
3 = Interpolated using measurements, boring logs and Table 2-2 of the Hydrogeology Report (Tuppan, 2013).
* = Water level not measured to prevent fouling of probe..

Table 3

Cowlitz County Headquarters Landfill
Groundwater Sampling Specifications

Monitoring Well	Sampling Depth (pump inlet depth)	Depth to Top of Screen from Well Logs	Measured Flow Rate (ml/min)	Typical Drawdown (feet)	Discharge Time (seconds)	Fill Time (seconds)
C-1	27.0	18.8	125-150	1.0-2.0	4	30
C-2	52.5	38.6	50-60	1.0-1.2	5	60
P-9	46.5	45.2	350-500	0.06-0.15	5	5
U-1	35.0	31.3	90-125	1.3-1.8	4	40

Note: Depths are in feet below top of casing.
Flow rate, drawdown and controller settings vary by pump and depth to water.

Table 4

Cowlitz County Headquarters Landfill
Analytical Program

Groundwater and HGCS	
Field Parameters	
Temperature pH Specific conductance ORP/Eh Dissolved Oxygen Turbidity	
Geochemical Indicator Parameters	
Bicarbonate (HCO_3)	Iron (Dissolved)
Alkalinity (as $CaCO_3$)	Manganese (Dissolved)
Sulfate (SO_4)	Calcium (Dissolved)
Nitrate (NO_3)	Magnesium (Dissolved)
Chloride (Cl)	Sodium (Dissolved)
Total Suspended Solids (TSS)	Potassium (Dissolved)
Metals (Total)	
Antimony	Lead
Arsenic	Nickel
Barium	Selenium
Beryllium	Silver
Cadmium	Thallium
Chromium	Vanadium
Cobalt	Zinc
Copper	
Volatile Organic Compounds EPA Method 8260	
Leachate Indicators Ammonia (NH_3-N) Total Organic Carbon (TOC) Total Dissolved Solids (TDS)	
Note: WAC 173-351-990 Appendices I and II parameters except Ca, Mg, Na, and K are dissolved rather than total.	

Leachate	
Field Parameters	
Temperature pH Specific conductance	
Geochemical Indicator Parameters	
Bicarbonate (HCO_3) Alkalinity (as $CaCO_3$) Chloride (Cl) Sulfate (SO_4) Nitrate (NO_3) Total Suspended Solids (TSS)	Iron (Total) Manganese (Total) Calcium (Total) Magnesium (Total) Sodium (Total) Potassium (Total)
Metals (Total)	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Lead Nickel Selenium Silver Thallium Vanadium Zinc
Volatile Organic Compounds	
EPA Method 8260	
Leachate Indicators	
Ammonia (NH_3-N) Total Organic Carbon (TOC) Total Dissolved Solids (TDS)	
Note: WAC 173-351-990 Appendix I and II parameters except total iron and manganese rather than dissolved.)	

Surface Water	
Field Parameters Temperature pH Specific Conductance ORP/Eh Dissolved Oxygen Turbidity	
Metals (Total)	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Iron Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc
Leachate Indicator Parameters Nitrate Sulfate Ammonia TOC TDS	
Note: Metals analyses are for total recoverable metals.	

Table 5

Cowlitz County Headquarters Landfill
Summary of Sample Containers, Preservation, and Handling

Analytes	Container	Preservation and Handling
Volatile Organics	Three, 40 ml glass vials, PTFE-lined silicon septum cap	HCl to pH2, fill leaving no air space. Keep in dark on ice.
Alkalinity, HCO_3, Cl, SO_4, NO_3, TDS, TSS	One, 0.5 or 1 L HDPE bottle	Keep on ice.
NH_3,	One, 0.125 or 0.25 L HDPE bottle	H_2SO_4 to pH 2, keep on ice.
TOC	One, 40 ml amber glass vial, PTFE-lined silicone septum cap	H_2SO_4, fill leaving no air space. Keep in dark on ice
Metals	Two, 0.125 or 0.25 L HDPE bottle	HNO_3 to pH 2. Keep on ice. One unpreserved if lab filtering.

Note: The lab is requested to provide the smallest possible bottle and combine bottles if possible to facilitate sampling at low flow rates.
Bicarbonate calculated as alkalinity divided by 0.8202 as described by the USGS and therefore not analyzed by lab.
Two HNO_3 preserved bottles are needed for groundwater for total and dissolved metals if dissolved metals field filtered.

Table 6

Cowlitz County Headquarters Landfill
Analytical Methods and Holding Times

	EPA Analytical Method	Method Reporting Limit	Units	Holding Time
Organics				
Volatile Organics	8260C	0.5-20	µg/L	14 days
Indicator Parameters				
Alkalinity	SM 2320B	2	mg/L	14 days
Bicarbonate	SM 2320B	2	mg/L	14 days
Ammonia	350.1	0.05	mg/L	28 days
Chloride	300.0	0.2	mg/L	28 days
Nitrate	300.0	0.1	mg/L	48 hours
Sulfate	300.0	0.4	mg/L	28 days
Total Dissolved Solids (TDS)	SM2540C	5	mg/L	7 days
Total Organic Carbon (TOC)	SM5310C	0.5	mg/L	28 days
Total Suspended Solids (TSS)	SM2540D	5	mg/L	7 days
Metals	200.7/200.8	0.02-210	µg/L	6 months
Field Measurements				
Specific conductance	Meter	10	Micromhos/ cm at 25° C	---
pH	Meter	0.1	pH units	---
Temperature	Meter	0.1	°C	---
Dissolved oxygen	Meter	0.1	mg/L	---
Redox potential (Eh)	Meter	1	mV	---
Turbidity	Meter	0.1	NTU	---

NOTE: Reported 8260 VOCs will include compounds listed in WAC173-351 Appendix II. MDLs will be reported by the laboratory for metals and VOCs. The metals method, MRLs and MDLs are determined by the method used, metal and as affected by the matrix.

Table 7

Cowlitz County Headquarters Landfill
Identification of Upgradient and Downgradient Groundwater
Sample Locations

Monitoring Well	Location
C-1	Downgradient
C-2	Downgradient
P-9	Upgradient
U-1	Upgradient
NOTE:	

APPENDIX A

FIELD SAMPLING DATA SHEETS
HYDROLOGY FIELD SHEET
CHAIN-OF-CUSTODY FORM
REPORTING CHECKLIST

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz Co- Headquarters Rd Landfill**	Sample Location:	
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

	Measurement	Date	Time	Method
Depth to Water: Prepumping				Well Probe
Final pumping		"		

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time		Containers (number/volume/type/preservative)			Depth Taken (ft)	Field Filtration	Sampling Method
		1	1000ml	poly none		no	Bladder
"	"	1	125ml	poly HNO3	"	no	Pump
"	"	3	40ml	glass HCl	"	no	"
"	"	1	40ml	glass H2SO4	"	no	"
"	"	1	125ml	poly H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled

Sample Appearance: Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz Co- Headquarters Rd Landfill**	Sample Location:	HGCS B1-P
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

	Measurement	Date	Time	Method
Depth to Water:	Prepumping			Well Probe
	Final pumping			

Pumping Time	Rate	Fill Time	Discharge	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Flow	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly none	Surface	no	Flow stream
" "	1 125ml poly HNO3	"	"	from pipe
" "	3 40ml glass HCl	"	"	"
	1 40ml glass H2SO4			
	1 125ml poly H2SO4			

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled

Sample Appearance: Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz Co- Headquarters Rd Landfill**	Sample Location:	SS-1
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

	Measurement	Date	Time	Method
Depth to Water:	Prepumping			Well Probe
	Final pumping	"		

Pumping Time	Rate	Fill Time	Discharge	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Flow	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly None	Surface	no	Dipped
" "	1 250ml poly H2SO4	"	"	"
" "	1 40ml glass H2SO4	"	"	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled

Sample Appearance: Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: Leachate L-1
Sampling Event: Sample Field Identifier:
Sampler: Start Date/Time:
Weather:

Well Pumping Data

	Measurement	Date	Time	Method
Depth to Water: Prepumping				Well Probe
Final pumping				

Pumping Time	Rate	Fill Time	Discharge	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Flow	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly none	Surface	no	Flow stream
" "	1 125ml poly HNO3	"	"	from pipe
" "	3 40ml glass HCl	"	"	"
" "	1 40ml glass H2SO4	"	"	"
" "	1 125ml poly H2SO4	"	"	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Sample Handling: Cooler, deliver to lab same day

Comments:

Cowlitz County Headquarters Landfill
Hydrology Field Sheet

Sampling Event: _____
Measured by: _____
Weather: _____

Location	Date	Time	Measurement	Comments
U-1				
C-1				
C-2				
MW-1				
MW-2				
MW-4				
P-6				
P-8				
P-9				
P-10				
P-11				
P-12				
P-13R				
P-14				
P-15				
P-18				

CHAIN OF CUSTODY

ALS Environmental
1317 South 13th Ave., Kelso, WA 98626 | 360.577.7222 | 800.695.7222 | 360.636.1068 (fax)

SR# _____

PAGE ____ OF ____ COC# _____

PROJECT NAME
PROJECT NUMBER
PROJECT MANAGER
COMPANY NAME
ADDRESS
CITY, STATE, ZIP
E-MAIL ADDRESS
PHONE # FAX #
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐ SIM PAH☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCBs Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081☐ 8141☐ 8151☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	Metals, Total or Dissolved (See List below)	Cyanide☐ Hex-Chrom☐	(circle) pH, Cond., Cl, SO4, PO4, F, NO_3, BOD, TSS, TDS, Turb	(circle) NH_3-N, COD, TKN, TOC, DOC, NO_2+NO_3, T-Phos	TOX 9020☐ AOX 1650☐ 506☐	Alkalinity ☐ CO_3 ☐ HCO_3 ☐	Dioxins/Furans 1613☐ 8290☐	Dissolved Gases RSK 175☐ Methane☐ Ethane☐ Ethene☐ CO_2☐			REMARKS

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. CLP Like Summary (no raw data)
___ IV. Data Validation Report
___ V. EDD

INVOICE INFORMATION

P.O. # _____
Bill To: _____

TURNAROUND REQUIREMENTS

____ 24 hr ____ 48 hr
____ 5 day
____ Standard (15 working days)
____ Provide FAX Results

_____
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: ____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature _____ Date/Time _____	Signature _____ Date/Time _____	Signature _____ Date/Time _____	Signature _____ Date/Time _____
Printed Name _____ Firm _____	Printed Name _____ Firm _____	Printed Name _____ Firm _____	Printed Name _____ Firm _____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

CHECKLIST FOR GROUNDWATER REPORTING
Municipal Solid Waste Landfills
WAC 173-351-415

Include a signed, completed copy of this checklist with each quarterly and annual report.

Quarterly groundwater reports shall be submitted to the jurisdictional health department and Ecology within 60 days of receipt of analytical data. Annual groundwater reports shall be submitted to the jurisdictional health department and Ecology by April 1 of each year.

1st_____ 2nd_____ 3rd_____ 4th_____ YEAR_____	Reference (section. subsection)	Included in this report	Location – page # or appendix #
***Quarterly Groundwater Reports**: 173-351-415 (2) plus the referenced section*			
Statistical calculations and summaries			
Descriptive statistics	420, (1)	☐	
Statistical tests	420, (2)	☐	
Notification of statistical increase (if applicable)	420, (4)	☐	
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	☐	
Static water level readings	415, (2)	☐	
Potentiometric surface elevation maps depicting flow direction	415, (2)	☐	
Flow rate – calculated	415, (2)	☐	
Cation-anion balances	430, (5a)	☐	
Explanation of greater than 5% (or 10%) difference if needed	430, (5a)	☐	
Trilinear diagrams	430, (5b)	☐	
Leachate analyses (if sampled and tested)	415, (2)	☐	
Data entered into EIM database (date entered: _____)	415, (3)	☐	
Complete copy of the lab report with chain of custody record.		☐	
***Annual Groundwater Reports**: 173-351-415 (1)* **YEAR**_____			
Summary of statistical results and trends	415, (1)	☐	
Summary of groundwater flow rate and direction for the year	415, (1)	☐	
Copy of all potentiometric maps for the year	415, (1)	☐	
Summary geochemical evaluation	415, (1)	☐	
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	☐	

_____ _____ _____

Signature of Report Author | Date | Landfill

If you need this publication in an alternate format, please call the Waste 2 Resources Program at (360) 407-6900. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

APPENDIX B

SITE SAFETY AND OPERATIONS PLAN

SITE SAFETY AND OPERATIONS PLAN

PROJECT INFORMATION

SITE: Cowlitz County Headquarters Landfill DATE: May 10, 2023

LOCATION: 3434 Silver Lake Road PREPARED BY: Dennis Dykes

Castle Rock, WA 98632 PROJECT NUMBER:

PROJECT MANAGER: Dennis Dykes

CLIENT CONTACT: Michele Horn, (360) 274-6492

PROJECT OBJECTIVES: Quarterly detection monitoring program implementation

SCOPE OF WORK: Sample monitoring wells, surface water, and leachate. Conduct maintenance and repair of monitoring system as needed.

START DATE: June 2023 COMPLETION DATE: Ongoing

NOTE: This Site Safety Plan must be re-evaluated and updated when site conditions or scope of work changes.

FACILITY DESCRIPTION AND BACKGROUND

TYPE OF FACILITY: Operating Municipal Solid Waste Landfill

SIZE: Approximately 600 acres BUILDING/STRUCTURES: Two pump station,, one service bldg, gas flares

ACCESS: Access to site is through Weyerhaeuser security gate on 1600 road west site.

TOPOGRAPHY: Irregular with filled cells rising 60-100+ feet above hills and drainage topography.

GENERAL GEOLOGIC/HYDROLOGIC SETTING: Weathered and eroded lithic tuff and basaltic rock. Landfill constructed in the upper reach of South Sucker Creek.

SITE STATUS: Operating landfill.

PREVIOUS HAZARDOUS MATERIAL/WASTE STORAGE AND DISPOSAL METHOD(S): Municipal waste disposed on site using standard fill and cover procedures.

SITE HISTORY: Operations began in the early 1990s as a limited purpose landfill constructed by the Weyerhaeuser Company primarily for paper mill waste. The landfill was purchased and re-permitted as a municipal solid waste landfill by Cowlitz County in 2013 and began receiving municipal waste in 2014. Weyerhaeuser constructed and filled Cells 1 through 6 and Cowlitz County began filling in Cell 6 and has constructed and filled in Cells 7 through 9. The landfill plan includes 22 cells.

SPECIAL CONDITIONS/COMMENTS: The site is an active landfill with numerous trucks transiting and unloading frequently.

WASTE TYPE(S)/CHARACTERISTICS

ARE HAZARDOUS SUBSTANCES KNOWN TO HAVE BEEN STORED/SPILLED ON SITE? ☐ YES ☒ NO

SOURCE(S) OF INFORMATION: _____

Compound	Maximum Concentration Encountered or Anticipated			Depth
	Soil (ppb)	Water (ppb)	Air (ppb)	(ft below grade)

SPECIAL CONSIDERATIONS/COMMENTS: Coordinate all activities on site with Cowlitz County Solid Waste personnel. No smoking. Avoid contact with leachate.

HAZARD EVALUATION

CHEMICAL HAZARDS: Landfill gas and leachate may be encountered during sampling. Landfill gas contains predominantly methane and carbon dioxide, and may also contain hydrogen sulfide, carbon monoxide, VOCs, and other toxic gases at low levels. Low level exposure is currently possible primarily at the leachate sampling site and near the active waste unloading area. Exposure to site contaminants may occur via inhalation and skin contact. Reduce potential contact exposure by wearing vinyl gloves. Consider using safety glasses, nitrile gloves, and Tyvek coated coveralls when activities indicate a higher risk of exposure. Reduce potential inhalation exposure by working upwind when possible. Withdraw from site and consider implementing air monitoring, mechanical ventilation and/or respiratory protection under a new Site Safety and Operations Plan if unusual conditions are encountered.

PHYSICAL HAZARDS:

Explosive gases: Explosive concentrations of methane gas generated by the landfill may accumulate in confined or low spaces. Avoid areas where gases may accumulate. If entering confined spaces where gas may accumulate is necessary, a confined space entry program must be developed before entry. Monitor with a combustible gas meter if conditions at a sampling location indicate a hazard may be present.

Heavy Equipment: Potential physical hazard from working near equipment and roads is present. Hard hat, steel-toe boots, safety glasses with side shields, and hearing protection as appropriate are required when hazards are present. Keep clear of moving or rotating equipment. Signal equipment operator when approaching equipment.

OPERATIONS PLAN

VICINITY MAP / EMERGENCY ROUTE: On the attached figure.

SITE SKETCH: On the attached work plan.

UNDERGROUND UTILITY CLEARANCE PERFORMED ON: _____ BY: _____

EXCAVATION, DRILLING, AND/OR SAMPLING METHOD(S): Groundwater sampling using dedicated bladder pumps. Surface water and HGCS sampling by dipping bottles in water. Leachate sampling using disposable bailers in sump.

COMMENTS: _____

SAFETY EQUIPMENT AND PROCEDURES

INITIAL LEVEL OF PROTECTION: ☐ C ☒ D

REQUIRED PERSONAL PROTECTIVE EQUIPMENT: Hard hat, steel-toe boots, hearing protection, and safety glasses with side shields required when in the vicinity of heavy equipment. Vinyl gloves required when handling groundwater and leachate samples.

AIR MONITORING EQUIPMENT AND PROCEDURES: Air monitoring equipment is not required during sampling. If hazardous conditions develop during sampling the sampler must withdraw from the area, report the conditions to Cowlitz County personnel, record the conditions in the field notes, and not return to the area until the hazard has been corrected or new procedures developed.

ACTION LEVELS: _____

COMMUNICATIONS: Use cell phone to summon emergency assistance, if needed. If cell service not available contact Cowlitz County personnel or return to office for landline use.

DECONTAMINATION PROCEDURES: Decontamination procedures are not needed after routine sampling. Discard disposable materials and equipment with municipal waste. If unusual or uncertain conditions are encountered wash hands and face thoroughly prior to breaks and before leaving site.

KEY PROJECT PERSONNEL

SITE TEAM (no.): 1 Monitoring contractor __ Client __ Agency __ Other (Drill crew)

SITE WORK TEAM (name/responsibility): 1. Contracted field sampling personnel

2. _____ 3. _____

4. _____ 5. _____

ENTRY BRIEFING DATE: First day of site work LOCATION: Site

NOTE:

SPECIAL CONDITIONS (e.g., work schedule or limitations): Work during daylight hours.

EMERGENCY PROCEDURES

ACUTE EXPOSURE SYMPTOMS(S):	FIRST AID:
Eyes - slight to moderate irritation	Flush with water for 15 minutes.
Skin - irritation, redness, edema, drying	Wash with soap and water.
Ingestion -	Do not induce vomiting, call a physician.
Respiratory – dizziness, irritation of eyes, nose and throat, vomiting, bluish skin effects	Remove to fresh air.

NEAREST HOSPITAL/EMERGENCY MEDICAL CENTER:
St. John's Medical Center, 1614 E. Kessler Blvd., Longview, WA
911 or 360-414-2000

EMERGENCY ROUTE: (also see attached map)
Take 1600/Headquarters Road to I-5 south. Take Exit 36B Longview/SR432 West. Follow SR432/Tennant Way to Oregon Way/15th Avenue. Right on 15th Avenue to Kessler Blvd. Left on Kessler Blvd. to Emergency entrance.

EMERGENCY PHONE NUMBERS:

Ambulance, police, fire		Dial 911
Cowlitz County Landfill	Michele Horn	360-274-6492
Project Manager	Contractor	
Health and Safety Manager	Contractor	
Branch Manager	Contractor	

HEALTH AND SAFETY EQUIPMENT CHECKLIST

**** THE FOLLOING SAFETY EQUIPMENT IS REQUIRED ON YOUR JOB SITE****

- ☐ Photoionization Detector or Flame Ionization Detector – OVM 100 ppm isobutylene standard
- ☐ Combustible Gas Detector – methane and oxygen detector
- ☐ Oxygen Indicator – methane and oxygen detector
- ☐ Draeger/Sensidyne Pump and Detector Tubes – Hydrogen sulfide
- ☐ Respirator – Half or full-face respirator with organic vapor cartridge; change daily
- ☐ Protective Clothing – Tyvek
- ☐ Chemical Protective Gloves – Nitrile gloves
- ☐ Decontamination Equipment – Hot water pressure washer
- ☐ Steel-toed Boots – required on all job sites
- ☐ Disposable Boot Covers
- ☒ Protective Gloves – vinyl or nitrile gloves when handling sample water and leachate
- ☒ Hearing Protection – use when appropriate
- ☒ Safety Vest – use when appropriate
- ☒ Safety Glasses – use when appropriate
- ☒ Hard Hat – use when appropriate
- ☐ Caution Tape, Traffic Cones, or Barriers
- ☐ Emergency Eye Wash Fountain
- ☒ First Aid Kit – located in field vehicle
- ☒ Fire Extinguisher – located in field vehicle
- ☒ Drinking Water
- ☐ Mechanical ventilation – i.e., brush fan or portable blower
- ☐ _____

PLAN APPROVALS

Project Manager		
Regional Health & Safety Manager		
Title	Signature	Date

SIGNATURE PAGE

SITE: Cowlitz County Landfill PROJECT NUMBER: _____

NOTE: All personnel are to understand and comply with specific practices and guidelines identified or described in this SSOP. All personnel are expected to use common sense when hazards are identified by themselves or other on site personnel. Personnel are expected to reduce the hazard if safely possible, warn other on site personnel if the hazard may affect them, report the hazard to project manager and HQLF personnel, and remove themselves from the hazardous conditions.

SIGN-OFF: I have read and understand the attached Site Safety and Operations Plan and attached General Safe Work Practices, and agree to comply with the requirements described within:

NAME	TITLE	DATE

GENERAL SAFE WORK PRACTICES

Field operations for this project shall be conducted with common sense and in accordance with minimum common and typical safety practices described below.

SAFETY PRACTICES FOR FIELD PERSONNEL

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in any area where the possibility of contamination exists.

2. Hands must be thoroughly washed when leaving a contaminated or suspected contaminated area before eating, drinking, or any other activities.

3. Contaminated protective equipment shall not be removed from the work area until it has been properly decontaminated or containerized on site.

4. Avoid activities which may cause dust. Removal of materials from protective clothing or equipment by blowing, shaking, or any means which may disperse materials into the air is not advised.

5. Personnel should be cautioned to inform each other of subjective symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract.

6. No excessive facial hair which interferes with a satisfactory fit of the face piece-to-face seal will be allowed on personnel required to wear respiratory protective equipment.

7. At sites with known or suspected contamination, appropriate work areas for field personnel support, contaminant reduction, and exclusion will be designated and maintained.

8. A first aid kit and multipurpose portable fire extinguisher must be available during field activities.

9. All field personnel will, whenever possible, remain upwind of open wells, sumps, or other areas that may release gases.

10. Subsurface work shall not be performed at any location until the area has been cleared by a utility locator firm to be free of underground utilities or other obstructions.

11. Field personnel will not enter into excavations, trenches, or other confined spaces deeper than 4 feet. Unattended boreholes must be properly covered or otherwise protected.

Emergency route map from Headquarters Landfill to Hospital

Take 1600/Headquarters Road to I-5 south. Take Exit 36B Longview/SR432 West. Follow SR432/Tennant Way to Oregon Way/15th Avenue. Right on 15th Avenue to Kessler Blvd. Left on Kessler Blvd. to Emergency entrance.

Taken from Google Maps

Sampling and Analysis Plan
for the
Cowlitz County Tennant Way Landfill

March 2024 Revision

Prepared for
Cowlitz County Department of Public Works
March 5, 2024

Prepared by

Bright Fields Groundwater, Inc.

3800 NE 399th Street
La Center, Washington 98629
Phone: (360) 263-6307
Internet: ddykes@tds.net

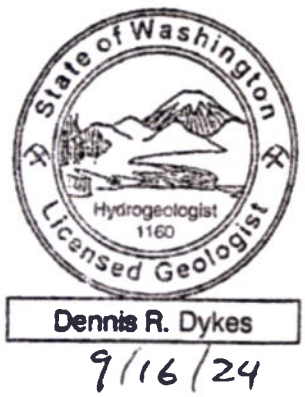
CONTENTS

CONTENTS (Continued)

FIGURES AND TABLES

The material and data in this report were prepared by or under the supervision and direction of the undersigned.

Sampling and Analysis Plan for the Cowlitz County Tennant Way Landfill
Revised March 5, 2024



Bright Fields Groundwater, Inc.

Dennis R. Dykes, LHG
Senior Hydrogeologist

1 INTRODUCTION

This document is the revised Sampling and Analysis Plan (SAP) for the Cowlitz County Tennant Way Landfill (CCTWL). The CCTWL is a closed municipal solid waste landfill (MSWLF) located at 85 Tennant Way, Longview, Washington (see Figure 1). The landfill is owned by the Cowlitz County Department of Public Works (CCDPW). This SAP revises and updates the SAP dated March 21, 2013. The SAP is being revised to update site conditions since closure, update monitoring procedures, and review compliance with regulatory guidance.

The landfill is monitored in compliance with the Minimum Functional Standards for Solid Waste Handling (MFS) and the Criteria for Municipal Solid Waste Landfills (CMSWL). The MFS are defined in the Washington Administrative Code (WAC) Chapter 173-304 and the CMSWL are defined in WAC 173-351. The Cowlitz County Environmental Health Unit (EHU) is the jurisdictional health authority as defined in the applicable WACs. The Department of Ecology (Ecology) advises the EHU. The groundwater monitoring requirements are specified in WAC 173-304-490 for the MFS and Chapter 173-351-430 for the CMSWL.

The CCTWL includes two units identified as Sites A and B. Site A of the CCTWL was closed in 1992 and is monitored under the MFS although monitoring is consistent with Site B monitoring for simplicity. Site B includes three closed cells and is monitored under the CMSWL.

1.1 SAP Purpose and Objectives

The purpose of this SAP is to provide background information and describe procedures that when implemented assure compliance with *WAC 173-351-410 Groundwater sampling and analysis requirements*. The objectives are to describe the type and quality of data to be generated for this purpose as well as the procedures to be used to acquire and review the data. WAC 173-351-410(1) requires that "*The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells installed in compliance with WAC 173-351-400 and with this section.*"

The data must be of sufficient quality and quantity to "*determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the particular groundwater monitoring program*" (WAC173-351-420(3)). Background values have been evaluated using the more the monitoring data generated under the permit in a separate report (Bright Fields Groundwater, 2023). The evaluation of whether a statistically significant increase over background has occurred is completed as part of the reporting specified in Section 8 below.

The SAP also provides guidance to accomplish the required field tasks in a safe and efficient manner. Safety measures that are to be followed while on site are detailed in the Site Safety and Operations Plan (Appendix B).

1.2 Site Background

The CCTWL is located in the northeast quarter of Section 10 and the northwest quarter of Section 11, Township 7 North, Range 2 West of the Willamette Meridian. The landfill is located on the floodplain of the Cowlitz River near the confluence with the Columbia River. It is bounded on the south by a narrow property that fronts a slough of the Cowlitz River, on the west by a man-made log pond, on the east by Burlington Northern, Inc. railroad tracks, and on the north by rail line to the Port of Longview. A site location map is presented as Figure 1.

The landfill began operations in 1975 and formally entered post closure care in 2017. The total area of the landfill is approximately 100 acres (Figure 2). Site A is approximately 38 acres located in the northern part of the landfill. Site A received its final waste in December 1991 and a cover was installed in 1992. Site B is composed of three adjoining cells. Cell 1 is approximately 10 acres in size and located in the south central part of the landfill. It was constructed with a liner and began receiving municipal solid waste in December 1991. Cell 2 is approximately 9 acres in size and located immediately west of Cell 1. Cell 2 was also constructed with a liner and began receiving waste in January 1994. Both Cells 1 and 2 were closed in 2000 with installation of the final cover. Cell 3 is in the southeastern portion of the landfill and began receiving waste in September 1999. It was also constructed with a liner and received its' final load of waste in March 2014. The final cover was completed in 2015. The CCTWL entered post closure care on July 1, 2017 following completion of all closure requirements.

Groundwater, surface water, and leachate have been monitored at the landfill since 1983. Groundwater levels have been measured during each sampling event. Water samples have been collected for analysis from the monitoring wells, surface water sites, and the leachate sites.

The monitoring system currently consists of 12 monitoring wells, 15 piezometers, one location for measurement of the river level, two surface water sampling locations, and 3 leachate sampling locations (Table 1 and Figure 2). The monitoring well network at the landfill was expanded in conjunction with the phased development of the landfill. Monitoring well construction details are listed on Table 2.

1.3 Geology and Hydrogeology

The landfill is located in a meander of the Cowlitz River near its confluence with the Columbia River. The site is underlain by sand, sandy silt and silt. The meander developed by eastward migration of the river and deposition of sediment inside the meander. Former river or flood channels are apparent on historic aerial photographs (Figure 1). The river likely eroded and redeposited sediments within the meander. This process may have created separate lithologic sequences that generally trend east to west at the site.

The sequence under the southern part of the site is comprised of sand in the upper part of the saturated zone. Under the northern part of the site is a finer grained sandy silt or silt. The saturated portion of the sand layer is generally between 30 and 35 feet thick and is underlain by a silt layer. The monitoring wells in the central and southern parts of the site monitor the upper and lower parts of this sand layer. The northern silt sequence is at least 49 feet thick at

monitoring well MW-5A. The monitoring wells in the northern part of the site are screened in the silt material.

The regional hydrogeology in the site vicinity is characterized by recharge to bedrock aquifers in upland areas and discharge to the Columbia and Cowlitz Rivers. Groundwater flows from the regional bedrock aquifers through the thick alluvial sequence in the river valley before discharging to the rivers (Meyers, 1970). Precipitation also infiltrates the surface of the alluvium, recharging local flow systems in the river's floodplain.

The hydrogeology of the site area appears to be dominated by a local flow system. This flow system appears to be defined and controlled by a meander of the Cowlitz River and a log pond. The river defines the base level on the north, east and south sides of the meander. The log pond defines the base level on the west side of the site (Figure 1). Precipitation incident on this area will recharge the uppermost saturated part of the alluvium and flow radially to the discharge areas. Flow toward the river will predominate because the log pond is generally at a higher elevation than the normal river level and the finer grained aquifer material in the northern part of the site will slow the vertical distribution of infiltrating water supporting higher groundwater levels.

Water entering the local flow system on the northern side of the site generally flows south and southwest with a slight downward vertical component to flow. The vertical component of flow will act to distribute a portion of the flow downward in the saturated zone. In the southern part of the site, horizontal flow predominates. The upper part of the sand layer has a substantially higher hydraulic conductivity than the lower part therefore the upper part of the sand layer will likely transmit most groundwater flow in the central and southern part of the site. The horizontal gradient may also flatten due to the higher hydraulic conductivity. The direction of flow in the southern part of the site shifts to the southwest toward the discharge area in the slough.

Although the average flow direction will be to the south, river tides and high river levels may cause short term reversals of flow under the southern boundary of the site. These reversals will most likely occur during high tide and at river flood stages. Bank storage will be induced by the reversed flow into the river bank. Such bank storage will flow back to the river as the river level declines. During extended periods of high river level, groundwater levels upgradient of the bank storage area are likely to rise due to recharge and inhibited downgradient flow.

1.4 Surface Water

The landfill is located within a meander of the Cowlitz River. The Cowlitz River runs generally less than 2000 feet from the northern, eastern, and southern boundaries of the property (Figure 1). A lock to the log pond owned by Pacific Fibre Products, Inc. (PFP) is about 150 feet west of Site A although closer to the property boundary. The log pond itself is at least 300 feet to the northwest of the northern property boundary. Surface water is more than 200 feet from Cell 3 of Site B.

The landfill is within a diked area that is protected from floodwaters of the Cowlitz and/or Columbia rivers. The dikes are constructed to provide protection from a 500-year flood. Therefore, the landfill is not likely to be eroded by a 100-year flood.

There are two flood gates located on the lock of the PFP log pond. An inner lock (north) and an outer lock (south) are operated by PFP. These locks prevent floodwater from entering the log pond. The locks are occasionally opened by the PFP to test if they are in working order. Overflow from the log pond flows into Diking District Ditch No. 3 located north of the log pond. The discharge from Ditch No. 3 is pumped into the Columbia River.

Stormwater drainage ditches are located on the western, eastern, northern and a short section of the southern boundaries of the landfill. Drainage also occurs from the area between Site A and Site B discharging to the west. Stormwater is conveyed in these ditches to the northwest corner of the landfill where it is discharged to a 48-inch diameter culvert composed of ½-inch thick mild steel. The culvert directs runoff north to an area that eventually drains into the log pond. The sandy soil and grass lining of the ditches infiltrates and slows water flow in the ditches. Flow is typically not evident in the ditches except at the northern discharge.

Stormwater runoff from Site A is collected in vegetated ditches. These ditches convey runoff to the perimeter ditches. Runoff from the closed cells of Site B is collected in ditches and pipes and also discharge to the perimeter ditch system.

Stormwater from the northeast part of the site, which includes buildings and roadways, is collected in a 48-inch diameter concrete storm drain. This storm drain discharges on the northwest corner of the landfill to the stormwater discharge culvert.

2 SAMPLING LOCATIONS, FREQUENCY AND ANALYSIS

Groundwater, surface water and leachate at the landfill are monitored quarterly. The locations and frequency of sample collection and the sample analyses are described in this section.

2.1 Monitoring Locations

Groundwater is monitored at 12 monitoring wells and 15 piezometers at the CCTWL (Table 1 and Figure 2). Twenty four of the monitoring wells and piezometers are installed as shallow and deep well pairs. The shallow wells/piezometers are designated with a B extension (e.g., MW-5B) and the deep piezometers with an A extension (e.g., MW-5A). The remaining two monitoring wells and one piezometer are shallow installations and are not identified with a B extension. The well construction details are listed on Table 2.

Site A is monitored by five well/piezometer pairs. Groundwater levels are measured in each. Groundwater samples are collected for analysis from wells MW-3B, -5B, -7B and -11B. Upgradient conditions are represented by MW-5B located north of Site A of the landfill. Piezometers MW-2A and -2B, which are not sampled, are also located north of the landfill and typically have the highest groundwater levels at the site. MW-3A and –3B are located on the southwest side of Site A. Monitoring wells MW-7A and -7B, and MW-11A and -11B are located between Site A and Cells 1 and 2 of Site B. These three well pairs are downgradient of Site A and upgradient of Cells 1 and 2 of Site B.

Cells 1 and 2 of Site B are monitored by six well/piezometer pairs. Groundwater levels are measured in each well. Groundwater samples are collected for analysis from wells MW-3B, -7B, -8B, -9B, -10B, and -11B. Upgradient conditions are represented by monitoring wells MW-3B, -7B, and -11B. Monitoring wells MW-8B, -9B, and -10B are downgradient of Cells 1 and 2.

Cell 3 of Site B is monitored by four well/piezometer pairs, two other shallow wells, and one other piezometer. Groundwater levels are measured in each well and piezometer. Groundwater samples are collected for analysis from wells MW-12B, -13, -14B, -15, and -16B. Upgradient conditions are represented by monitoring wells MW-16B. Monitoring wells MW-12B, MW-13, MW-14B, and MW-15 are downgradient of Cell 3. Piezometers MW-1A and -1B and PZ-2 are located cross gradient east of the cell although they often are shown to be upgradient of the cell.

Surface water samples are collected at two locations (Figure 2). These locations include the stormwater discharge culvert (RD-1) north of the leachate ponds and the log pond lock (S-2) near the northwest corner of the landfill.

A water level measurement is taken in the slough south of the site at the beginning and end of the water level measurement round (see section 4.1 for description of the measurement round). This measurement is taken at a survey cap set in the concrete on the west side of the head works of the log pond lock gate.

Leachate samples are collected at three locations of the landfill's leachate collection system. The leachate sampling location for Site A is in the northwestern corner of the landfill (L-1 sampling location). The L-1 sump receives water from the Site A perimeter underdrain. The leachate sampling location for Cells 1 and 2 of Site B is near the south central boundary of the landfill (L-2 sampling location). The L-2 sump receives leachate from the Cells 1 and 2 collection system and the leachate from the Cell 3 collection system. The leachate sampling location for Cell 3B of Site B, which was added to the sampling program in October 1999, is a sump in the northern part of the area near the entrance to the landfill (L-3 sampling location). The three sampling locations are shown on Figure 2.

2.2 Monitoring Frequency

Groundwater, surface water and leachate are sampled quarterly in January, April, July and October at the identified locations. Water levels are also measured quarterly in a continuous round during each sampling event.

2.3 Sample Analyses

Groundwater, surface water and leachate samples are analyzed as indicated on Table 4. Groundwater samples are analyzed for the parameters listed in WAC 173-351-990 Appendices I and II. Leachate samples are analyzed for the same parameters. Surface water samples are analyzed for the inorganic parameters listed in Appendix I (metals and nitrate) plus iron and manganese. The analytical methods are described in Section 6.

The CCTWL conducted an Assessment Monitoring Program (AMP) in 2011 (Bright Fields Groundwater, 2011). This program included additional analyses listed in WAC 173-351-990 Appendices III. The results of the AMP did not identify additional parameters for analysis in the detection monitoring program.

Immediately prior to the AMP the CCTWL dedicated pumps to each sampled well and converted to the low flow sampling method. As part of the conversion the SAP was revised to include the new sampling method and to switch groundwater metals analyses to total metals from dissolved. Therefore, total metals have been reported for eight sampling events without a notable change in metals concentrations. WAC 173-351-430 (2)(b)(ii) is therefore not applicable to the CCTWL.

Field parameters listed in WAC 173-351-990 Appendix II are measured in each sample. The oxidation reduction potential (ORP), turbidity, and dissolved oxygen are also measured in groundwater in the field as part of the sampling procedures.

3 DECONTAMINATION PROCEDURES

This section describes the procedures for decontamination of equipment and handling and disposal of decontamination liquids. The low flow/low stress sampling method is used to sample groundwater at the CCTWL. This method minimizes the equipment and materials that may contact the sample water. Leachate samples are collected using disposable bailers that do not require decontamination. Decontamination is therefore typically limited to the equipment used for field measurements and other occasionally used equipment or accidental spillage.

3.1 Decontamination

Bailers, pumps and other sample collection equipment do not typically require decontamination before use. Disposable bailers are pre-cleaned before packaging and the pumps are dedicated to the wells. When necessary the sampling equipment is decontaminated with a non-phosphatic detergent wash, distilled water rinse, a final distilled water rinse, and a sample rinse. Disposable equipment, which is decontaminated by the manufacturer, is rinsed using purge water or the first bailing of lechate immediately prior to use. Disposable equipment and supplies are discarded after use.

3.2 Handling and Disposal of Decontamination Liquids

Decontamination liquids with potentially significant contamination are placed in appropriately sized containers for transfer to the CCTWL leachate control system when quantities are significant. The containers will be sealed and labeled if stored more than a few hours. The label will include the date, sampler's name, contents of the container, and the source of the liquids (e.g., decontamination of bailer used in MW-3B). The CCTWL is responsible for staging stored containers and disposing of the contents.

4 GROUNDWATER SAMPLING PROCEDURES

Groundwater sampling at the CCTWL is conducted using the Low Flow (Low Stress) Purging and Sampling Procedure. In this method groundwater is pumped from the well at a rate that minimizes disturbance of the aquifer and static water column in the well.

Dedicated low flow electric SS Sample Champ submersible pumps manufactured by Proactive Environmental Products are installed in the sampled monitoring wells. The pump installations include Teflon lined tubing, a power cable, and stainless steel suspension cables. The tubing and power cable are zip tied to the suspension cable. The suspension cable is attached to a well cap and when closed the tubing and power cable are within the well covered by the cap. A hook is attached to the suspension cable about five feet below the cap and used to support the pump during sample collection.

Sampling is initiated by positioning the vehicle and sampling equipment at an appropriate location near the well. The well vicinity and well itself are observed and any unusual conditions noted on the Field Sampling Data sheet for the well and photographed if appropriate.

4.1 Water Level Measurement

Depth to water in each well is measured to the nearest 0.01 foot using an electric water level measurement probe. Water levels are measured in the wells prior to and during sampling as well as during a special measurement round.

Measurements during purging and sampling are used to determine if flow rate adjustment is needed and to document the drawdown within the well thereby documenting low stress of the aquifer. An initial water level measurement is made after opening the well and setting the pump at the sampling depth. The water level is measured again after completion of equipment set up and before initiation of pumping to evaluate water level stability. Water levels are measured at regular intervals during purging and sampling to document whether the drawdown is less than 0.3 feet which is optimal for the sampling method. Measurements taken during sampling are recorded on the Field Sampling Data sheet for that well. A final measurement is taken shortly before turning the pump off. An example of a data sheet is provided in Appendix A. The type of well probe used is recorded in the field notes.

A continuous water level measurement round is conducted to collect data needed to determine the groundwater flow direction. This round is designed to minimize the potential influence of river tides on the representativeness of groundwater level measurements. The water level measurement round is started at low tide and proceeds as quickly as possible. Measurements are first taken in the slough and on the southern side of the site in the wells nearest the river. Measurements then proceed to the north. The water level in the slough is measured again at the end of the round. Measurements taken during the water level measurement round are recorded on a Hydrology Field Sheet. The wells are listed on the field sheet in the order measured. The time of low tide at Longview as predicted by NOAA is also noted on the field sheet. An example of a Hydrology Field Sheet is provided in Appendix A.

4.2 Groundwater Sampling Procedures

The pump inlets are set at a level two feet below the top of the screen in each well except where static water levels have been measured below the top of the screen. In these wells the pumps are set two feet below the lowest measured water level. A summary of the pump setting criteria is provided in Table 3.

The pumps are equipped with up to five feet of tubing, suspension cable, and electrical cable above the top of the well when withdrawn and hooked at the top of the well. The extra tubing and electrical cable is used to facilitate sampling. A hook is clamped to the suspension cable and used to suspend the pump at the specified depth from the top of the well during sampling. The extra tubing and cable is suspended within the well under the well cap between sampling events.

The SS Sample Champ pumps are simple to operate and maintain. The controller includes one knob used to vary the output voltage to the pump and a digital readout of the output voltage.

4.2.1 Purging and Field Measurements

The wells are purged prior to sample collection using the submersible pumps dedicated to each well. Purging is initiated by slowly increasing the pump controller voltage until water is observed flowing in the tubing. A typical voltage for each well is shown on Table 3 although the actual voltage will vary depending on the groundwater level and valve setting. Water level measurements are taken to determine the drawdown and the flow rate is adjusted to maintain a drawdown of less than 0.3 feet at a flow rate generally less than 500 ml/minute. Flow rate is measured in a graduated container at regular intervals. The measurements and pumping time are recorded on the Field Data Sheet.

Historic samples from each well have not shown impacts from the landfill above a groundwater standard. Arsenic and occasionally nitrate have been detected in groundwater above the Washington groundwater standards however these are naturally occurring or related to storm water infiltration. Additionally, purge water discharged to the ground surface infiltrates directly to the shallow water table minimizing potential exposure to potential receptors, surface water or groundwater, therefore purge water is discharge to the ground at least five feet away from the well.

Typically, the water levels within each well stabilize within the first several minutes of pumping showing little drawdown. Three wells (MW-5B, -8B, and -11B), however, experience drawdown exceeding 0.3 feet at the lowest sustainable flow rate (approximately 300 to 350 ml/minute). Drawdown and field parameters typically stabilize relatively quickly at all wells indicating sampled water is from the aquifer in the vicinity of the well. Occasionally a rising tide affects water levels in a well during sampling. These affects can raise water levels hundredths to tenths of a foot.

Field parameters are measured in a flow through apparatus and used to determine when purging is complete and sample collection can begin. Measurement of field parameters typically can begin after 10 to 14 minutes of pumping and are typically stable after three to six measurements. Field parameters are measured at intervals that allow the volume of water in the sampling

equipment to be replaced at least three times. Parameters are generally recorded at three to four minute intervals at the stable pumping rates. Purging is considered completed when the field parameters are stable for three successive measurements. The following parameters are measured and considered stable when within the indicated range:

Parameter	Stable Range
Temperature	+ or – 3%
Specific Conductance	+ or – 3%
pH	+ or – 0.1 unit
ORP	+ or – 10 millivolts
Dissolved Oxygen	+ or – 10%
Turbidity	+ or – 10% (if over 5 NTU)

Field parameter measurements are recorded on the field sheet for the well. Temperature can be affected by ambient conditions, a factor that should be considered when monitoring this parameter.

4.2.2 Sampling

Samples are collected immediately after purging and without stopping or adjusting the pumping rate. Samples are collected directly to the sample bottles from the tubing.

Samples for VOC and TOC analyses are collected first. Samples for inorganic analyses are collected second followed by total and dissolved metals analyses. The portion of the sample for dissolved metals analysis may be filtered in the field or in the local laboratory when the time before submitting is small. If field filtered, use a disposable inline 0.45 micron filter that is pre-wetted with sample water. The VOC and TOC bottles are filled completely, sealed with PTFE lined septum lids, and checked for the presence of air bubbles by inverting and tapping the bottles. If an air bubble is detected, the vial will be reopened and topped off so the sample is bubble free.

4.2.3 Post Sampling

After completion of sample collection the flow rate and depth to water in the well are measured and recorded. The pump is then turned off, the tubing removed from the flow through cell and allowed to drain, the valve closed, the tubing and power cable returned into the well, and well cap set on the well. The monument is then closed and locked. The flow through apparatus is rinsed with distilled water.

4.3 Sample Labeling and Handling

Sample containers are labeled with the site name, blind sample name, and date and time of collection. Samples are placed in coolers and delivered to the laboratory under chain-of-custody documentation at the end of the work day or the morning after the samples are collected. An example of a chain-of-custody form is included in Appendix A. Table 5 identifies the sampling containers, preservation requirements, and handling methods.

4.4 Quality Control Samples

Quality control procedures consist of collecting one duplicate sample and transporting volatile organic trip blanks provided by the laboratory. The duplicate is collected at random during each sampling event by alternating filling of two sets of sample bottles for each analysis.

5 SURFACE WATER AND LEACHATE SAMPLING PROCEDURES

5.1 Sampling

The surface water samples are collected by immersing the sample bottles approximately 1-inch below the water surface while keeping bottles with a preservative in as near an upright position as possible. At the RD-1 location at low water it may be necessary to decant water from an unpreserved bottle into the preserved bottle. Care must be taken to prevent disturbing sediment into the samples.

The leachate samples are collected using disposable HDPE bailers. The bailers are rinsed in the leachate prior to sample collection.

Field measurements for pH, temperature, and specific conductance are made in a beaker of sample water. The beaker is rinsed three times with sample water before the measurements are taken. The measurements are recorded on Field Sampling Data sheets.

5.2 Sample Labeling and Handling

Sample containers are labeled and handled as described in the groundwater sampling section (see Table 4).

5.3 Quality Control Samples

The quality control procedures are completed in conjunction with the groundwater sampling.

6 ANALYTICAL METHODS

6.1 Field Methods

Each instrument used for field measurements is calibrated, maintained, and used according to the manufacturer's instructions. Calibrations are completed shortly before the beginning of a sampling event and reported in the sampling memorandum.

Groundwater samples are pumped through a flow through apparatus that has ports for the temperature, specific conductance, pH, ORP/Eh, and dissolved oxygen probes. A sample for turbidity measurement is collected at the flow through cell and placed in the turbidity meter for measurement.

Surface water and leachate are collected in a decontaminated beaker where the temperature, specific conductance and pH are measured. The beaker is rinsed with sample water at least three times before filling with water to be tested. The leachate is returned to the respective sump after measurement. The field parameters are listed on Table 5.

6.2 Laboratory Methods

Specific analytical methods, method reporting limits (MRLs), and holding times are listed in Table 6. Analyses will be completed by an Ecology certified laboratory using the procedures specified by each analytical method. Certifications are noted on the laboratory report. The laboratory will also report method detection limits (MDLs) for metals and VOCs.

6.3 Laboratory Reporting

Laboratory reports include a cover letter, a case narrative when appropriate, the analytical results for the requested analyses, quality assurance/quality control (QA/QC) results, and the completed chain-of-custody forms. The QA/QC documentation will include dates of analysis, method blank results, surrogate recoveries for organic analyses, matrix spikes, laboratory duplicates and laboratory control samples. The laboratory will also provide an electronic data deliverable (EDD) in an EIM ready format.

7 QUALITY ASSURANCE, DATA VALIDATION, DATA REDUCTION AND CORRECTIVE ACTION

7.1 Quality Assurance for Field Procedures

7.1.1 Field Sampling Procedures Documentation

Sampling procedures, observations, decontamination, field data, and sample bottle preservatives and handling are documented on Field Sampling Data sheets completed for each sample. After completion of sampling, the sampler prepares a sampling memorandum that summarizes the field procedures. The Hydrology Field Sheet, Field Sampling Data sheets, Chain-of-Custody forms and other relevant documentation are attached to the memorandum. Samples are delivered daily to the laboratory. A chain-of-custody/analytical-request form is completed and signed by sampling and laboratory personnel. Examples of the forms are in Appendix A.

The precision of physical measurements, such as water-level measurements, is based on the general body of data for the instruments and procedures and is not specifically calculated. The accuracy of physical measurements is dependent on the instrument and procedure used for the measurement.

The accessibility and physical condition of each monitoring point is inspected during each monitoring event. Deficiencies are corrected or referred to CCTWL for correction. If the function of a monitoring well declines (e.g., the yield declines or turbidity increases), redevelopment of the well will be recommended. Redevelopment typically will include mechanically surging the well casing and screen and purging of the well. Redevelopment will be completed soon after a sampling event to allow stabilization before the next event. If the well is determined to have failed, replacement of the well will be recommended.

7.1.2 Field Instrument Calibration and Maintenance

Field instruments are calibrated, used, and maintained according to manufacturer's recommendations. Instruments are calibrated a short time before the initiation of each sampling event.

7.2 Data Validation

7.2.1 Data Validation Review

Data validation review is performed and data qualifiers are assigned to sample results following procedures in *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA, 2020) and *National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020)*. The following items summarize QC criteria to be used in evaluating laboratory data:

- Holding times
- Blanks
- Surrogate recovery (organics only)
- Matrix spike/matrix spike duplicates
- Duplicates (inorganics only)
- Method Reporting Limits (MRLs)
- Laboratory Control Samples

Data qualifiers are assigned where appropriate. Occasionally used qualifiers include:

- U = not detected, MRL shown
- J = estimated concentration shown
- T = detected below the MRL, value is an estimate
- B1= blank corrected to the MRL
- B = detected in blank, concentration not corrected
- UB1 = detected in blank below MRL, MRL shown

The specified method reporting limits are listed in Table 6. The data validation review addresses laboratory precision, accuracy, and completeness requirements which are described below.

A memorandum describing the results of the data validation review is prepared and attached to the laboratory report.

Laboratory footnotes, cover letters, or case narratives may indicate difficulties or deviations from method procedures other than those listed above. These are addressed on a case-by-case basis in the data validation memorandum, should they occur.

7.2.2 Quality Assurance Objectives for Laboratory Data

The overall QA objective is to demonstrate that the data is of known and useable quality. This objective is documented in the validation memorandum using the following procedures and criteria. Typically, quality objectives are categorized under precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Definitions of each parameter follow. The precision and accuracy criteria for laboratory results are based on analytical method criteria.

Precision. Precision is the degree of agreement between replicate measurements of the same source or sample. Replicate measurements can be on the same sample or on two samples from the same source. Precision is generally assessed using a subset of the measurements made. The chemical analytical precision will be discussed in the data validation review based on method criteria.

Accuracy. Accuracy measures the level of bias that an analytical method or measurement exhibits. To measure accuracy, a known value is analyzed or measured and the result compared to the known value. For chemical analyses, the analytical method specifies the frequency and

accuracy required for analysis of a spiked sample and will be addressed in the data validation review.

Representativeness. Representativeness is the degree to which data accurately and precisely represent a characteristic of the population, natural variation at a sampling point, and/or an environmental condition. There is no standard method or formula to evaluate representativeness. The field sampling plan is designed to allow collection of representative samples. The representativeness of the data is evaluated and used to identify potential data gaps, which are addressed in the annual report.

Completeness. Completeness is commonly expressed as a percentage of measurements that are valid and useable relative to the total number of related measurements made. The following formula is used to calculate completeness:

$$C = \frac{v}{n} \times 100$$

where, C = Percent completeness
n = Number of measurements
v = Number of valid measurements

USEPA recommends an 80 to 85 percent completeness criteria based on a nationwide historical database (USEPA, 1987). The 85 percent criteria will be used for laboratory analyses. Field data will have an 80 percent completeness criteria during each quarterly event.

Comparability. Comparability is a qualitative characteristic expressing the confidence with which one data set can be compared with another. The comparability goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. When precision and accuracy are known, the data sets can be compared with confidence. Comparability of data is used to evaluate the relative impacts of potential source areas and is addressed in the annual report.

7.3 Data Reduction

Data reduction is performed on field and laboratory data to assist in the interpretation of on-site conditions. Water level measurements, field water quality measurements, and laboratory data are entered into a computer spreadsheet or database after the laboratory data has been validated. Data may be further reduced for trend or other analysis.

The following procedures are followed for quality assurance of data reduction:

Computer Spreadsheets. Data entered into computer spreadsheets or a database are checked against laboratory reports and data validation memoranda. Discrepancies are identified and corrections to the computer files made. Data qualifiers are added where appropriate.

Statistical Analysis. Statistical methods and procedures are applied to groundwater data. The statistical methods and procedures are reviewed by a qualified person. The review includes a

check for completeness and accuracy. Results indicating a significant difference in water quality between a downgradient well and background well are checked. Well designations are shown on Table 7.

Quality Assurance for Computer-Generated Plots. Computer-generated plots may be used to illustrate trends in water quality data or to show water level contours. The quality of these plots is checked for completeness and errors by reviewing a copy of the data file used to create the plot. Assumptions made and methods used are recorded by the plot generator and reviewed by the project manager.

Formatting Compatible with Ecology EIM System. The analytical and water level data will be formatted in a manner suitable for submission to the Ecology EIM or other system specified by Ecology. This may include preparation of a computer spreadsheet in an appropriate format by the analytical laboratory or from a database. The spreadsheet must be carefully reviewed to accurately identify sample locations, include appropriate notes, include sample handling not reported by the laboratory (e.g. filtering, sample type) and correct miscellaneous entries or formats not compatible with the EIM. If a database is used the database may be cross walked to the EIM or other specified database in coordination with the database manager.

7.4 Corrective Action

Corrective action measures may result from non-conformance or non-compliance of analytical laboratories or field personnel with the specified procedures or criteria. The project manager will be informed of potential quality assurance problems and notified as soon as possible if field or laboratory quality assurance problems arise that may potentially jeopardize the use of collected data. Project personnel are responsible for reporting lapses in QA procedures.

Corrective steps will be addressed by the project manager when analytical data is found to be outside predetermined limits of acceptability. Corrective steps may include a procedural change, additional performance and system audits, meeting with laboratory personnel, and resampling. The designated CCTWL contact will be notified if a corrective step is taken which results in a substantive deviation from the SAP.

Laboratories will be required to meet analytical method performance criteria and USEPA data validation guidelines as well as to provide documentation and annotation of data submitted.

8 BACKGROUND EVALUATION

Data collection by the detection monitoring programs at each landfill is designed to provide data that can be statistically evaluated quarterly to show whether the landfills have affected groundwater quality. The evaluations are designed to compare the most recent data to the background conditions in a statistically valid manner that minimizes the potential for false positive or false negative results. Background is defined as the natural condition of the groundwater unaffected by a release from the landfill. It is understood that background is not likely to be static so must be reevaluated periodically for both concentrations, variability and trends within the data.

This section describes the procedures that will be used to occasionally reevaluate background conditions. Background reevaluation can occur about every ten years. This allows for forty or more additional sampling events to generate data that may be used to reevaluate background. The procedures include three phases. First, the data quality will be reviewed to assure usefulness in the analysis. This review will include identifying outlier data, managing non-detections, determining sample independence and stationarity, and evaluating whether the populations are normally distributed.

Second, the data and site conditions will be evaluated using statistical tests. This will include selection of a subset of the monitoring parameters for statistical evaluation, evaluation of site specific hydrogeologic conditions, and further evaluation of the temporal and spatial variability of the data sets for effects on statistical tests. Monitoring locations at the landfill are described in Section 2-1 and site hydrogeologic conditions are described in Section 1-3. The identification of upgradient and downgradient wells is shown on Table 7. Third, the statistical evaluation method will be selected and implemented. Statistical Interval methods are appropriate for background to compliance point comparisons. A Prediction Limit Test method has been used at this landfill and is expected to be implemented going forward.

Chapter 6 of *Guidance for Monitoring at Landfills and Other Facilities Regulated Under Chapter 173-304, 173-306, 173-350 and 173-351 WAC* as updated in 2018 describes the statistical analyses requirements and procedures to be used. This guidance document refers to the USEPA *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (*Unified Guidance*) document. The procedures described in this section comport with this guidance.

8.1 Data Quality Evaluation for Use in Statistical Tests

8.1.1 Outliers

The *Unified Guidance* defines a statistical outlier as "a value originating from a different statistical population than the rest of the sample" and provides several methods for evaluating data identified as potential outliers. It also suggests that effort should be made to determine

potential causes of data identified as potential outliers before deciding a course of action. Actions can include removing from or retaining the outlier in the dataset.

Cowlitz County has chosen to identify and evaluate potential outliers using lower and upper interquartile values determined using a spreadsheet function or box plots. The first lower and upper boundaries will be calculated using:

First Lower Boundary = first quartile ($x_{.25}$) - 1.5 x Interquartile Range (IQR)
First Upper Boundary = third quartile ($x_{.75}$) + 1.5 x IQR

The second lower and upper boundaries will be calculated using:

Second Lower Boundary = $x_{.25}$ – 3.0 x IQR
Second Upper Boundary = $x_{.75}$ + 3.0 x IQR

Data between the first and second boundaries are considered mild outliers. Data below the second lower or above the second upper boundaries are considered extreme outliers.

Possible causes of the outlier data will be evaluated including laboratory introduction or error, introduction during sampling or sample transport, unusual site conditions, and actual introduction from the landfill. If an outlier below or above the second lower or upper boundary, respectively, is not reproduced in subsequent samples from the location and/or a cause other than a release from the landfill is identified, the outlier datum is marked as such in the database and not used in the statistical evaluation.

8.1.2 Non Detections

Many parameters measured during monitoring are not detected at or above the analytical method quantitation limits. Parameters with a significant portion of non-detections are not selected for background evaluation because they do not meet the criterion of being shown to occur in natural water at the site. If the dataset for a parameter selected for evaluation includes a small proportion of non-detections, half the value of the detection limit will be used for these in the evaluation.

8.1.3 Statistical Independence

The regulations and guidance require that statistically independent data be used in the statistical evaluations. Since groundwater samples are collected at the same location (not spatially independent), independence is achieved by allowing enough time between sampling events for sufficient flow of groundwater past the well to assure different water is sampled (temporal independence). The *Unified Guidance* suggests that one to two months is typically sufficient but the amount of time needed depends on the local hydrogeologic conditions. The quarterly sampling program allows about three months between sampling events which is considered enough time between the samples for the analytical data generated to be independent.

8.1.4 Stationarity

Statistical tests typically require data that is spatially and temporally stationary. Spatial stationarity will be evaluated using the procedure described in Chapter 13 of the *Unified*

Guidance. This procedure includes two steps. The first step is to generate side by side box plots of the data from each well. If the box plots have largely overlapping interquartile ranges (boxes) and the medians are similar, the data is assumed to be spatially stationary. If box plots are not clearly similar, a parametric t-test or nonparametric Wilcoxon Rank Sum test may be completed to formally test spatial stationarity. If spatial variability is shown between some or all of the datasets then an intrawell statistical approach or a valid grouping of wells will be considered.

The data for the selected parameters at each well will be tested for temporal stationarity using the procedure described in Chapter 14 of the Unified Guidance. This procedure begins with generating time series plots of the data for parameters at each well. Plots of multiple parameters at single wells and single parameters at multiple wells will be evaluated to identify potential seasonal variations, autocorrelation and other trends. If these conditions appear to be described by the plots the cause of the variations will be evaluated. Further analysis using one-way ANOVA testing described in Chapter 14 will be considered to evaluate stationarity or if correction is appropriate.

For the Site A area at the Tennant Way Landfill temporal stationarity will be evaluated to determine the appropriate look back period. Water quality in the three downgradient wells has improved since cell closure of the area so the older data does not reflect current conditions. If the datasets for the wells in this area are shown to be spatially non-stationary the look back period will be evaluated for use as intrawell background. The data from these wells is also used as background for the Cells 1 and 2 of Site B area which is downgradient.

8.1.5 Normal Distribution

Parametric tests have been used to evaluate data at the Cowlitz County landfills. These tests are appropriate for normally distributed data sets. The data for the selected parameters will be tested for normality. The Shapiro-Wilk Method will be applied to the data for selected parameters at each well after the outlier review. A statistics program and spreadsheet will be used to apply and document the determination of whether the null hypothesis is rejected (not normal) or not rejected (no evidence not normal) below or above, respectively, the p-value 0.05.

8.2 Statistical Test Considerations

8.2.1 Identify Parameters for Evaluation

The *Unified Guidance* suggests that evaluation of between 10 and 15 parameters should be an adequate number for most conditions. Downgradient compliance well concentrations of these parameters will be compared to background concentrations. Other parameters are reviewed after each sampling event to identify changes that might be of concern but are not routinely statistically compared to background.

The guidance suggests that the selected parameters should be expected to have the potential to be released from the landfill, mobile and stable in groundwater, and be at concentrations detectable in groundwater. The parameters listed in WAC 173-351 Appendices I and II are assumed to

potentially meet these requirements for municipal solid waste landfills. The regulations require a minimum of eight observations be used to evaluate background using statistical tests.

Cowlitz County will choose the parameters for evaluation based on the data record. Most of the selected parameters are likely to be non-hazardous inorganic constituents and parameters that measure characteristics of water that are likely to change if the groundwater is affected by a landfill. The Tennant Way Landfill has been monitored quarterly for more than 30 years although the improvement of groundwater quality downgradient from Site A will limit the background data for the Cells 1 and 2 of Site B area to more recent data.

8.2.2 Evaluate Hydrogeologic Conditions of Each Well

The hydrogeologic conditions at each well will be reviewed to evaluate similarities and differences between wells. The geology penetrated, measured hydraulic conductivity, surrounding apparent hydraulic gradient, and groundwater flow direction to and away from each well will be summarized. This information will be used to evaluate the likelihood that the groundwater obtained from a well is similar to other wells.

8.2.3 Evaluate Temporal Variation of Selected Parameters

The data for the selected parameters at each well will be plotted and reviewed for temporal variations. Seasonal or other cyclic variations will be identified if present as well as rising or falling trends. This information will be used to describe natural variation in background conditions and other changes (e.g. improvement in laboratory reporting limits) that may affect the portion of the population that is useful for determining background for the selected parameters. If trends are suspected but not clear, trend tests may be applied.

8.2.4 Evaluate Natural Spatial Variation of Parameters

If the data was found to be spatial non-stationary, the differences between the mean and variance of each selected parameter will be determined. The location and magnitude of these differences will be evaluated with consideration of the hydrogeologic conditions to determine if interwell comparison of compliance well data with upgradient well data is valid. If not, an intrawell statistical approach will be evaluated.

Intrawell statistical evaluation of background appears to be reasonable for most data at the Cowlitz County landfills because groundwater quality has not been shown to have been degraded except from the Site A area at the Tennant Way Landfill.

If an intrawell approach is indicated for a particular wells' data, the data will be evaluated to determine an appropriate look back period. The background level for this location will be determined from this period. An appropriate period will include no trends and minimal fluctuations in levels although use of clearly seasonal cycles may be needed to increase the reference sample size. If necessary this will include evaluation of the variance stationarity and potential affect on the distribution.

8.3 Determine Background Levels and Statistical Test Method

The guidance documents identify the Prediction Limit test as appropriate for comparison of compliance point and background groundwater data at landfills. Cowlitz County will continue using this method unless procedures described above indicate a different method should be used.

This method uses a prediction limit determined from background data to test future compliance data. The null hypothesis assumes that the background and compliance point data are identical so if a future datum exceeds a prediction limit it is statistically shown to not be from the background distribution and may indicate a release from the landfill.

Prediction limits will be determined using procedures described in the *Unified Guidance* (Chapter 18). The guidance describes procedures for normal and non-normal (parametric and non-parametric) data.

8.3.1 Determine Prediction Limits for Parameters

Normally Distributed (Parametric) Data

The previous evaluations of the hydrogeologic conditions and temporal and spatial variation of the data for the selected parameters at each well will be used to determine if interwell or intrawell comparisons will be used. The statistically useful portions of the background data for each parameter at each well will be identified. The number (n), mean ($\bar{x}$) and standard deviation (σ) of these data populations will be calculated.

The *Unified Guidance* provides the following equation for calculating the prediction limit for one constituent at one well:

$$Prediction\ Limit\ =\ \bar{x} + t_{(1-\alpha/m,n-1)}\, s\sqrt{(1 + 1/n)}$$

Where: t = Student's t-quantile taken from Table 16-1 of Appendix D of the *Unified Guidance*
m = one compliance data point compared to upper prediction limit
1-α = 0.05 confidence test level (95% confidence level)
n-1 = degrees of freedom for Student's test

This calculation will be completed using the appropriate data for each selected parameter from compliance wells using an intrawell test or a single background well.

Three background wells are used for the Cells 1 and 2 of Site B Area at the Tennant Way Landfill. If the data from these wells can be combined to determine the prediction limit, this equation will be applied:

$$Prediction\ Limit\ =\ \bar{x} + \kappa s$$

Where: κ = multiplier taken from Table 19-1 in Appendix D of the *Unified Guidance*

The κ-multipliers selected will be for interwell background data with the appropriate n and up to three wells (depending on spatial stationarity of the wells data). This is for 1-of-2 interwell prediction limits on observations for one constituent sampled quarterly.

Non-normal (Non-parametric) Data

If data is shown to be non-normal (non-parametric) the data will be sorted in ascending order and the second largest or other large datum will be selected as the prediction limit. The confidence level (1-α) predicted for the next compliance datum will be taken from Table 18-1 of Appendix D of the *Unified Guidance*. The confidence level for actual compliance data can be calculated as n/n+m where m is the number of data points being compared to the prediction limit. Cowlitz County will be comparing one datum to what is expected to be a large background so ongoing comparisons of quarterly compliance data should meet the confidence level.

8.3.2 Determine Statistically Significant Increase (SSI) Criteria

Future compliance well parameter results will be compared to the prediction limits determined by these procedures. If a datum is above its' prediction limit, retesting will be performed. Retesting differs from verification sampling in that the resample data is incorporated in the statistical properties of the test. It therefore is assumed in the prediction limit determination where appropriate (e.g. interwell test using multiple background wells).

Retest data must be independent and the guidance suggests that this typically requires two months between samples depending on the hydrogeologic conditions at the well. In the context of a quarterly monitoring it is practical to use the datum from the next scheduled sampling event for the retest. This is because resampling is unlikely to be possible soon enough the datum and the next quarters' datum to be independent.

If the retest datum is below the prediction limit the test passes and there is no SSI. If the retest fails, an SSI occurs for that parameter at that well. The initial response will be to evaluate the potential for this SSI being a false positive and evaluate the site wide false positive rate (SWFPR) as described in Chapter 19.2 of the *Unified Guidance*. The parameter will be evaluated with consideration of whether SSIs have occurred in the past and/or SSIs have occurred for other parameters at that well. Actions may be required if SSIs have occurred for a significant number of parameters downgradient of the landfill area. A detailed review of the downgradient and background data for the landfill area will be complete as part of an initial action. This review will investigate if the SSIs are valid and evaluate the potential threat to environmental receptors.

WAC 173-351-440 requires assessment monitoring in response to an SSI. Assessment monitoring was completed at the Tennant Way Landfill in 2012. If future SSIs are determined to be significant at the Tennant Way Landfill, the results of the previous assessment monitoring will be reviewed and used to develop a more focused investigation of the SSIs than the assessment monitoring specified in the WAC.

8.3.3 Tennant Way Site A Background Reevaluation for Rail Project Well Relocation

The Port of Longview is planning to construct additional rail sidings around the MW-5 background well cluster. This will compromise the effectiveness of this well and necessitate installation of a new background well between the railroad and the landfill. Background

groundwater quality for Site A can be expected to be somewhat different at the new well location and to change over time as groundwater adjusts to the construction activities and materials.

The new well should be installed and added to the monitoring program for two years before an evaluation of background. This will allow for eight sampling events to generate an adequate amount of data for determining prediction limits from the new location. The data will be reviewed and evaluated following procedures described in this section. The groundwater quality at the new well location can be expected to change over time as water infiltrates and flows through the railroad fill to groundwater. The effect on Site A background conditions will be documented by the quarterly monitoring program. Reevaluation of the prediction limits for this landfill area may be necessary more often as groundwater conditions adjust to the land use changes.

9 REPORTING

Although the MFS and the MSWLF each contain reporting requirements, the CCTWL has elected to prepare reports compliant with the MSWLF requirements that include the Site A data. This is because the MFS requirements are covered by the MSWLF and reporting is simplified.

The MSWLF specifies that quarterly and annual reports be prepared and transmitted to the jurisdictional health authority. The CCTWL has elected to combine the annual report with the fourth quarter report.

9.1 Quarterly Reports

A report is submitted to the EHU and Ecology following validation and management of the data collected each quarter. The MSWLF specifies that the reports be submitted within 60 days of receipt of the analytical data. The content of the report follows Ecology guidance (Washington DOE, 2018) and includes the following:

- a form specified in WAC173-351-415 (see copy in Appendix A),
- documentation that the report was prepared by and under the supervision of a qualified licensed professional,
- statement and documentation that identifies the analytical laboratory and demonstrates that it is certified to perform the analyses in Washington,
- the field sampling memorandum,
- the data validation memorandum,
- laboratory reports,
- summary tables of the analytical data,
- statistical calculations and summaries,
- comparison of downgradient to upgradient parameter data using a nonparametric prediction limit method or other method appropriate for the data set,
- depth to water measurements, water level elevations, water level contour plots, and gradient and flow rate estimates,
- notification of statistical increases in concentrations and concentrations above WAC173-200 criteria or other MCLs where criteria are not specified, and
- a discussion of results that describes the apparent groundwater flow conditions, geochemical conditions, and an evaluation of water quality conditions.

Statistical calculations include the following:

- mean
- variance
- standard deviation
- coefficient of variation
- standard error

Comparison of groundwater background and downgradient data is completed for Site A, Cells 1 and 2 of Site B, and Cell 3 of Site B areas separately. Sample location designations as background or downgradient of the respective areas are shown on Table 7.

9.2 Annual Reports

The annual report is integrated with the fourth quarter report. Sections are included in the report that summarize the results for the calendar year and describe variability between quarters. Trend analyses for various parameters are included.

9.3 Data Transmittal to Department of Ecology

Quarterly monitoring data will be transmitted to Ecology in a manner consistent with procedures specified by Ecology. The groundwater monitoring data will be submitted within 60 days of receipt from the analytical laboratory in an electronic form capable of being transferred into the Ecology data management system. Currently Ecology specifies the Environmental Information Management (EIM) System.

9.4 Background Data Evaluation

The occasional re-evaluation of background will be reported to the EHU and Ecology in a memorandum or letter report. These reports will include a summary description of significant changes and the cause of such changes if the cause is apparent as well as documentation of the procedures and statistical analyses. A re-evaluation will also be described in the quarterly and annual reports for the period during which it was completed.

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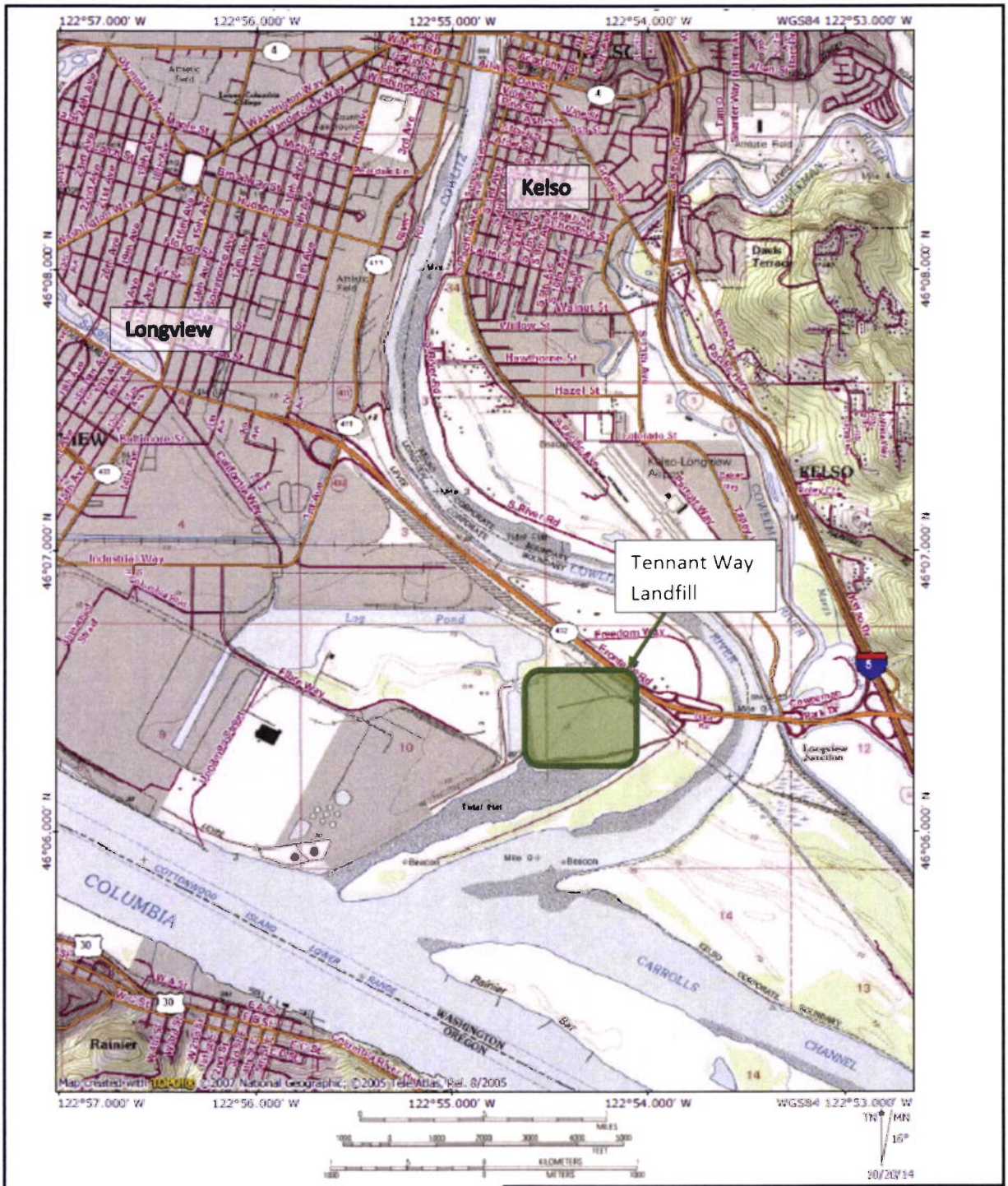
LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others or the use of segregated portions of this report.



Based Map: USGS through National Geographic

Bright Fields Groundwater, Inc.

Figure 1
Cowlitz County Tennant Way Landfill
Longview, Washington
Site Location Map

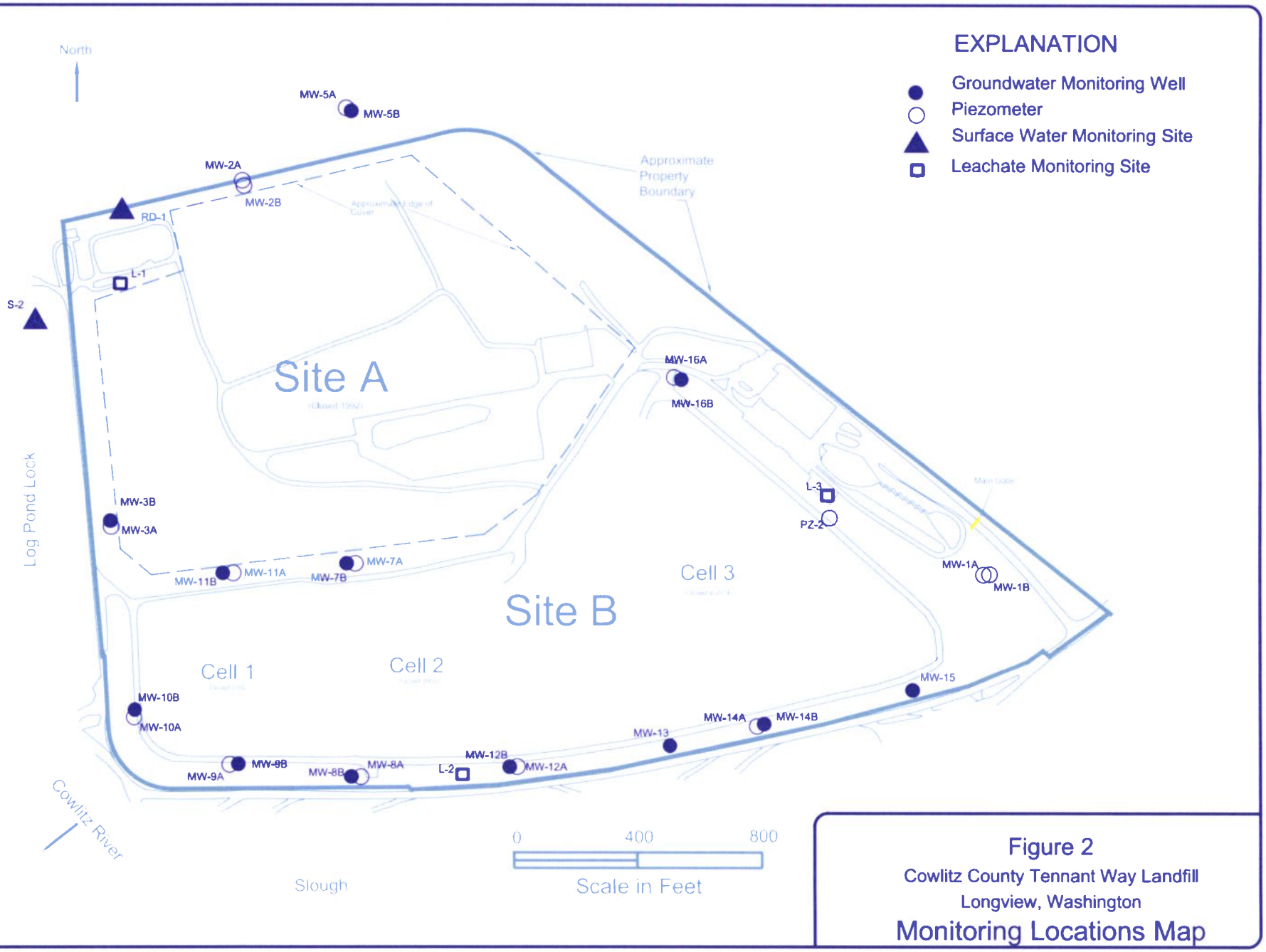


Figure 2

Cowlitz County Tennant Way Landfill

Longview, Washington

Monitoring Locations Map

Table 1

Cowlitz County Tennant Way Landfill
Monitoring Locations

Groundwater Monitoring Wells[1]	Water Level Measurements Only[2]	Surface Water Monitoring	Leachate
MW-3B	MW-1A	RD-1	L-1
MW-5B	MW-1B	S-2	L-2
MW-7B	MW-2A		L-3
MW-8B	MW-2B		
MW-9B	MW-3A		
MW-10B	MW-5A		
MW-11B	MW7A		
MW-12B	MW-8A		
MW-13	MW-9A		
MW-14B	MW-10A		
MW-15	MW-11A		
MW-16B	MW-12A		
	MW-14A		
	MW-16A		
	PZ-2		

NOTE: [1]Samples will be collected and water levels measured in each of these wells.
[2]Water level measurements will be made in these piezometers, the groundwater monitoring wells, and the slough during the water level measurement round.

Table 2

Cowlitz County Tennant Way Landfill
Monitoring Well Construction Details

Well I.D.	Date Installed	Datum	Well Depth (feet btc)[1]	Top of Casing Elevation[2]	Top of Screen Elevation[3]	Bottom of Screen Elevation[3]	Screen Length (feet)[3]
MW-1A	1983	NAVD88	38.5	25.86	-14.93	-19.93	5
MW-1B	1983	NAVD88	18.5	25.77	5.12	0.12	5
MW-2A	1983	NAVD88	40.0	22.86	-6.72	-19.22	12
MW-2B	1983	NAVD88	18.5	22.91	12.40	2.40	10
MW-3A	1983	NAVD88	38.5	19.17	-10.12	-20.12	10
MW-3B	1983	NAVD88	19.8	19.18	4.90	-0.10	5
MW-5A	1990	NAVD88	49.0	15.36	-24.50	-33.58	10
MW-5B	1990	NAVD88	20.0	15.39	5.52	-4.48	10
MW-7A	1992	NAVD88	48.5	28.63	-12.04	-22.04	10
MW-7B	1992	NAVD88	30.2	28.41	9.90	-0.10	10
MW-8A	1992	NAVD88	64.0	36.49	-16.06	-26.06	10
MW-8B*	1992	NAVD88	35.4	36.08	1.18	-8.82	10
MW-9A	1994	NAVD88	68.2	37.92	-19.12	-28.62	10
MW-9B	1994	NAVD88	44.5	37.49	5.63	-3.92	10
MW-10A	1994	NAVD88	73.0	42.05	-29.90	-39.45	10
MW-10B	1994	NAVD88	45.1	42.98	13.80	-0.70	15
MW-11A	1994	NAVD88	52.3	25.55	-15.31	-24.86	10
MW-11B	1994	NAVD88	28.3	25.54	13.36	-1.09	15
MW-12A	1995	NAVD88	62.0	34.60	-14.42	-23.97	10
MW-12B	1995	NAVD88	45.6	34.43	1.88	-7.67	10
MW-13	1995	NAVD88	45.9	36.66	3.81	-5.74	10
MW-14A	1995	NAVD88	62.0	34.94	-14.00	-23.55	10
MW-14B	1995	NAVD88	41.8	34.36	5.41	-4.14	10
MW-15	1995	NAVD88	41.3	33.88	5.46	-4.09	10
MW-16A	1995	NAVD88	56.9	25.41	-19.84	-29.39	10
MW-16B	1995	NAVD88	41.5	25.17	-4.51	-14.06	10
PZ-2	1995	NAVD88	31.0	38.76	6.30	-3.34	10

NOTE:
1 = Depth as feet below top of casing measured in the sampled wells in January 2011 following redevelopment. Depth of other wells taken from well logs or as confirmed by measurement.
2 = 2024 survey relative to NAVD88. Note: 2001 survey except PZ-2 and 2008 survey for MW-2A and -B used before 2024 as adjusted to NAVD88.
3 = Taken from Revised Hydrogeologic Characterization Report (EMCON, 1995) except where adjusted based on measurements.
* = MW-8B well log not accurate. Depths shown are based on depth measurement and partial well log.
NAVD88 = Elevations are relative to North American Vertical Datum 1988.

Table 3

Cowlitz County Tennant Way Landfill
Groundwater Sampling Specifications

Monitoring Well	Sampling Depth (pump inlet depth)	Depth to Top of Screen from Well Logs	Measured Flow Rate (ml/min)	Typical Drawdown (feet)	Approx. Voltage Setting (volts)
3B	16.7	14.7	500	0-0.15	10-13
5B	10.7	8.7	300-350*	0.4-0.9	9-11
7B	24.4	19.0	500	0-0.25	10-15
8B	32.8	25.8	300-350*	1.0-1.8	15-17
9B	34.8	32.8	500	0-0.15	15-17
10B	39.7	30.1	500	0-0.15	15-17
11B	21.5	13.0	300-350*	1.0-2.5	10-14
12B	35.3	33.3	500	0-0.2	13-15
13	36.1	34.1	500	0-0.10	12-16
14B	32.1	30.1	500	0-0.10	12-16
15	31.2	29.2	500	0-0.15	13-15
16B	32.3	30.3	500	0-0.20	10-13

Note: Depths are in feet below top of casing.
Flow rate, drawdown and voltage vary by pump, depth to water and ambient temperature.
* Unable to maintain lower flow rate.

Table 4

Cowlitz County Tennant Way Landfill
Analytical Program

Groundwater	
Field Parameters	
Temperature pH Specific conductance ORP/Eh Dissolved Oxygen Turbidity	
Geochemical Indicator Parameters	
Bicarbonate (HCO_3) Alkalinity (as $CaCO_3$) Sulfate (SO_4) Nitrate (NO_3) Chloride (Cl) Total Suspended Solids (TSS)	Iron (Dissolved) Manganese (Dissolved) Calcium (Dissolved) Magnesium (Dissolved) Sodium (Dissolved) Potassium (Dissolved)
Metals (Total)	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Lead Nickel Selenium Silver Thallium Vanadium Zinc
Volatile Organic Compounds EPA Method 8260	
Leachate Indicators Ammonia (NH_3-N) Total Organic Carbon (TOC) Total Dissolved Solids (TDS)	
Note: WAC 173-351-990 Appendices I and II parameters except Ca, Mg, Na, and K are dissolved rather than total.	

Leachate	
Field Parameters	
Temperature pH Specific conductance	
Geochemical Indicator Parameters	
Bicarbonate (HCO_3) Alkalinity (as $CaCO_3$) Chloride (Cl) Sulfate (SO_4) Nitrate (NO_3) Total Suspended Solids (TSS)	Iron (Total) Manganese (Total) Calcium (Total) Magnesium (Total) Sodium (Total) Potassium (Total)
Metals (Total)	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Lead Nickel Selenium Silver Thallium Vanadium Zinc
Volatile Organic Compounds	
EPA Method 8260	
Leachate Indicators and Leachate Parameters	
Ammonia (NH_3-N) Total Organic Carbon (TOC) Total Dissolved Solids (TDS)	
Note: WAC 173-351-990 Appendix I and II parameters except total iron and manganese rather than dissolved.)	

Surface Water	
Field Parameters	
Temperature pH Specific Conductance	
Metals (Total)	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Iron Lead Manganese Nickel Selenium Silver Thallium Vanadium Zinc
Indicator Parmeter	
Nitrate	
Note: Metals analyses are for total recoverable metals.	

Table 5

Cowlitz County Tennant Way Landfill
Summary of Sample Containers, Preservation, and Handling

Analytes	Container	Preservation and Handling
Volatile Organics	Three, 40 ml glass vials, PTFE-lined silicon septum cap	HCl to pH2, fill leaving no air space. Keep in dark on ice.
Alkalinity, HCO_3, Cl, SO_4, NO_3, TDS, TSS	One, 0.5 or 1 L HDPE bottle	Keep on ice.
NH_3,	One, 0.125 or 0.25 L HDPE bottle	H_2SO_4 to pH 2, keep on ice.
TOC	One, 40 ml amber glass vial, PTFE-lined silicone septum cap	H_2SO_4, fill leaving no air space. Keep in dark on ice
Metals	Two, 0.125 or 0.25 L HDPE bottle	HNO_3 to pH 2. Keep on ice. One unpreserved if lab filtering.

Note: Bicarbonate calculated as alkalinity divided by 0.8202 as described by the USGS and therefore not analyzed by lab.
Two HNO_3 preserved bottles are needed for groundwater for total and dissolved metals if dissolved metals field filtered.

Table 6

Cowlitz County Tennant Way Landfill
Analytical Methods and Holding Times

	EPA Analytical Method	Method Reporting Limit	Units	Holding Time
Organics				
Volatile Organics	8260C	0.5-20	µg/L	14 days
Indicator Parameters				
Alkalinity	SM 2320B	2	mg/L	14 days
Bicarbonate	SM 2320B	2	mg/L	14 days
Ammonia	350.1	0.05	mg/L	28 days
Chloride	300.0	0.2	mg/L	28 days
Nitrate	300.0	0.1	mg/L	48 hours
Sulfate	300.0	0.4	mg/L	28 days
Total Dissolved Solids (TDS)	SM2540C	5	mg/L	7 days
Total Organic Carbon (TOC)	SM5310C	0.5	mg/L	28 days
Total Suspended Solids (TSS)	SM2540D	5	mg/L	7 days
Metals	200.7/200.8	0.02-210	µg/L	6 months
Field Measurements				
Specific conductance	Meter	10	Micromhos/ cm at 25° C	---
pH	Meter	0.1	pH units	---
Temperature	Meter	0.1	°C	---
Dissolved oxygen	Meter	0.1	mg/L	---
Redox potential (Eh)	Meter	1	mV	---
Turbidity	Meter	0.1	NTU	---

NOTE: Reported 8260 VOCs will include compounds listed in WAC173-351 Appendix II. MDLs will be reported by the laboratory for metals and VOCs. The metals method, MRLs and MDLs are determined by the method used, metal and as affected by the matrix.

Table 7

Cowlitz County Tennant Way Landfill
Designation of Background and Downgradient Groundwater
Sample Locations

Monitoring Well	Site A	Site B	
		Cell 1 and Cell 2	Cell 3
MW-3B	D	B	---
MW-5B	B	---	---
MW-7B	D	B	---
MW-8B	---	D	---
MW-9B	---	D	---
MW10B	---	D	---
MW-11B	D	B	---
MW-12B	---	---	D
MW-13	---	---	D
MW-14B	---	---	D
MW-15	---	---	D
MW-16B		---	B

NOTE: MW = Monitoring Well
B = Background well
D = Downgradient well
--- = Not applicable

APPENDIX A

FIELD SAMPLING DATA SHEETS
HYDROLOGY FIELD SHEET
CHAIN-OF-CUSTODY FORM
REPORTING CHECKLIST

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz County Tennant Way Landfill**	Sample Location:	
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

Measurement				Date	Time	Method
Depth to Water	Prepumping Final pumping			"		Well Probe
	Pumping Time	Rate	Voltage	DTW	Liters Pumped	Rate (ml/min)

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly none		no	Low Flow
" "	1 250ml poly none	"	no	Submersible
" "	1 250ml poly HNO3	"	no	Pump
" "	1 250ml poly H2SO4	"	no	"
" "	3 40ml glass HCl	"	no	"
" "	1 40ml amber glass H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled.
Sample Appearance: Sample Handling: Cooler, deliver to lab

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz County Tennant Way Landfill**	Sample Location:	
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

Depth to Water:	Prepumping / Final pumping	Measurement	Date	Time	Method
					Well Probe

Pumping Time	Rate	Voltage	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly none	Sump	No	Disposable
	1 250ml poly HNO3	"	"	Bailer
	1 250ml poly H2SO4	"	"	"
	3 40ml glass none	"	"	"
	1 40ml glass H2SO4	"	"	"

Equipment Decontamination: None, disposable bailer used. Field equip rinsed with distilled.

Sample Appearance: Sample Handling: Cooler, deliver to lab

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz County Tennant Way Landfill**	Sample Location:	
Sampling Event:		Sample Field Identifier:	
Sampler:		Start Date/Time:	
		Weather:	

Well Pumping Data

Depth to Water:	Measurement: Prepumping / Final pumping	Date	Time	Method: Well Probe

Pumping Time	Rate	Voltage	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
	1 1000ml poly none	Surface	no	Dipped
	1 250ml poly HNO3	"	no	"

Equipment Decontamination: None, field equipment rinsed with distilled.

Sample Appearance: Sample Handling: Cooler, deliver to lab

Comments:

Cowlitz County Tennant Way Landfill
Hydrology Field Sheet

Time of Low Tide:

Event:

Location	Date	Time	Measurement	Comments
River				
MW-10B				
MW-10A				
MW-9B				
MW-9A				
MW-8B				
MW-8A				
MW-12B				
MW-12A				
MW-13				
MW-14B				
MW-14A				
MW-15				
MW-1B				
MW-1A				
MW-16B				
MW-16A				
PZ-2				
MW-7B				
MW-7A				
MW-11B				
MW-11A				
MW-3B				
MW-3A				
MW-2B				
MW-2A				
MW-5B				
MW-5A				
River				

CHAIN OF CUSTODY

ALS Environmental

1317 South 13th Ave., Kelso, WA 98626 | 360.577.7222 | 800.695.7222 | 360.636.1068 (fax)

SR# _____

PAGE _____ OF _____ COC# _____

PROJECT NAME

PROJECT NUMBER

PROJECT MANAGER

COMPANY NAME

ADDRESS

CITY, STATE, ZIP

E-MAIL ADDRESS

PHONE # FAX #

SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐ SIM PAH☐	Volatile Organics 8260☐ 624☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐	Oil & Grease TRPH 1664 HEM☐ 1664 SGT☐	PCBs Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081☐ 8141☐ 8151☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	Metals: Total or Dissolved (See List below)	Cyanide☐ Hex-Chrom☐	(circle) pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS, Turb.	(circle) NH_3-N, COD, TKN, TOC, DOC, NO_2+NO_3, T-Phos	TOX 9020☐ AOX 1650☐ 506☐	Alkalinity ☐ CO_3☐ HCO_3☐	Dioxins/Furans 1613☐ 8290☐	Dissolved Gases CO_2☐ RSK 175☐ Methane☐ Ethane☐ Ethene☐			REMARKS

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

INVOICE INFORMATION

P.O. # _____

Bill To: _____

TURNAROUND REQUIREMENTS

____ 24 hr ____ 48 hr

____ 5 day

____ Standard (15 working days)

____ Provide FAX Results

_____ _____

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

***INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)**

SPECIAL INSTRUCTIONS/COMMENTS:

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature _____ Date/Time _____	Signature _____ Date/Time _____	Signature _____ Date/Time _____	Signature _____ Date/Time _____
Printed Name _____ Firm _____	Printed Name _____ Firm _____	Printed Name _____ Firm _____	Printed Name _____ Firm _____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

CHECKLIST FOR GROUNDWATER REPORTING
Municipal Solid Waste Landfills
WAC 173-351-415

Include a signed, completed copy of this checklist with each quarterly and annual report.

Quarterly groundwater reports shall be submitted to the jurisdictional health department and Ecology within 60 days of receipt of analytical data. Annual groundwater reports shall be submitted to the jurisdictional health department and Ecology by April 1 of each year.

1st_____ 2nd_____ 3rd_____ 4th_____ YEAR_____	Reference (section. subsection)	Included in this report	Location – page # or appendix #
***Quarterly Groundwater Reports**: 173-351-415 (2) plus the referenced section*			
Statistical calculations and summaries			
Descriptive statistics	420, (1)	☐	
Statistical tests	420, (2)	☐	
Notification of statistical increase (if applicable)	420, (4)	☐	
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	☐	
Static water level readings	415, (2)	☐	
Potentiometric surface elevation maps depicting flow direction	415, (2)	☐	
Flow rate – calculated	415, (2)	☐	
Cation-anion balances	430, (5a)	☐	
Explanation of greater than 5% (or 10%) difference if needed	430, (5a)	☐	
Trilinear diagrams	430, (5b)	☐	
Leachate analyses (if sampled and tested)	415, (2)	☐	
Data entered into EIM database (date entered: _____)	415, (3)	☐	
Complete copy of the lab report with chain of custody record.		☐	
***Annual Groundwater Reports**: 173-351-415 (1)* **YEAR**_____			
Summary of statistical results and trends	415, (1)	☐	
Summary of groundwater flow rate and direction for the year	415, (1)	☐	
Copy of all potentiometric maps for the year	415, (1)	☐	
Summary geochemical evaluation	415, (1)	☐	
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	☐	

Signature of Report Author _____ Date _____ Landfill _____

If you need this publication in an alternate format, please call the Waste 2 Resources Program at (360) 407-6900. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

APPENDIX B

SITE SAFETY AND OPERATIONS PLAN

SITE SAFETY AND OPERATIONS PLAN

PROJECT INFORMATION

SITE: Cowlitz County Tennant Way Landfill DATE: May 10, 2023

LOCATION: 85 Tennant Way PREPARED BY: Dennis Dykes

Longview, WA 98632 PROJECT NUMBER: _____

_____ PROJECT MANAGER: Dennis Dykes

CLIENT CONTACT: Michele Horn, (360) 274-6492

PROJECT OBJECTIVES: Quarterly detection monitoring program implementation

SCOPE OF WORK: Sample monitoring wells, surface water, and leachate. Conduct maintenance and repair of monitoring system as needed.

START DATE: June 2023 COMPLETION DATE: Ongoing

NOTE: This Site Safety Plan must be re-evaluated and updated when site conditions or scope of work changes.

FACILITY DESCRIPTION AND BACKGROUND

TYPE OF FACILITY: Closed Municipal Solid Waste Landfill

SIZE: Approximately 100 acres BUILDING/STRUCTURES: Vacant office, service building and scales.

ACCESS: Access to site is via security gate at entrance to landfill on east side of site.

TOPOGRAPHY: Irregular with filled cells rising 40 to 60+ feet above drainage ditches and roads.

GENERAL GEOLOGIC/HYDROLOGIC SETTING: Alluvial sands and silts on floodplain of Cowlitz and Columbia Rivers

SITE STATUS: Inactive closed landfill that received final waste in 2014.

PREVIOUS HAZARDOUS MATERIAL/WASTE STORAGE AND DISPOSAL METHOD(S): Municipal waste disposed on site using standard fill and cover and final closure procedures. Temporary on site storage of household hazardous waste within building conducted under permit from 1993 to 2009. No temporary waste storage since closure.

SITE HISTORY: Landfill operations began in the mid 1970s in the northern Site A. The landfill expanded to Site B in the south with the construction of Cells 1, 2 and 3. Final waste received in early 2014, final cover installed in 2014 and formally entered post closure 2017. Site A and Site B are regulated under the MFS and CMSWL, respectively. The monitoring program is conducted as specified in the CMSWL to simplify implementation since the CMSWL standards overlap completely with the MFS.

SPECIAL CONDITIONS/COMMENTS: None

WASTE TYPE(S)/CHARACTERISTICS

ARE HAZARDOUS SUBSTANCES KNOWN TO HAVE BEEN STORED/SPILLED ON SITE? ☒ YES ☐ NO

SOURCE(S) OF INFORMATION: Household hazardous waste was (1993 to 2009) collected by Cowlitz County and temporarily stored on site in an area not accessed by monitoring personnel. Low concentrations of VOCs have been detected in leachate and groundwater by the monitoring program.

Compound	Maximum Concentration Encountered or Anticipated			Depth
	Soil (ppb)	Water (ppb)	Air (ppb)	(ft below grade)

SPECIAL CONSIDERATIONS/COMMENTS: Coordinate all activities on site with Cowlitz County Solid Waste personnel. No smoking. Avoid contact with soil and groundwater, surface water and leachate.

HAZARD EVALUATION

CHEMICAL HAZARDS: Aromatic and chlorinated hydrocarbons have previously been detected in leachate and groundwater at the site at low and decreasing levels. These compounds are very volatile and moderately toxic. Landfill gas and leachate may also be encountered during sampling. Landfill gas contains predominantly methane and carbon dioxide, and may also contain hydrogen sulfide, carbon monoxide, VOCs, and other toxic gases at low levels. Low level exposure is currently possible primarily at the leachate sampling sites. Exposure to site contaminants may occur via inhalation and skin contact. Reduce potential contact exposure by wearing vinyl gloves. Consider using safety glasses, nitrile gloves, and Tyvek coated coveralls when activities indicate a higher risk of exposure. Reduce potential inhalation exposure by working upwind when possible. Withdraw from site and consider implementing air monitoring, mechanical ventilation and/or respiratory protection under a new Site Safety and Operations Plan if unusual conditions are encountered.

PHYSICAL HAZARDS:

Explosive gases: Explosive concentrations of methane gas generated by the landfill may accumulate in confined or low spaces. Avoid areas where gases may accumulate. If entering confined spaces where gas may accumulate is necessary a confined space entry program must be developed before entry. Monitor with a combustible gas meter if conditions at a sampling location indicate a hazard may be present.

Heavy Equipment: Potential physical hazard from working near equipment is low since the site is inactive. Hard hat, steel-toe boots, safety glasses with side shields, and hearing protection as appropriate are required when hazards are present. Keep clear of moving or rotating equipment. Signal equipment operator when approaching equipment.

OPERATIONS PLAN

VICINITY MAP / EMERGENCY ROUTE: On the attached figure.

SITE SKETCH: On the attached work plan.

UNDERGROUND UTILITY CLEARANCE PERFORMED ON: _____ BY: _____

EXCAVATION, DRILLING, AND/OR SAMPLING METHOD(S): Groundwater sampling using dedicated electric submersible pumps. Surface water sampling by dipping bottles in water. Leachate sampling using disposable bailers in sumps.

COMMENTS: _____

SAFETY EQUIPMENT AND PROCEDURES

INITIAL LEVEL OF PROTECTION: ☐ C ☒ D

REQUIRED PERSONAL PROTECTIVE EQUIPMENT: Hard hat, steel-toe boots, hearing protection, and safety glasses with side shields required when in the vicinity of heavy equipment. Vinyl gloves required when handling groundwater and leachate samples.

AIR MONITORING EQUIPMENT AND PROCEDURES: Air monitoring equipment is not required during sampling. If hazardous conditions develop during sampling the sampler must withdraw from the area, report the conditions to Cowlitz County personnel, record the conditions in the field notes, and not return to the area until the hazard has been corrected or new procedures developed.

ACTION LEVELS: _____

COMMUNICATIONS: Use cell phone to summon emergency assistance, if needed.

DECONTAMINATION PROCEDURES: Decontamination procedures are not needed after routine sampling. Discard disposable materials and equipment with municipal waste. If unusual or uncertain conditions are encountered wash hands and face thoroughly prior to breaks and before leaving site.

KEY PROJECT PERSONNEL

SITE TEAM (no.): 1 Monitoring contractor __ Client __ Agency __ Other (Drill crew)

SITE WORK TEAM (name/responsibility): 1. Contracted field sampling personnel
2. _____ 3. _____
4. _____ 5. _____

ENTRY BRIEFING DATE: First day of site work LOCATION: Site

NOTE:

SPECIAL CONDITIONS (e.g., work schedule or limitations): Work during daylight hours.

EMERGENCY PROCEDURES

ACUTE EXPOSURE SYMPTOMS(S):	FIRST AID:
Eyes - slight to moderate irritation	Flush with water for 15 minutes.
Skin - irritation, redness, edema, drying	Wash with soap and water.
Ingestion -	Do not induce vomiting, call a physician.
Respiratory – dizziness, irritation of eyes, nose and throat, vomiting, bluish skin effects	Remove to fresh air.

NEAREST HOSPITAL/EMERGENCY MEDICAL CENTER:
St. John's Medical Center, 1614 E. Kessler Blvd., Longview, WA
911 or 360-414-2000

EMERGENCY ROUTE: (also see attached map)
Proceed on frontage road to Tennant Way west entrance. Tennant Way/SR432 west to Oregon Way/15th Avenue. Right on 15th Avenue to Kessler Blvd. Left on Kessler Blvd. to Emergency entrance.
If the railroad crossing is blocked proceed west along south side of railroad to Industrial Way. Industrial Way to 3rd Ave north. Turn left on Tennant Way frontage road to Tennant Way entrance at 7th Ave. Rejoin route to hospital.

EMERGENCY PHONE NUMBERS:

Ambulance, police, fire		Dial 911
Cowlitz County Landfill	Michele Horn	360-274-6492
Project Manager	Contractor	
Health and Safety Manager	Contractor	
Branch Manager	Contractor	

HEALTH AND SAFETY EQUIPMENT CHECKLIST

**** THE FOLLOING SAFETY EQUIPMENT IS REQUIRED ON YOUR JOB SITE****

- ☐ Photoionization Detector or Flame Ionization Detector – OVM 100 ppm isobutylene standard
- ☐ Combustible Gas Detector – methane and oxygen detector
- ☐ Oxygen Indicator – methane and oxygen detector
- ☐ Draeger/Sensidyne Pump and Detector Tubes – Hydrogen sulfide
- ☐ Respirator – Half or full-face respirator with organic vapor cartridge; change daily
- ☐ Protective Clothing – Tyvek
- ☐ Chemical Protective Gloves – Nitrile gloves
- ☐ Decontamination Equipment – Hot water pressure washer
- ☐ Steel-toed Boots – required on all job sites
- ☐ Disposable Boot Covers
- ☒ Protective Gloves – vinyl or nitrile gloves when handling sample water and leachate
- ☒ Hearing Protection – use when appropriate
- ☒ Safety Vest – use when appropriate
- ☒ Safety Glasses – use when appropriate
- ☒ Hard Hat – use when appropriate
- ☐ Caution Tape, Traffic Cones, or Barriers
- ☐ Emergency Eye Wash Fountain
- ☒ First Aid Kit – located in field vehicle
- ☒ Fire Extinguisher – located in field vehicle
- ☒ Drinking Water
- ☐ Mechanical ventilation – i.e., brush fan or portable blower
- ☐ _____

PLAN APPROVALS

Project Manager		
Regional Health & Safety Manager		
Title	Signature	Date

SIGNATURE PAGE

SITE: Cowlitz County Landfill PROJECT NUMBER: _____

NOTE: All personnel are to understand and comply with specific practices and guidelines identified or described in this SSOP. All personnel are expected to use common sense when hazards are identified by themselves or other on site personnel. Personnel are expected to reduce the hazard if safely possible, warn other on site personnel if the hazard may affect them, report the hazard to project manager and CCTWL personnel, and remove themselves from the hazardous conditions.

SIGN-OFF: I have read and understand the attached Site Safety and Operations Plan and attached General Safe Work Practices, and agree to comply with the requirements described within:

NAME	TITLE	DATE

GENERAL SAFE WORK PRACTICES

Field operations for this project shall be conducted with common sense and in accordance with minimum common and typical safety practices described below.

SAFETY PRACTICES FOR FIELD PERSONNEL

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in any area where the possibility of contamination exists.

2. Hands must be thoroughly washed when leaving a contaminated or suspected contaminated area before eating, drinking, or any other activities.

3. Contaminated protective equipment shall not be removed from the work area until it has been properly decontaminated or containerized on site.

4. Avoid activities which may cause dust. Removal of materials from protective clothing or equipment by blowing, shaking, or any means which may disperse materials into the air is not advised.

5. Personnel should be cautioned to inform each other of subjective symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract.

6. No excessive facial hair which interferes with a satisfactory fit of the face piece-to-face seal will be allowed on personnel required to wear respiratory protective equipment.

7. At sites with known or suspected contamination, appropriate work areas for field personnel support, contaminant reduction, and exclusion will be designated and maintained.

8. A first aid kit and multipurpose portable fire extinguisher must be available during field activities.

9. All field personnel will, whenever possible, remain upwind of open wells, sumps, or other areas that may release gases.

10. Subsurface work shall not be performed at any location until the area has been cleared by a utility locator firm to be free of underground utilities or other obstructions.

11. Field personnel will not enter into excavations, trenches, or other confined spaces deeper than 4 feet. Unattended boreholes must be properly covered or otherwise protected.

Emergency route map from Tennant Way Landfill to Hospital

If railroad crossing is blocked proceed along south side of railroad to Industrial Way then west to 3rd Avenue. Turn north to Tennant Way Frontage Road then west to 7th Avenue. Turn south and rejoin route at Tennant Way.

Map from Google Maps