Remedial Action Work Plan
Webster Nursery
9805 Blomberg Street SW
Tumwater, Washington

October 31, 2017

Prepared for

Washington State Department of Natural Resources
Olympia, Washington

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LIST OF ABBREVIATIONS AND ACRONYMS

AO ..... Agreed Order
bgs ..... below ground surface
CACR ..... cleanup action completion report
CAO ..... cleanup action objectives
CAP ..... cleanup action plan
CDF ..... controlled-density fill
CUL ..... cleanup level
cy ..... cubic yard
DNR ..... Washington State Department of Natural Resources
Ecology ..... Washington State Department of Ecology
ft ..... feet/foot
HASP ..... health and safety plan
HE ..... heptachlor epoxide
LAI ..... Landau Associates, Inc.
µg/kg ..... micrograms per kilogram
µg/L ..... micrograms per liter
MTCA ..... Model Toxics Control Act
QAPP ..... quality assurance project plan
RAWP ..... remedial action work plan
RCRA ..... Resource Conservation and Recovery Act of 1976
SAP ..... sampling and analysis plan
SWMP ..... stormwater management plan
TESC ..... temporary erosion and sediment control
UST ..... underground storage tank
WAC ..... Washington Administrative Code

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1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) was prepared for Washington State Department of Natural Resources (DNR) for the Webster Nursery cleanup site (Site) located south of Tumwater, Washington (Figure 1). The Site is defined by the extent of contamination caused by the release of organochlorine pesticides from an underground storage tank (UST). Persistent low concentrations of heptachlor epoxide (HE) have been identified in shallow groundwater near the previous UST location.

This RAWP was completed in accordance with Agreed Order (AO; No. DE 13181, effective August 2016) between Washington State Department of Ecology (Ecology) and DNR, consistent with the final Cleanup Action Plan (CAP) established by Ecology in August 2016 (Ecology 2016a, b). Prior to the 2016 CAP, DNR managed monitoring and compliance at the Site under a previous AO (No. DE 00 TCPSR-295, effective October 1998) and CAP issued by Ecology on January 8, 2001 (Ecology 2001).

The purpose of the RAWP is to establish a plan to design and implement the selected cleanup action for the remediation of contaminated groundwater and soil at the Site in a manner consistent with the 2016 CAP, accepted engineering practices, and the requirements specified in Washington Administrative Code (WAC) 173-340-360. Engineering design plans and technical specifications are included as Appendix A. Additional remedial action documentation and background information is provided in the CAP (Ecology 2016a).

The preferred cleanup alternative described in the 2016 CAP involves removal of HE-affected soil near the water table to reduce the potential for back-diffusion of HE from soil to groundwater. DNR is the responsible party for overall implementation and maintenance of the cleanup action (Ecology 2016a). Remedial action costs will be handled by the DNR as required in Condition VIII.A of the AO.

2.0 SITE DESCRIPTION AND REMEDIAL DESIGN

Webster Nursery is an operating nursery located at 9805 Blomberg Street SW, in Thurston County, Washington, approximately 0.5 miles west of Interstate 5 (Figure 1). Soil and groundwater at the Site are locally affected by a historical release of organochlorine pesticides from a UST located south of the former pesticide storage warehouse. The Site is accessed from Blomberg Street SW. A Site plan is shown on Figure 2.

2.1 Site Description

The Site is generally flat, with a ground surface elevation of approximately 190 feet (ft) above mean sea level. Salmon Creek, located approximately 0.2 miles to the south, flows generally west to meet the Black River approximately 2.5 miles west of the Site (Figure 1).

Soil encountered in borings at the Site generally consists of a thin (less than 0.2-ft thick) layer of topsoil overlying approximately 4 to 6 ft of light brown, fine to medium sand with silt and organic material. With depth (below approximately 4 to 5 ft), soil grades to light brown, silty fine sand and sandy silt (LAI 2016).

Groundwater below the Site is shallow and unconfined, with depth to water ranging from 4.19 to 11.28 ft below ground surface (bgs) in 2014. Groundwater levels fluctuate approximately 7 ft seasonally in response to surface conditions and precipitation. Although regional groundwater flow is likely directed west/northwest (Ecology 2001, LAI 2014b, Tetra Tech 1999), shallow groundwater flow at the Site is influenced by local surface conditions, runoff, and infiltration. Groundwater mounding has been interpreted in wells near the 1996 excavation area (Ecology 2016a).

2.2 Site Background

In 1978, a concrete UST was installed south of the former pesticide storage warehouse. The UST was historically used to contain wash water and spills from pesticide mixing operations at the nursery. The original concrete UST was replaced with a metal UST in 1982. During removal of the metal UST in July 1996, soil and groundwater pesticide contamination was confirmed, and a remedial excavation was planned and completed in 1996. Groundwater seepage in the bottom of the excavation limited the horizontal and vertical extent of the excavation, so a smaller volume of soil was removed than planned. According to the 2001 CAP, approximately 70 cubic yards (cy) of contaminated soil was removed for disposal (Ecology 2001). The excavation depth was approximately 7 ft bgs. Field screening during excavation indicated soil contamination was left in place. The approximate location of the 1996 excavation area and soil and groundwater sampling locations are shown on Figure 2.

2.3 Current Conditions

According to the 2001 CAP, the long-term timeframe for the Site remedy (monitored natural attenuation) was 5 to 10 years. However, groundwater concentrations of HE above the Model Toxics

Control Act (MTCA) Method B groundwater cleanup level (CUL[1]) have persisted at two monitoring wells: SW-10 and SW-11. These wells are located about 5 ft south and east of the 1996 excavation area margin, respectively, and are screened from approximately 6 to 16 ft bgs (LAI 2016). The persistence of HE concentrations in groundwater at these two monitoring locations led Ecology and DNR to further characterize the extent of residual pesticide contamination in soil (Ecology 2014).

HE is not mobile in the subsurface and has a low potential to leach into groundwater (Syracuse Research Corporation 2007). Consequently, the extent of HE in soil is interpreted from soil analytical results obtained from soil investigations conducted in 1999, 2014, and 2015. HE has been detected in soil below and immediately south and southeast of the 1996 excavation margins, with the highest concentrations occurring between about 4 and 10.5 ft bgs (LAI 2014a, 2016, Tetra Tech 1999). This depth interval corresponds with the seasonal range in groundwater elevations (LAI 2014a, b). In addition, at some locations soil HE detections at depths below the seasonal high water table exceed the current MTCA Method B soil CUL for protection of groundwater (4.02 micrograms per kilogram [µg/kg]). The presence of HE in soil appears to correspond with groundwater contamination (LAI 2014a, 2016). HE concentrations in soil and groundwater are presented on Figure 3.

2.4 Chemicals of Concern

HE (daughter product of heptachlor) is the primary chemical of concern at the Site. Media of concern at the Site include soil and groundwater due to HE detections exceeding applicable CULs. Figure 3 shows the horizontal and vertical extent of HE observed at the Site.

2.5 Cleanup Action Objectives and Standards

Cleanup action objectives (CAOs) and cleanup standards were initially established in the 2001 CAP. However, CULs have been revised by Ecology since the 2001 CAP took effect. The current CULs provided in Ecology's Cleanup Levels and Risk Calculation database are applicable under the 2016 CAP. MTCA Method B CULs for groundwater and soil applicable at the Site are included in Table 1.

CAOs outlined in the CAP include:

- **Human Health:** Prevent exposure to groundwater exceeding contaminant-specific applicable or relevant and appropriate requirements in accordance with WAC 173-340-360 and WAC 173-340-700.
- **Environmental Protection:** Prevent migration of groundwater contamination at levels that could negatively affect Salmon Creek.

Additionally, DNR has expressed a goal of expediting attainment of cleanup standards to the greatest extent practicable at the point of compliance. The point of compliance is defined as that portion of

[1] Under the 2001 CAP, the applicable groundwater CUL was 0.009 micrograms per liter (µg/L). Under the 2016 CAP, the applicable groundwater CUL is 0.0048 µg/L.

the subsurface impacted by leakage from the pesticide UST (Ecology 2001, 2016a). The selected remedy will seek to address each of these goals and objectives.

2.6 Remedial Action Conceptual Design

The selected remedial action described in the 2016 CAP seeks to remove HE concentrations in shallow groundwater. The limited distribution of HE in groundwater at the Site suggests that low concentrations of HE are back-diffusing locally into shallow groundwater from affected soil near the water table. As a result, the selected cleanup action proposes to excavate soil located within the zone of seasonal groundwater fluctuation that contains HE concentrations above the MTCA Method B soil CUL protective of groundwater (4.02 µg/kg).

Seasonally, the water table fluctuates over the interval between approximately 4 and 10.5 ft bgs. Therefore, the selected cleanup action will target the region of soil enclosed by boring locations in which HE has been detected in soil above the applicable 2016 soil CUL at depths between 4 and 10.5 ft bgs. Additionally, excavation would target a deeper region in the immediate vicinity of boring LAI-B12, where past results indicate that HE exceeds the MTCA Method B soil CUL protective of groundwater to a depth of 15 ft bgs. It is anticipated that removal of contaminated soil within the zone of seasonal groundwater fluctuation will eliminate the potential pathway from soil to groundwater and will result in groundwater compliance.

The primary components of the Site cleanup are as follows:

- Removal of soil using trench boxes and dewatering as needed.
- Removal and stockpiling of clean soil for use as backfill.
- Installation and maintenance of temporary erosion and sediment control (TESC) best management practices.
- Loading and transport of contaminated soils to a Subtitle D solid waste landfill for disposal.
- Confirmation sampling and analysis to document performance of the remedial excavation.
- Backfilling and compaction of the excavation with approved clean fill.
- Site restoration.

Ecology determined that this selected remedy is protective of human health and the environment, and is permanent to the maximum extent practicable.

3.0 REMEDIAL ACTION IMPLEMENTATION

Excavation of contaminated soil near the water table will be completed as presented in the CAP and described herein, to the extent practicable. Excavation adjacent to the warehouse will be performed using a sequential slot-cutting technique aided by trench boxes; slots will be backfilled with controlled-density fill (CDF) or similar to support the structure. Excavated, HE-contaminated soil will be removed from the Site and disposed of at a Resource Conservation and Recovery Act (RCRA) Subtitle D solid waste landfill. Exceptions to the proposed excavation area may include areas where soil contamination occurs near or beneath structures whose integrity could be compromised by excavation, or at depths deemed impractical to excavate at the time of work.

3.1 Pre-Construction Activities

Pre-construction activities include development of engineering design plans and specifications, completion of associated project plans to address substantive permitting requirements, public notifications, and utilities management. Project plans are listed below and included as Appendices A through E.

3.1.1 Engineering Design Plans and Specifications

Engineering design plans and technical specifications prepared for this cleanup action are provided as Appendix A. The construction drawings and specifications:

- Were prepared in conformance with currently accepted engineering practices, stamped, and signed by a Washington State licensed professional engineer.
- Provide a general description of the Site and project, detailing the cleanup action objectives, Site features, and safety measures.
- Provide detailed plans and specifications necessary for construction.
- Provide a description of construction impact controls (such as dust, traffic, and noise).
- Provide requirements for construction documentation and quality control tests, as applicable.

Technical specifications supplement the construction drawings and direct the contractor to implement construction, transport, and disposal activities in a manner consistent with industry standards and project-specific requirements as described in this RAWP. Technical specifications and construction drawings will be converted into a public bidding document.

3.1.2 Project Plans

This RAWP describes how the remedial action and compliance monitoring will be implemented. Project plans enclosed as appendices include Cleanup Design Drawings and Technical Specifications as Appendix A, a Site-specific Health and Safety Plan (HASP) as Appendix B, a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) as Appendix C, a TESC Plan and Storm Water Pollution Prevention Plan (SWPPP) as Appendix D, and an Unanticipated Discovery Plan as Appendix E.

As work will be performed within the Webster Nursery property, a traffic control plan and on-site traffic control are not proposed. However, notifications will be posted on Blomberg Street SW near the two nursery entrance gates to notify the public of dates during which truck traffic should be anticipated. DNR and Ecology will work with the community to notify residents and minimize potential transportation conflicts.

3.1.3 Permitting and Substantive Requirements

Substantive requirements of a Thurston County Clearing and Grading Permit will be addressed by project plans including a TESC and a SWPPP. A State Environmental Policy Act review has been completed for this project and reviewed by Ecology and the public in conjunction with the 2016 CAP (Ecology 2016a). No other permits or permit exemptions are expected to be sought in relation to this project.

3.1.4 Access Agreements and Notifications

As all work will be performed on property owned by DNR, access agreements will not be required. Nursery staff will be notified at least 1 week in advance of work by the DNR project manager. Additionally, nearby residents will be notified by Ecology through standard public notification procedures and consistent with the Public Participation Plan developed by Ecology per Condition VIII.G of the AO. Signs will be placed at the Webster Nursery gate during work to remind staff and visitors of the active construction.

3.1.5 Utility Locate

The construction Contractor will coordinate marking of utilities within or immediately adjacent to the drilling and excavation areas by contacting the public call-before-you-dig one-call underground utility locate center 2 weeks prior to the start of work. In addition, a private utility locating service will be coordinated by the Contractor to mark utilities on the DNR property.

3.2 Construction Activities

Construction will involve monitoring well decommissioning, tree removal, importation and stockpiling of clean fill, excavation, stockpiling and management of excavated clean soil, handling and disposal of wastewater and contaminated soil, compliance monitoring, decontamination procedures, backfilling and grading the excavation area, installing two new monitoring wells, and Site restoration. These activities are proposed to occur in quick succession to reduce the number of notifications needed.

Excavation near the building is expected to be performed using sequential slot-cutting procedures. Recommended procedures are described in Appendix A, though some procedures may be adjusted at the time of construction according to the contractor's selected means and methods. Confirmation soil sampling and compliance monitoring are described in Section 3.4.

3.2.1.1 Construction Quality Assurance and Quality Control

Day-to-day construction quality control and construction-related testing will be performed by the contractor, consistent with the requirements of the construction contract specifications for the cleanup action. A qualified LAI technician under the supervision of a Washington State licensed professional engineer or licensed geologist will provide construction oversight and perform sampling. Additionally, a geotechnical engineer will oversee key periods of construction to ensure, with a reasonable degree of certainty, that the completed project meets or exceeds the design criteria, plans, and specifications. During construction, detailed records will be kept of the work performed, including construction techniques, materials removed from and imported to the Site, and tests and measurements performed. Quality control procedures are outlined in the project QAPP (Appendix C).

3.2.1.2 Monitoring Well Decommissioning

Because existing monitoring wells SW-10 and SW-11 are located within the proposed excavation area, they will be decommissioned by a licensed well driller or licensed engineer according to regulation (WAC 173-160-460) prior to excavation. They will be replaced by two new monitoring wells (SW-17 and SW-18, respectively) after excavation and backfilling is complete (Section 3.2.1.6). Well decommissioning will be completed less than 7 days before excavation begins.

3.2.1.3 Tree Removal

The contractor will be expected to remove trees and stumps as needed to accommodate all equipment needed for construction activities, as well as a small direct-push drill rig to install two monitoring wells after excavation (Section 3.2.1.6). This work will precede excavation activities by less than 3 days.

3.2.1.4 Import Clean Fill

Clean fine- to medium-grained backfill material obtained from an offsite location will be delivered by the contractor and stockpiled on-site for use during sequential trenching and backfilling. The contractor is required to obtain confirmation of the non-contaminated nature of imported clean fill from the supplier, including laboratory results from three discrete samples of the imported material, as specified in Section 3.3 of Appendix A. Soil originating from the following sources and/or sites will not be acceptable (Ecology 2016b):

a. Sites undergoing an environmental cleanup
b. Agricultural sites where soils contain pesticides, herbicides or metals.
c. Industrial and/or commercial sites where hazardous materials were used, handled or stored.
d. Sites where petroleum hydrocarbons could have spilled or leaked into the soil.
e. Street sweepings.
f. Commercial sites including former gasoline service stations.

g. Retail areas that contained dry cleaning facilities or photographic processing facilities, paint stores, auto repair and/or painting facilities.

h. Agricultural supply stores.

i. Industrial facilities including metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, or other similar facilities.

j. Soil from a thermal desorption remediation or treatment process.

k. Soil from a biological remediation or treatment process.

The Owner's representative will confirm the non-contaminated nature of imported clean fill by collecting two, six-point composite soil samples from the imported clean fill stockpile to be analyzed for pesticides using EPA Method 8081B. We anticipate approximately 24 cy of imported clean backfill will be needed.

3.2.1.5 Excavation

Based on the results of soil investigations, an estimated 230 cy of soil will be excavated from an area of approximately 575 square feet, and approximately 145 cy (estimated at 231 tons) of soil will be removed for offsite disposal. Specifically, the excavation will target removal of:

- Native soil between 3 ft and 10.5 ft bgs in the approximately 25-ft by 23-ft area enclosed by boring locations in which HE has been detected above applicable CULs.
- Native soil from 10.5 ft to as deep as 15 ft bgs in an approximately 6-ft by 6-ft area near boring LAI-B12 (Figure 4).

The actual extent of excavation will be physically limited by structural constraints (e.g., building), access (trees and infrastructure), soil characteristics, and the depth to groundwater at the time of excavation. During excavation, geographical coordinates for each corner of the excavation will be collected using a portable GPS unit. The anticipated excavation extent is shown on Figure 4, and a conceptual cross section is presented on Figure 5. To the extent possible, construction will be scheduled during a period forecasted to have little or no precipitation to minimize the potential for dewatering, erosion, and soil caving.

3.2.1.5.1 Potential Sequential Slot-Cutting Procedure

It is anticipated that excavation will proceed in a sequence of sequential "slots" in order to maintain structural support and attain the target depths. Is anticipated that excavation and soil management will be conducted with standard construction equipment (excavator and/or backhoe), aided by trench boxes as described in Appendix A. However, actual excavation procedures and equipment may differ according to the selected contractor's means and methods to achieve the stated cleanup action objectives. Figure 6 presents a conceptual design of the anticipated excavation and compliance sampling locations. Technical specifications for the cleanup are presented in Appendix A. Compliance sampling will be performed in the trenches as described in Appendix C.

A geotechnical engineer will oversee the excavation. The actual extent of excavation and excavation side slopes will be determined in the field based on the geotechnical engineer's professional discretion in order to protect the adjacent property.

3.2.1.5.2 Identifying and Stockpiling Clean Soil

Excavated soil that is unaffected by release from the UST[2] will be stockpiled, sampled, managed (Appendix C, D), and returned to the completed excavation as backfill. This soil includes:

- Soil excavated from 0 ft to 3 ft bgs across the proposed excavation area.
- Excavated backfill material used to fill the 1996 excavation area to a presumed depth of 6 ft bgs, provided it is readily identifiable from native soil using physical characteristics (such as soil texture) during excavation.

Clean soil, as defined above, will be excavated independent of deeper (contaminated) soil, directed to a specially identified stockpile location, and properly contained and managed. It is estimated that the volume of clean excavated soil will be 85 cy. Stockpile sampling procedures are discussed in Appendix C, Section 7.2.2.1.

3.2.1.5.3 Handling and Disposal of Contaminated Soil

Excavated contaminated soil will be loaded directly into bins and transported by truck to a RCRA Subtitle D solid waste disposal facility for proper disposal. As indicated in Ecology's Contained-Out Determination letter dated April 13, 2017 (Appendix F), contaminated soil at the Site does not warrant management as dangerous waste. It will not require disposal as listed dangerous wastes at a RCRA-permitted dangerous waste treatment, storage, and disposal facility provided that all conditions listed in the contained-out determination letter are met (Appendix F). The cleanup contractor will be responsible for meeting conditions of the contained-out determination letter.

The estimated volume of excavated soil to be transported for offsite disposal is approximately 145 cy. In addition, soil cuttings generated from the 2015 soil investigation are currently stored on-site in one 20-gallon drum; this soil will also be loaded and transported for offsite disposal along with newly excavated contaminated soil. If saturated soil is loaded into bins for offsite disposal, water will be removed from the top of the bin by sump pump or equivalent, to the extent practicable, before the soil is transported (Appendix F). In the event that direct same-day loading cannot be completed, excavated soil will be temporarily stockpiled on- site and adequately protected (i.e., contained by and covered with plastic sheeting). Heavy equipment and trucks crossing the Site will be directed to travel slowly to minimize dust and disturbance.

[2] Shallow soil is not expected to be impacted by leakage from the UST, which was buried with its top located 3 ft bgs. Soil HE results confirm that HE is largely absent in shallow soil with no samples from 0 to 3 ft bgs exceeding the applicable CUL.

3.2.1.6 Drilling, Installation and Development of New Monitoring Wells

Two new monitoring wells will be installed to replace decommissioned wells SW-10 and SW-11. The new monitoring wells will be drilled and installed using direct-push drilling equipment. The new wells will be developed 24 or more hours after installation. To be comparable to the existing wells, the replacement wells will be located south and east of the new excavation and screened from approximately 6 ft to 16 ft bgs. The replacement wells for SW-10 and SW-11 will be identified as SW-17 and SW-18, respectively. Well drilling, installation, and development will be completed less than 14 days after excavation begins. Proposed well locations are shown on Figure 4 and installation and development procedures are presented in the SAP (Appendix C).

3.2.1.7 Handling and Disposal of Wastewater

Wastewater may be produced from well development, well purging during groundwater sampling, excavation dewatering, decontamination, and from removal of standing water in transportation bins. Wastewater will be sampled for characterization as described in the SAP (Appendix C, Section 7.2.2.2). If wastewater sampling results indicate that HE and chlordane concentrations are below applicable CULs (i.e., 0.0048 µg/L for HE and 0.25 µg/L for chlordane), the water will be routed into the open excavation and allowed to infiltrate. If HE and chlordane concentrations exceed applicable CULs, a qualified disposal company will be contracted to remove and properly dispose of the wastewater. Wastewater generated from outside the excavation (such as well development and sampling purge water) and water that cannot be infiltrated through the open excavation will be contained in appropriately labeled drums or tanks (or equivalent containment) on- site. In addition, two 55-gallon steel drums on- site currently contain well development and purge water generated from previous Site investigations. This water will be handled and disposed of with construction wastewater using a disposal contractor following the completion of cleanup.

3.2.1.8 Filling, Compacting, and Grading

The excavation will be backfilled with clean excavated soil and clean imported fine- to medium-grained fill material comparable to surrounding soil. It is anticipated that a total of 85 cy of excavated on- site soil and 24 cy of imported clean fill will be used to backfill the excavation. The fill will be placed in approximately 8- to 12-inch lifts and compacted to an unyielding condition. Filling and compacting will continue until final Site grade is approximately equivalent to existing Site grades.

3.2.1.9 Site Restoration

After completion of drilling, excavation, and filling/grading activities, it is anticipated that the Site will be restored by seeding with a permanent seed mix. Restoration will be performed in general accordance with the applicable guidelines set forth in Ecology's Stormwater Management Manual for Western Washington (Ecology 2014).

3.3 Construction Health and Safety

The Site-specific HASP (Appendix B) addresses monitoring for protection of human health. The HASP addresses potential physical and chemical hazards associated with Site cleanup activities consistent with the requirements of WAC 173-340-810. Anticipated potential physical hazards include working in proximity to heavy equipment and open excavations. Potential human exposure pathways include inhalation of airborne dust and contamination and contact with, or ingestion of, contaminated soil and groundwater. Contractors retained for remedial activities will be required to prepare a HASP that is at least as stringent as the Site-specific HASP and contractors should add their own health and safety procedures for the specific hazards of their work.

The following health and safety measures will be implemented as part of the remedial action:

- **Safety Fences and Signs:** The Site is a secure facility with limited access. However, signs and safety fencing will be installed, as necessary, around open excavations to prevent unauthorized entry. Activities in areas where contaminated soil will be handled will be performed within a taped-off or fenced area (exclusion area) to restrict access and raise awareness in the work zone.
- **Personal Protective Equipment**: Tyvek suits, nitrile gloves, chemical-resistant boots, safety goggles, and Site security measures will be utilized as appropriate to prevent dermal contact or other direct exposure.
- **Load Covering**: All loads of excavated soil will be property secured and covered to prevent release and exposure of hazardous materials during hauling operations.
- **Stockpile Covering:** Temporary soil stockpiles will be lined and covered with heavy plastic sheeting or equivalent at the end of each work day.
- **Air/Dust Monitoring**: Airborne particulate dust will be monitored using the no visible dust standard. On-site water may be used to apply small amounts of spray if airborne particulate levels exceeds applicable limits.
- **Excavation Sloping**: Areas of the excavation may be benched or sloped as needed to reduce instability.
- **Contractor Responsibility**: Contractor activities will be observed by an LAI field representative. Under no circumstances would it be the intent of the LAI field representative to directly control the physical activities of the contractor or the contractor's workers. The presence of our field representative at the Site is to provide the owner and design team a source of professional opinion and advice based on the field representative's observations of the contractor's work. Our services do not include any superintending, supervision, or direction of the contractor's workers. Any construction review of the contractor's performance is not intended to include review of the adequacy of the contractor's safety measures in, on, or near the construction Site. In accordance with generally accepted construction practices, the contractor will be solely and completely responsible for working conditions at the job Site, including safety of persons and property during performance of the work.

3.4 Environmental Monitoring and Sampling

Monitoring and sampling will be conducted per the requirements of WAC 173-340-410 and as documented in the HASP, SAP, and QAPP (Appendices B and C).

3.4.1 Performance Monitoring

Performance monitoring will take the form of confirmation sampling as described in the next section. Due to physical limitations on the excavation extent described in Section 3.2, soil contamination will not be "chased" during excavation. Rather, confirmation soil sampling results will indicate whether the cleanup action successfully removed subsurface soil contamination above applicable CULs.

3.4.2 Soil Sampling

Soil sampling will include confirmation soil sampling from the floor and walls of the excavation (Figure 6), and composite sampling of excavated, stockpiled soil that is expected to be clean (Section 3.2.1.5.2 and Appendix C, Section 7.2.2.1). A SAP has been prepared for the proposed confirmation sampling activities (Appendix C). Specific procedures, analytical parameters, and sampling frequency for the confirmation monitoring program are presented in the SAP.

3.4.3 Groundwater Monitoring Plan

Once cleanup and Site restoration is complete, four consecutive quarters of groundwater sampling will be conducted at water quality monitoring wells including new wells SW-17 and SW-18. A groundwater sampling plan is provided in the SAP.

4.0 POST-CONSTRUCTION DOCUMENTATION AND COMPLIANCE

The applicability or in-applicability of related documentation or approvals is explained below in the context of the proposed remedial action, and additional planned documentation or actions will be discussed.

4.1 Operations and Maintenance Plan

Assuming that remedial excavation can achieve removal of soil contaminated above the applicable CUL and no operational controls are needed at the Site, an operations and maintenance plan will not be required.

4.2 Institutional Controls

Institutional controls are currently in place as a restrictive covenant on the property (Thurston County Covenant # 3336349) consistent with the 2001 AO. Ecology will determine whether institutional controls shall be retained after the remedial action, contingent upon approval from Ecology, per Condition VIII.P of the AO.

4.3 Cleanup Action Reporting

DNR will submit a draft Cleanup Action Completion Report (CACR) to Ecology for review within 60 days of receipt of validated soil sample results, or completion of cleanup action and disposal (whichever is later). Within 30 days of receiving Ecology's comments on the draft CACR, DNR will submit a revised final CACR addressing Ecology's comments.

DNR will submit quarterly groundwater monitoring and reports to Ecology within 30 days of receipt of validated groundwater sampling results, and no later than 90 days from the groundwater sampling date. Following receipt and processing of the results from the fourth quarterly groundwater monitoring event, DNR will submit a data report to Ecology. The report will provide recommendations for future monitoring. The monitoring data will also be uploaded to Ecology's Environmental Information Management database after each sampling event by DNR (or a contractor to DNR).

5.0 CLEANUP IMPLEMENTATION SCHEDULE

A preliminary schedule was developed for the CAP (Ecology 2016a) for implementation of the final remedy. The schedule lists the expected order and duration of the main components of the construction work. The actual dates of individual events will be adjusted based on input from the selected remediation contractor and based on the schedule for DNR's award of the remediation contract. DNR will provide Ecology with updates to the schedule as needed. A general outline of activities is as follows:

1. Upon finalization of the cleanup action engineering design, plans, and bid package(anticipated November 2017), DNR will initiate a public works bidding and contracting process (anticipated January 2018).
2. Implementation of Site preparations and cleanup action is anticipated in September 2018.
3. DNR will submit a draft Cleanup Action Completion Report (CACR) to Ecology for review within 60 days of receipt of validated soil sample results, or completion of cleanup action and disposal (whichever is later; anticipated December 2018).
4. Within 30 days of receiving Ecology's comments on the draft CACR, DNR will submit a revised final CACR addressing Ecology's comments (anticipated February 2019).
5. DNR will submit quarterly groundwater monitoring reports to Ecology within 30 days of receipt of validated groundwater sampling results, and no later than 90 days from the groundwater sampling date. The first groundwater sampling event is anticipated in October 2018. It is anticipated that the first quarterly groundwater monitoring report will be submitted to Ecology by DNR in December 2018.

6.0 USE OF THIS WORK PLAN

This RAWP has been prepared for the exclusive use of DNR and applicable regulatory agencies for specific application to the Webster Nursery Site south of Tumwater, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of LAI. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAI warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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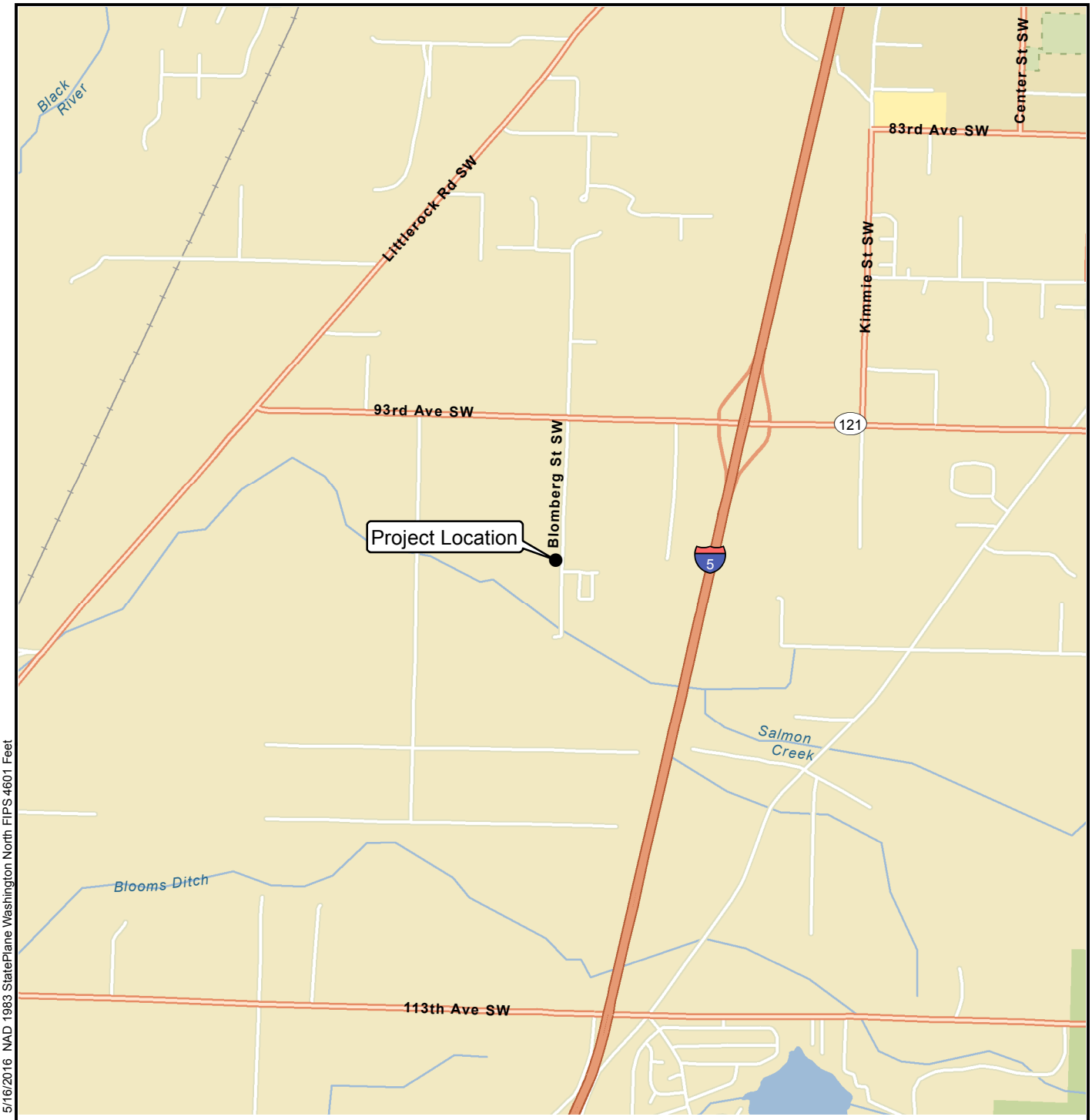

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0 0.5 1

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Data Source: Esri 2012

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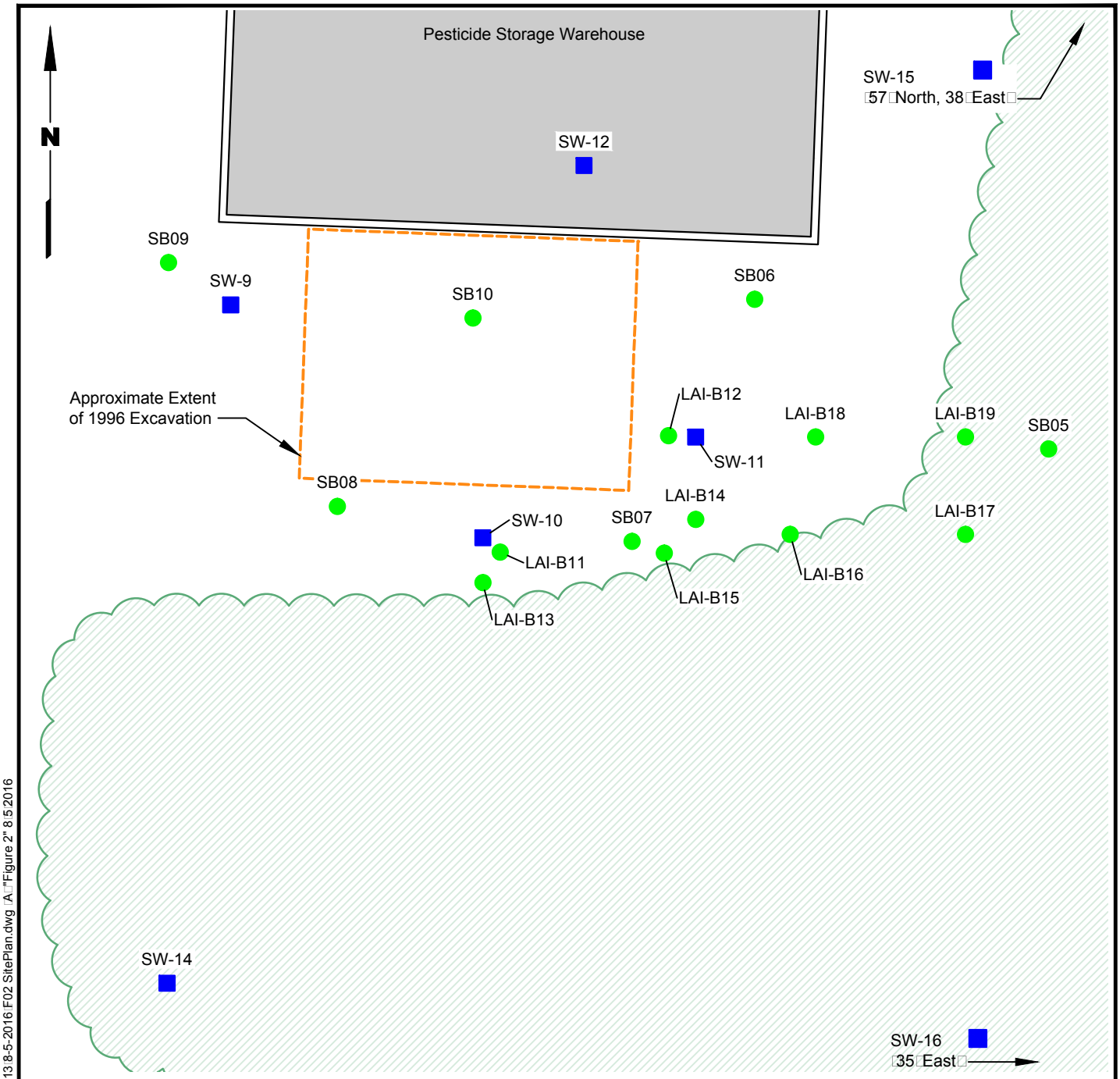
LANDAU ASSOCIATES

Webster Nursery Site Tumwater, Washington	**Vicinity Map**	Figure 1



Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Soil Boring
- Groundwater Monitoring Well
- Treed Area

0 10 20

Scale in Feet

Source: Tetra Tech, 1999

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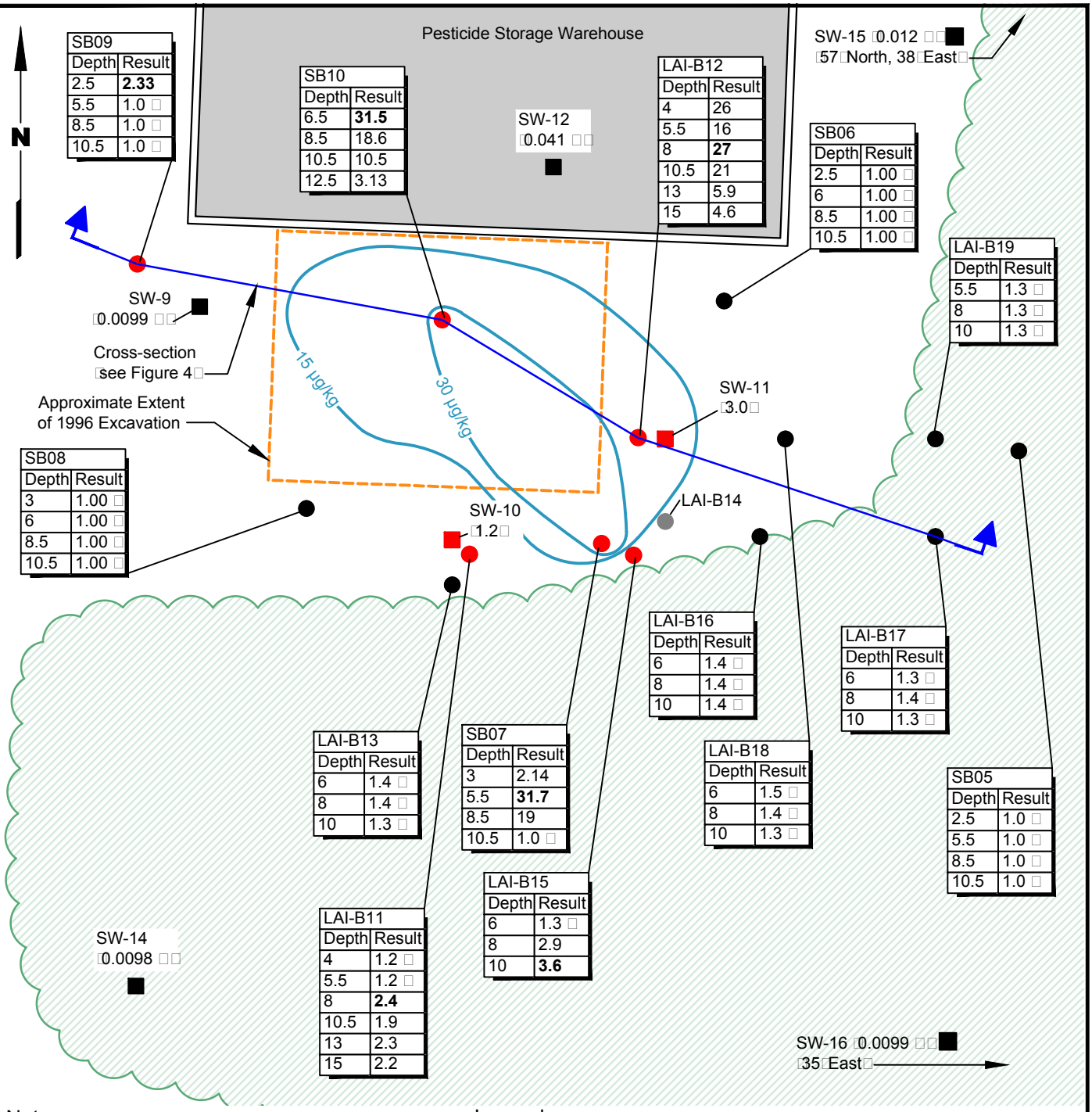
Webster Nursery Site Tumwater, Washington	**Site Plan**	Figure 2



Notes

1. Depth measured in feet below ground surface.
2. Soil concentrations in micrograms per kilogram (µg/kg); bold indicates maximum.
3. Groundwater concentrations are most recent result, in micrograms per liter (µg/L).
4. □ = indicates the compound was not detected at the reported concentration.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

Location Type:
- Soil Boring
- Groundwater Monitoring Well
- Soil Concentration Contour
- Treed Area

Heptachlor Epoxide Results:
- Detected
- Not Detected
- Not Analyzed

0 10 20
Scale in Feet

Source: Tetra Tech, 1999

LANDAU ASSOCIATES, INC. | G:\Projects\774\006\010\013\8-5-2016\F03 Soil-GWConcentrations.dwg (A) "Figure 3" 8/5/2016

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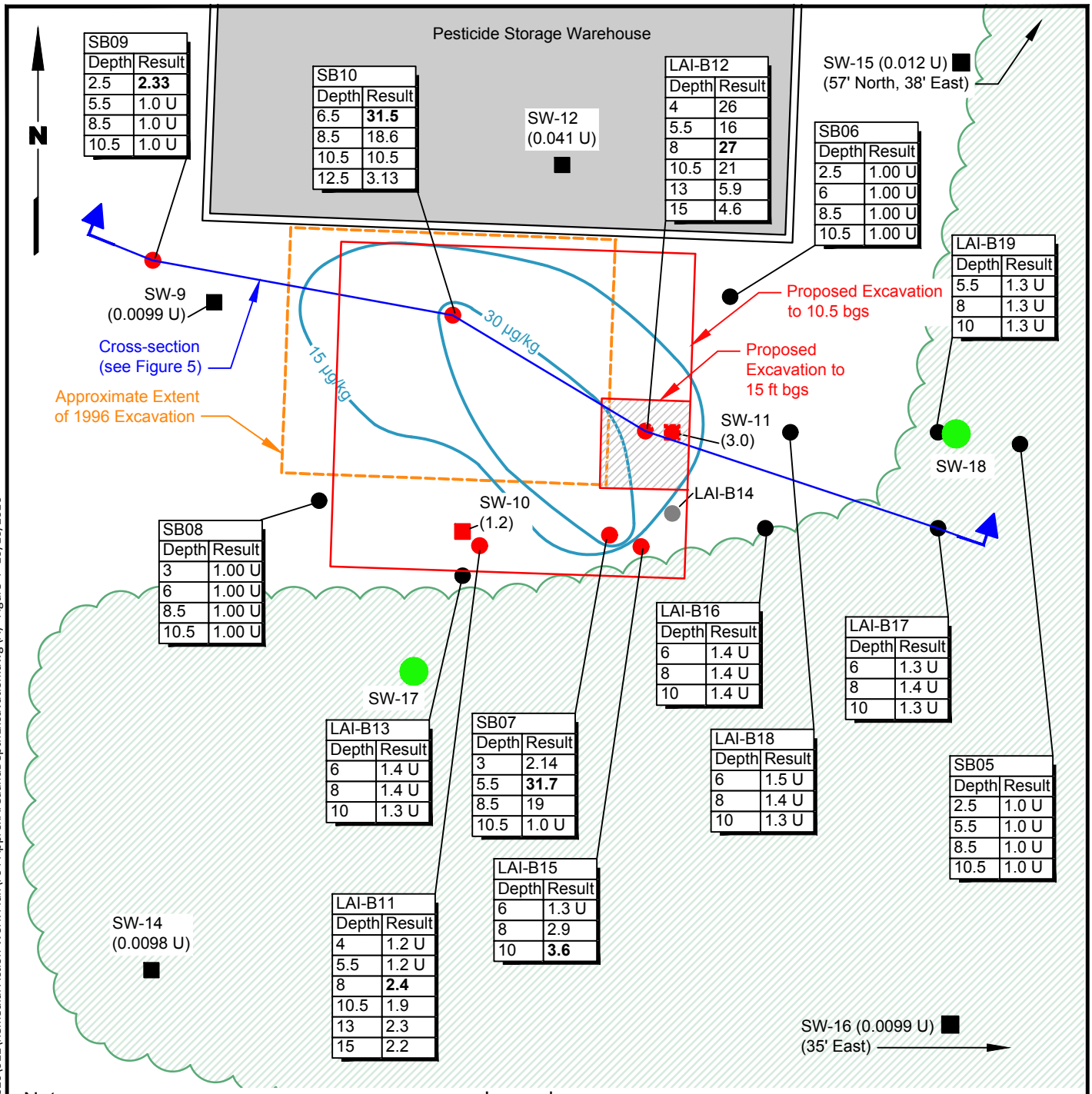
Webster Nursery Site
Tumwater, Washington

Heptachlor Epoxide Concentrations in Soil and Groundwater

Figure 3



Notes

1. Depth measured in feet below ground surface.
2. Soil concentrations in micrograms per kilogram (µg/kg); bold indicates maximum.
3. Groundwater concentrations are most recent result, in micrograms per liter (µg/L).
4. U = indicates the compound was not detected at the reported concentration.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Tetra Tech, 1999

Legend

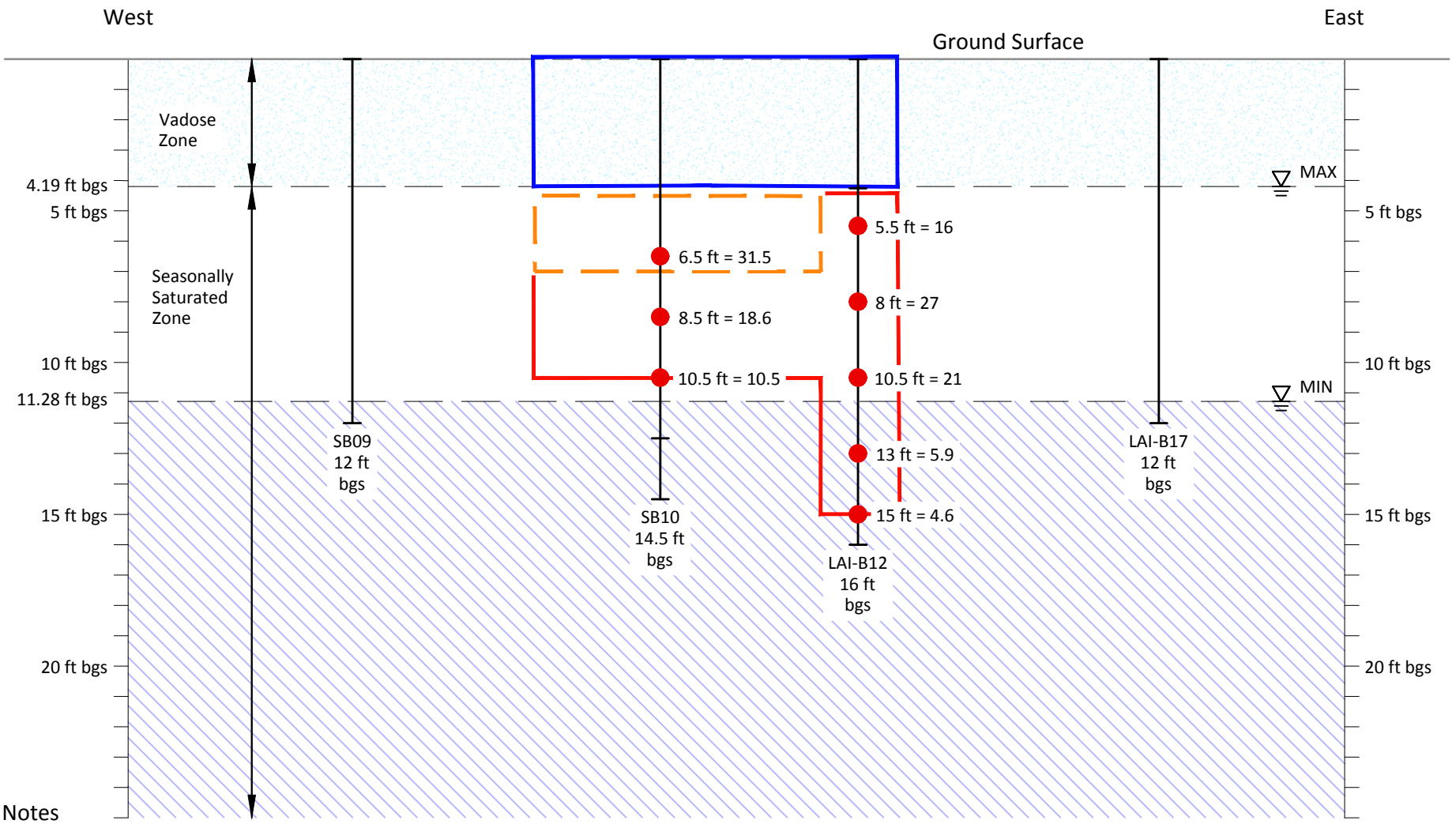
Location Type:
- Soil Boring
- Groundwater Monitoring Well
- Soil Concentration Contour
- Proposed Monitoring Well Location
- Treed Area

Heptachlor Epoxide Results:
- Detected
- Not Detected
- Not Analyzed

0 10 20
Scale in Feet

LANDAU ASSOCIATES

Webster Nursery Site Tumwater, Washington	**Approximate Area and Depth of Proposed Excavation**	Figure 4



Notes

1. Maximum Water Level = 4.19 bgs (Feb 2014), Minimum Water Level = 11.28 bgs (Sept 2014).
2. Surface elevation approx. 193 ft.
3. Ground surface elevations obtained from GoogleEarth, vertical datum unknown.
4. Soil concentrations in micrograms per kilogram (µg/kg)
5. Exceedance indicates a location where HE concentration in soil exceeds the MTCA Method B soil cleanup level for protection of groundwater.
6. Backfill in 1996 excavation area will be treated as clean soil only where readily distinguishable from native soil using physical characteristics such as texture or density.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Exceedance
- Clean Backfill of 1996 Excavation
- Clean Overburden
- Planned Excavation and Disposal

0 10 20

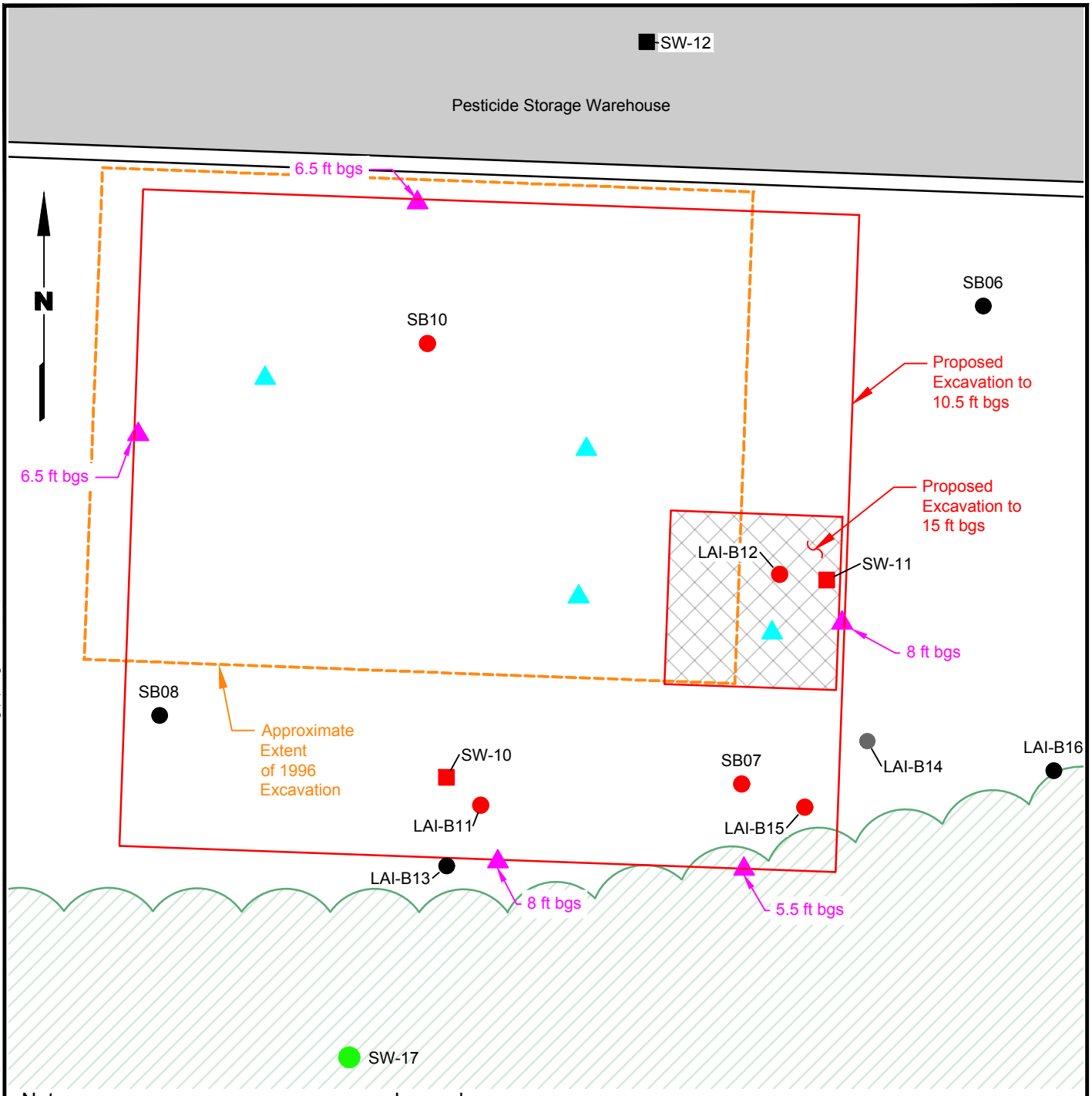
Horizontal Scale: 1" = 10'
Vertical Scale: 1" = 5'
2x vertical exaggeration

LANDAU ASSOCIATES

Webster Nursery Site
Tumwater, Washington

Conceptual Cross Section of Cleanup Action

Figure
5



Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. "ft bgs" = feet below ground surface.

0 5 10

Scale in Feet

Legend

Location Type:

- Soil Boring
- Groundwater Monitoring Well
- Proposed Monitoring Well Location
- Proposed Slot Base Confirmation Soil Sample Location
- Proposed Sidewall Confirmation Soil Sample Location and Depth
- Treed Area

Heptachlor Epoxide Results:

- Detected
- Not Detected
- Not Analyzed

Source: Tetra Tech, 1999

LANDAU ASSOCIATES, INC. | G:\Projects\774\006\020\022\Remedial Action Work Plan\F06 ExcavationAreaDetail.dwg (A) "Figure 6" 1/11/2017

LANDAU ASSOCIATES

Webster Nursery Site
Tumwater, Washington

Proposed Excavation and Approximate Confirmation Sampling Detail

Figure 6

Table 1
Model Toxic Control Act Method B Cleanup Levels
Webster Nursery
Tumwater, Washington

Chemical Name	CAS #	Soil Direct Contact MTCA Method B Non cancer (mg/kg)	Soil Direct Contact MTCA Method B Cancer (mg/kg)	Soil Protective of Groundwater Vadose @ 25 degrees C (mg/kg)	Soil Protective of Groundwater Saturated (mg/kg)	Soil TEE Soil Biota (mg/kg)	Soil TEE Wildlife (mg/kg)	Soil CUL in Final Units Vadose Zone (µg/kg)	Soil CUL in Final Units Saturated Zone (µg/kg)	Groundwater MTCA Method B Non cancer (µg/L)	Groundwater MTCA Method B Cancer (µg/L)
atrazine	1912-24-9	2.80E+03	4.35E+00					4.35E+03	4.35E+03	5.60E+02	3.80E-01
chlordane	57-74-9	4.00E+01	2.86E+00	2.06E+00	1.03E-01	1.00E+00	2.70E+00	2.06E+03	1.03E+02	8.00E+00	2.50E-01
dicamba	1918-00-9	2.40E+03						2.40E+06	2.40E+06	4.80E+02	
heptachlor	76-44-8	4.00E+01	2.22E-01	3.78E-02	1.90E-03		0.4 (a)	3.78E+01	1.90E+00	8.00E+00	1.94E-02
heptachlor epoxide	1024-57-3	1.04E+00	1.10E-01	8.02E-02	4.02E-03		0.4 (a)	8.02E+01	4.02E+00	1.04E-01	4.81E-03
picloram	1918-02-1	5.60E+03						5.60E+06	5.60E+06	1.12E+03	
simazine	122-34-9	4.00E+02	8.33E+00					8.33E+03	8.33E+03	8.00E+01	7.29E-01
tp;2,4,5-	93-72-1	6.40E+02						6.40E+05	6.40E+05	1.28E+02	
2,4-D	94-75-7	8.00E+02									
2,4,5 T	93-76-5	8.00E+02									

Notes:

All cleanup criteria are from Ecology's Cleanup Levels and Risk Calculation Database, except for the TEE values which are from WAC 173-340-900, Table 749-3.
Green shading = selected CUL

(a) Total heptachlor and heptachlor epoxide

Abbreviations/Acronyms:

CUL = cleanup level
Ecology = Washington State Department of Ecology
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
TEE = terrestrial ecological evaluation
WAC = Washington Administrative Code

APPENDIX A

Cleanup Design Drawings and Technical Specifications

PROJECT NO. DNR 17-E20
SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
9805 BLOMBERG STREET SW
THURSTON COUNTY, WA

10/27/17

1 - PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION

The project is being conducted for the Washington Department of Natural Resources (Owner). The project consists of providing all material, labor and equipment to excavate and remove pesticide-contaminated soil adjacent to a warehouse. This work will include, but is not limited to: clearing trees; providing structural support for the warehouse during excavation; construction dewatering and wastewater management; excavation and stockpiling of non-contaminated soil; staged excavation, loading, transport and disposal of contaminated soil; backfill of excavations; temporary erosion and sedimentation control, soil management, and stockpiling of non-contaminated soils and imported fill; and site restoration.

The work also includes decommissioning two groundwater monitoring wells within the excavation area within seven days prior to excavation, and installing two new groundwater monitoring wells once the excavation has been backfilled. Well decommissioning and installation must be completed by a licensed well driller or licensed engineer.

2 – GENERAL SPECIFICATIONS

2.1 REFERENCE SPECIFICATIONS

These Technical Specifications are used in conjunction with the indicated sections of the following:

ASTM – American Society of Testing and Materials.
WSDOT – Washington Department of Transportation, Standard Specifications for Road, Bridge and Municipal Construction.

2.2 APPLICABLE CODES

It is not the intent of the Owner to list and identify all applicable safety codes, standards, and/or regulations requiring compliance by Contractor. Contractor shall be responsible for identifying and determining all safety codes, standards, and regulations that are applicable to the work. These include, but are not limited to, the following:

- 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response

- 29 CFR 1926, Safety and Health Regulations for Construction
- 49.17 RCW, Washington Industrial Safety and Health Act
- WAC 173-160-460, Minimum standards for construction and maintenance of wells
- WAC 296-24, General Safety and Health Standards
- WAC 296-155, Safety Standards for Construction, including Part N Excavations, Trenching, and Shoring.
- WAC 296-62, Part P, Hazardous Waste Operations and Emergency Response
- American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices for 1991-1992, or most recent version.
- NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, DHHS Publication No. 85 115, October 1985.

2.3 TIMING RESTRICTIONS

Construction shall take place August 1 to October 31, 2018

Project work hours are between 8am to 8pm. No road traffic or excessive noise will be allowed after 6 pm unless Owner approved. No operation of road equipment or haul will be allowed on before 8 am or after 6 pm on workdays, weekends, or State-recognized holidays, unless authorized in writing by the Owner's Project Manager. Access control gates at the Site open at 8 am and close at 4:30 pm. All gates must be closed and secured by Contractor outside these standard hours.

2.4 HAZARDOUS MATERIALS

A. Contaminated Soil and Groundwater

The work is being conducted to complete a soil cleanup required by the Washington State Department of Ecology's (Ecology) Agreed Order (AO; No. DE 13181, effective August 2016) between Ecology and DNR, consistent with the final Cleanup Action Plan (CAP) appended to the AO and the Remedial Action Work Plan (RAWP) submitted to Ecology in October 2016.

The cleanup area is defined by the extent of contamination caused by the release of organochlorine pesticides from an underground storage tank (UST). Persistent low concentrations of heptachlor epoxide (HE) have been identified in shallow groundwater near the previous UST location. Based on field investigations, soil HE concentrations above the Model Toxics Control Act (MTCA) cleanup level for protection of groundwater (4.02 micrograms per kilogram [μg/kg]) occur below the seasonal water table and appear to be causing groundwater contamination. Contaminated soil is therefore required to be removed and replaced with non-contaminated backfill. In the areas designated for soil cleanup excavation on the Plans, the Contractor shall assume the following maximum concentrations of HE for health and safety purposes: 31.7 μg/kg in soil and 3.0 micrograms per liter (μg/L) in groundwater. Chlordane has also been detected in groundwater; Contractor shall assume a maximum concentration of 0.25 μg/L total chlordane in groundwater. Ecology has provided a contained-out determination stating the soil is exempt from management as dangerous waste.

Based on the presence of chemical constituents in soil at the site, Contractor shall prepare and implement a site-specific health and safety plan for the work under this Contract. Additionally, Contractor shall exercise due caution when excavating and handling impacted soil and construction water to minimize the potential health hazard to persons on the site, adjacent properties, and the general public.

B. Hazardous Materials and Waste – Regulatory Compliance
Contractor is responsible for understanding and complying with applicable local, state, and federal hazardous materials/waste laws and regulations for operations conducted under this contract. Such regulations pertain to, but may not be limited to: hazardous material storage, handling and transport, personnel protection, release notification, emergency response, cleanup and waste disposal. Contractor shall be responsible for restoring site in the event of a spill.

C. Hazardous Materials Spill Prevention
All operations shall be conducted in a manner that avoids release of hazardous materials, including petroleum products and hydraulic fluid, into the environment (water, air, or land).

D. Hazardous Materials Spill Containment, Control and Cleanup
If safe to do so, Contractor shall take immediate action to contain and control all hazardous material spills. Contractor shall ensure that a spill kit is on site. At a minimum, a quick response kit capable of absorbing 4 to 6 gallons of oil, coolant, solvent, or contaminated water shall be available on site. If large quantities of bulk fuel/other hazardous materials are stored on site, Contractor must be able to effectively control a container leak and contain and recover a hazmat spill equal to the largest single on-site storage container volume.

E. Hazardous Material Release Reporting
Releases of oil or hazardous materials to the environment must be reported according to the State Department of Ecology. It is the responsibility of the Contractor to have all emergency contact information readily available and a means of remote communication for purposes of quick notification. In the event of a spill, the Contractor is responsible for notifying the following: Washington Emergency Management Division, National Response Center (contact information below) and the Owner's Project Manager.

Washington Emergency Management Division: 1-800-258-5990
National Response Center: 1-800-424-8802

2.5 TRENCH SAFETY

The Contractor should perform the work under this contract without workers needing to enter excavated trenches; however, trenches must be shored to maintain the stability of the excavation sidewalls. If workers are required to enter any trench or other excavation 4 or more feet in depth for unanticipated conditions or repairs, the trench or excavation shall be shored and cribbed. The Contractor alone shall be responsible for worker safety and the Owner assumes no responsibility. All trench safety systems shall meet the requirements of the Washington Industrial Safety Act, Chapter 49.17 RCW and WAC 296-155 Part N.

2.6 SUBMITTALS

A. Within 21 days of the issuance of the Notice to Proceed and prior to starting intrusive work activities, submit the following:

1. Construction Schedule (General Conditions [GC] 3.02 Construction Schedule)
2. Schedule of Values (GC 6.02 Schedule of Values)
3. Subcontractor List (GC 5.20 Subcontractors and Suppliers) including:
    a. The permitted disposal facilities which will accept contaminated soil and wastewater generated at the site.
4. Health and Safety Submittals
    a. A site-specific health and safety plan meeting applicable regulatory requirements. Obtain Owner's concurrence with the plan before conducting the work. As a minimum, Contractor's site-specific health and safety plan shall include:
        i. A description of the site activities to be performed.
        ii. A listing of hazardous substances known to be, or suspected of being, present at the site.
        iii. A description of the site chemical hazards (e.g., toxicity, flammability, stability, reactivity, etc.), including the nature of each chemical; its physical properties; OSHA, WISHA, or ACGIH standards, where established; and physical hazards (e.g., noise, heavy equipment, heat stress, etc.).
        iv. A map of the site showing the known and possible locations of the chemical substances, and the proposed work activity locations and evacuation routes.
        v. General health and safety directives regarding onsite conduct, including levels of protection and contingency plans.
        vi. Site-specific health and safety directives for potentially hazardous activities. These directives shall specify the equipment and safety procedures to be used by personnel engaged in the work activities.
        vii. Establishment of the work area definitions associated with potential contact with hazardous materials. Planned changes in boundaries during the work shall be identified.
        viii. Requirements for personal protective equipment. The plan shall include a listing of the health and safety equipment that will be available onsite and required for intrusive site activities during the work under this Contract.
        ix. Personal decontamination facilities and procedures. Provide decontamination facilities for personnel, as necessary, for conformance with the health and safety plan.

x. Emergency procedures in case of hazardous waste spillage or exposure to personnel, personal injury, fire, explosion, etc. This section of the plan shall include emergency telephone numbers and specific procedures for immediate removal to a hospital or doctor's care of any person who may be injured on the job site.

xi. Field monitoring equipment and procedures. This section of the plan shall specify when and how monitoring will be performed (e.g., visual monitoring for airborne dust), what data reporting procedures will be used, and how the data will be used onsite to determine appropriate personal protective equipment.

xii. Names and responsibilities of personnel assigned to implement, administer, and supervise the health and safety plan.

xiii. Names, firms, and staff positions of personnel authorized to work at the site.

xiv. An employee signature page on which each of Contractor's employees whose activities involve contact with contaminated materials and each employee of each subcontractor of any tier whose activities involve contact with contaminated materials will acknowledge receipt of the plan, an understanding of the plan, and an agreement to comply with plan provisions.

xv. Recordkeeping requirements and all necessary reporting to cover the implementation of the Contractor’s site-specific health and safety plan.

xvi. Handling and disposal procedures for personal protective gear, decontamination residuals, and other potentially contaminated construction waste generated by Contractor and other site personnel during the course of the work.

xvii. An excavation safety plan (trench safety plan) as an attachment to the Health and Safety plan if personnel are proposed to enter the excavations. The excavation safety plan shall be prepared in accordance with 29 CFR Part 1926 Subpart P, and include all shoring, trench safety and/or dewatering that will be required for excavations exceeding 4 feet in depth. The excavation safety plan must be prepared and sealed by a professional engineer registered in the State of Washington who will also be the designated excavation competent person during construction. The excavation safety plan must include requirements for the designated excavation-competent person to inspect the installed excavation safety measures during construction.

b. Submit to the Owner the name and qualifications of Contractor's health and safety officer for the work. Contractor shall not replace this person without prior written approval by the Owner.

c. Submit proof of appropriate WAC 296-62 Part P training for site workers and supervisory personnel who are authorized by the Contractor to engage in work associated with hazardous materials and potentially hazardous materials. In addition, for onsite supervisory personnel, submit current certification of WAC 296-62 Part P onsite management or supervisor training and American Red Cross first aid and cardiopulmonary resuscitation (CPR) training.

d. Submit proof that all Contractor's site workers and supervisors have completed 40 hours of OSHA HAZWOPER (29 CFR 1910.120) training and ensure personnel have current HAZWOPER certifications during site work.

5. Certification sheets and analytical results for non-contaminated materials supplied to the project will meet the requirements of Part 3 Materials.
6. Dewatering, Water Treatment, and Disposal Plan that details Contractor's planned sequencing, methods, equipment, and materials to maintain the groundwater table below the excavation depths during excavation, sediment removal, and disposal activities. The plan shall be approved by the Owner prior to conducting the work under this section, and shall address the following minimum requirements:
    a. Description of the methods and equipment that will be used for excavation dewatering and water storage, sediment removal, and disposal.
    b. Estimated dewatering rates assumed by Contractor in sizing the various components of the dewatering and water storage and sediment removal systems.
    c. List of the number, types, sizes, capacity, and other relevant information for the various components of the dewatering and water storage systems (e.g., pumps, sump risers, discharge hoses, storage, baffles or filter systems, etc.).
    d. Estimated storage capacity to be provided for temporary containment of water between extraction and final disposal, and plans for promptly increasing such storage capacity as needed during the work.
7. A list of permitted disposal facilities which will accept the contaminated soil and wastewater.
8. Documentation that demonstrates that Contractor or subcontractor conducting handling and transport of contaminated materials is properly licensed and in compliance with applicable DOT regulations. Also submit a copy of contingency and spill control plans describing measures to be implemented in the event spills or discharges occur during material handling and transporting. These submittals shall be submitted to Owner for review prior to performing contaminated material transportation activities.
9. The Contractor shall provide documentation that they will be using a licensed well driller to decommission, drill and install groundwater monitoring wells.

B. At project completion, the Contractor must provide the following submittals as a condition of final payment:
    1. Proper manifesting and records of waste materials and legible copies of certified weight receipts or other documentation certifying the total weight of material transported to the solid waste disposal facility and wastewater disposal facility (if used).

2. As-built report documenting the soil cleanup activities, including daily logs and summary forms, as-built drawings and measured locations and depths for contaminated soil excavations.
3. Copies of groundwater monitoring well decommissioning reports signed by a licensed well driller or professional engineer as submitted to Ecology.
4. Copies of groundwater monitoring well start cards signed by a licensed well driller or professional engineer as submitted to Ecology.

2.7 DOCUMENTS FOR REVIEW

The Owner will provide the following documents to the Contractor:

- Remedial Action Work Plan
- Department of Ecology Agreed Order DE 13181
- Boring logs
- Letter: Contained-Out Determination for Contaminated Soils from Webster Nursery in Tumwater, Washington

3 – MATERIALS

Contractor, unless otherwise stated in the Plans or these Technical Specifications, shall provide all materials required for this project.

3.1 FOUNDATION SUPPORT BEAM

Contractor to supply steel foundation support beam, connections, bolts, temporary jacks and ancillary equipment to attach to the pesticide warehouse foundation as described in the Plans and these Technical Specifications. The steel beam shall be A36 grade steel.

3.2 CONTROLLED-DENSITY FILL (CDF)

Contractor to identify a source and supply of CDF per WSDOT Standard Spec 2-09.3(1)E with a minimum 150 psi 28-day strength. The sand mixture used for manufacturing the CDF shall be non-contaminated material obtained from an offsite location. The source and non-contaminated nature of the material will be confirmed with the supplier. At a minimum, the supplier shall provide certification that the CDF source has a total arsenic levels less than 20 mg/kg and Total Petroleum Hydrocarbons (TPH) less than 200 mg/kg for diesel and oil range hydrocarbons, below recording limits for gasoline, and no detectible pesticides as determined by EPA Method 8081.

3.3 IMPORTED FILL

Contractor to identify a source and supply non-contaminated fill which is fine- to medium-grained (grain size of less than 2 millimeters in diameter) soil obtained from an offsite location. Soil originating from the following sources and/or sites will not be acceptable:

a. Sites undergoing an environmental cleanup

b. Agricultural sites where soils contain pesticides, herbicides or metals.

c. Industrial and/or commercial sites where hazardous materials were used, handled or stored.

d. Sites where petroleum hydrocarbons could have spilled or leaked into the soil.

e. Street sweepings.

f. Commercial sites including former gasoline service stations.

g. Retail areas that contained dry cleaning facilities or photographic processing facilities, paint stores, auto repair and/or painting facilities.

h. Agricultural supply stores.

i. Industrial facilities including metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, or other similar facilities.

j. Soil from a thermal desorption remediation or treatment process.

k. Soil from a biological remediation or treatment process.

Clean fill will be delivered by the contractor and stockpiled on-site for use during sequential trenching and backfilling. The source and non-contaminated nature of the imported fill must be demonstrated by the supplier. At a minimum, the supplier shall provide certification (laboratory analytical results) from three discrete samples of the imported fill material, to the Contractor and Owner's representative, prior to delivery of the material to the Site. The analytical results must include pesticide concentrations, and must demonstrate that the imported material has total arsenic levels less than 20 mg/kg, TPH less than 200 mg/kg for diesel and oil range hydrocarbons, and is below recording limits for gasoline. Additionally, the Owner's representative will confirm the non-contaminated nature of imported clean fill by collecting two, six-point composite soil samples from the imported clean fill stockpile to be analyzed for pesticides using EPA Method 8081B. Soil exceeding applicable cleanup levels will be removed from the Site and replaced with verifiably non-contaminated soil at Contractor's expense.

3.4 SILT FENCE

Contractor to provide silt fence as shown and specified on the Plans.

3.5 CONSTRUCTION ENTRANCE

Contractor to provide construction entrance rock and underlying separation geotextile as shown and specified on the Plans.

3.6 WATER STORAGE TANK(S)

Contractor to provide a portable temporary water storage tank(s) to contain water produced from excavation dewatering for temporary storage and laboratory testing to determine whether water can be returned to the excavation, or must be managed and disposed of as contaminated wastewater.

3.7 DEWATERING SYSTEM

Contractor to design and install excavation dewatering equipment to lower groundwater to levels below the target depth of the excavation. The dewatering system will be selected based on Contractor's means and methods. Water produced from dewatering shall be contained in water storage tank(s) for laboratory testing prior to disposal or discharge (depending on contaminant concentrations). Contractor

should be prepared to provide additional water storage tanks as needed to accommodate groundwater conditions during construction.

3.8 GROUNDWATER MONITORING WELL DECOMMISSIONING SEALANT

Groundwater monitoring wells that are to be decommissioned shall be sealed with bentonite or cement as specified in WAC 173-160-450.

3.9 GROUNDWATER MONITORING WELL MATERIALS

Groundwater monitoring wells shall constructed with the following materials:

1. Two-inch diameter threaded Schedule 40 PVC pipe with O-rings
2. 20 x 40 Silica Sand, NSF/ANSI Standard 061
3. Pre-pack screen with two-inch diameter Schedule 40 PVC .010 slot, ASTM Flush Threaded with an O-ring seal, packed in20 x 40 Silica Sand, NSF/ANSI Standard 061, contained by 45 mesh stainless steel screen.
4. Bentonite granules or pellets
5. Concrete mixed on site to be workable with consistency of a 4- to 6-inch slump
6. Galvanized steel monitoring well cover 6-inch outside diameter watertight with three hex-head bolts and gaskets, and a minimum 7.7-inch long skirt or engineer approved equivalent.
7. Threaded bottom cap
8. Lockable top cap.

The contractor shall use potable water for all well construction including mixing concrete and hydrating bentonite.

3.10 QUARRY SPALLS

Contractor to provide quarry spalls that meet the requirements of WSDOT Standard Spec 9-13.1.

4 – CONSTRUCTION REQUIREMENTS

Contractor shall accomplish all work for this project as shown on the attached Plans and these Technical Specifications.

4.1 HEALTH AND SAFETY

A. Site activities involving hazardous or potentially hazardous materials shall be conducted in accordance with Contractor's site-specific health and safety plan. As conditions change or if new operations are to be performed, Contractor's health and safety plan shall be modified or amended, or a new health and safety plan shall be developed.

B. Safety Fences and Signs: The Site is a secure facility with limited access. However, signs and safety fencing will be installed, as necessary, around open excavations to prevent unauthorized entry. Activities in areas where contaminated soil will be handled will be performed within a taped-off or fenced area (exclusion area) to restrict access and raise awareness in the work zone.

C. Personal Protective Equipment: Tyvek suits, nitrile gloves, chemical-resistant boots, safety goggles, and Site security measures will be utilized as appropriate to prevent dermal contact or other direct exposure.

D. Designate a qualified representative as Health and Safety Officer whose responsibility will be health and safety monitoring and oversight. The designated qualified health and safety representative shall be onsite at all times when contact with hazardous materials is anticipated.

E. Contractor shall be responsible for providing safety training and shall require its subcontractors and all Contractor-authorized visitors to have this training, if appropriate for the work to be conducted by these personnel. Documentation of this training shall be available at the site. Provide appropriate personal protective equipment for Contractor's employees, as specified in the health and safety plan, and require subcontractors to provide this equipment for subcontractor's employees.

F. Provide for decontamination of Contractor's and subcontractor's personnel and equipment that contact hazardous or potentially hazardous materials, in conformance with the requirements of the health and safety plan.

G. Provide for the proper disposal of disposable safety gear and equipment used by Contractor's employees, the Owner, federal and state agency representatives, and all site visitors. Such disposal shall conform to all applicable federal and local hazardous waste disposal regulations. Waste material from Contractor's onsite decontamination facilities shall be properly containerized, labeled, and disposed of by Contractor.

H. Maintain accurate accident and injury reports and furnish the Owner a copy of the reports within 24 hours of the reported incident.

I. Provide proper illumination of construction activity, as necessary, to allow all workers and oversight personnel to safely execute their responsibilities and tasks.

J. Promptly comply with any specific instructions or directions given to Contractor by the Owner unless overriding health and safety concerns dictate another course of action.

K. Health and safety plans, emergency procedures, and first-aid procedures shall be available at the site and Contractor shall hold regularly scheduled meetings, as necessary, to instruct its personnel and its subcontractors on health and safety practices and proper use of personal protective equipment.

L. Provide excavation-competent person oversight and excavation safety equipment as designated in the Health and Safety Plan for all excavations exceeding 4 feet in depth.

4.2 CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL

Day-to-day construction quality control and construction-related testing as outlined herein will be performed by the Contractor. The Owner will hire an independent construction quality assurance firm (Owner's representative) that includes an on-site technician under the supervision of a Washington State licensed professional engineer or licensed geologist to provide construction oversight and perform sampling. Additionally, a geotechnical engineer will oversee key periods of construction to ensure, with a reasonable degree of certainty, that the completed project meets or exceeds the design criteria, plans, and specifications. The Contractor will be responsible for compacting backfill to an unyielding condition at the direction of the Owner's representative. During construction, the Contractor and Owner's representative

will keep detailed records of the work performed, including construction techniques, materials removed from and imported to the Site, and tests and measurements performed.

4.3 TESC, SITE CLEARING AND PREPARATION

A. Contractor shall install silt fence, construction entrance and other temporary erosion and sediment controls (TESC) as shown on the Plans. Contractor shall designate a Washington State Certified Erosion and Sedimentation Control Lead (CESCL) who shall have the responsibility to monitor and implement erosion control measures, and who shall be on site or on call at all times of work. The CESCL shall have the authority to implement the stormwater management plan based on site conditions, within their scope. If the methods indicated in the Plans and these Technical Specifications are not adequate, the CESCL shall implement additional methods as needed.

B. Cut down and remove trees as indicated on the Plans (with number and size of trees to be determined by Contractor in mandatory pre-bid meeting) while protecting all structures and roads in the vicinity. Cut trees so that stumps remain extended less than 2 feet above the existing ground surface. Leave stumps in place unless excavation requires removal. All trees cut shall be direct loaded to trucks for removal from the site. Debris generated by clearing trees shall also be removed from the site. Downed timber and clearing debris shall not be placed against standing timber. Cut trees and associated debris shall become the property of the Contractor and removed from the Site.

C. Contractor shall install diversion berms or other means and have tarps and posts on hand to divert rainfall and runoff from accumulating in open excavations.

D. Contractor shall divert downspout located at southeast corner of building to a discharge location approximately 50 ft from excavation using 3 inch ADS pipe or similar.

E. Dust should be minimized during site work to maintain a "no visible dust" standard. Contractor shall spray small amounts of onsite water as necessary to control dust resulting from construction activity. Vehicles will cross unpaved surfaces slowly to minimize dust and disturbance. Contractor shall sweep affected onsite and public roads, as necessary, to remove material deposited as a result of site work.

4.4 UTILITY LOCATE

A. Contractor shall call the public call-before-you-dig one-call underground utility locate center (811) two weeks prior to the start of work. In addition, the Contractor will contact a private utility locating service to mark utilities on the DNR property in the vicinity of the proposed excavation.

4.5 CONSTRUCTION MEASUREMENTS

A. The Contractor shall be contractually responsible for all of the project measurement including construction staking. During excavation, the Owner’s representative will collect geographical coordinates for each corner of the excavation using both taped measurement and a portable global positioning system (GPS) unit.

B. All Work performed shall be in conformity with the lines, grades, slopes, cross sections, and dimensions as shown in the Plans, or as staked. The excavation shall be cut to a tolerance of zero to plus 0.5 feet vertically and horizontally unless directed by the Owner’s representative. Any excavation and resulting backfill outside these tolerances which are not approved by the Owner’s representative will not be compensated.

C. The Owner's representative shall approve all staked measurements prior to excavation.

D. The Owner's representative shall approve all excavation dimensions prior to backfilling.

4.6 EXCAVATION AND BACKFILLING

The soils to be excavated consist of silty sands, clean fine to medium grained sands, and gravel fills which are expected to unravel if not supported during excavation. The groundwater level was measured to be approximately 4 feet (ft) below ground surface (bgs) in February 2014 and approximately 11 ft bgs in September 2014, so it is expected that dewatering will be required to reach planned excavation depths.

Excavation will proceed in a sequence of "slots" in order to maintain structural support of the warehouse and excavation sidewalls, and attain the target depths. Excavation equipment may be selected based on Contractor's preferred means and methods, but it must provide a smooth and regular excavation surface and the soil being removed is prevented from mixing with underlying soil. Excavation shall be aided by a trench shield of adjustable outside width with sufficient length and depth and a steel plate of sufficient length and width to cover the end of the trench shield that is adjacent to the warehouse. The slot excavations are to be completed in alphabetical sequence as shown on the Plans. The excavation and backfilling process is generally describe below:

A. Expose the foundation of the pesticide storage warehouse approximately six feet on each side of the center line of the warehouse, and install the foundation support beam as shown on the Plans.

B. Install pancake jacks or Owner's representative-approved equivalent support under the centerline on 2ft x 2ft wood cribbing and apply pressure so the jack is tight against the foundation bottom or beam, but not lifting the building. The Owner's representative will be watching for signs of lifting or settlement of the center column, and will direct the Contractor to decrease or apply pressure to the jack such that it is secure and load bearing prior to excavation.

C. Begin excavation of the "A" slots. The northern edge of the excavation will be placed approximately 1 ft south of the warehouse footing to protect the foundation. The trench shield and steel plate on the building side of the trench shield will be advanced by excavating soil below the box and pushing the shield and steel plate downward using the excavator bucket. During excavation:

    1. In the "A" slots, the top 6 ft of soil is anticipated to consist of non-contaminated gravel backfill. Soil excavated from the upper 6 ft (approximately) shall therefore be stockpiled on-site to be used as backfill, as shown in the Plans. The actual depth and extent of soil to be stockpiled for backfill will be directed by the Owner's representative at the time of excavation.
    2. Excavation from approximately 6 ft to 10.5 ft bgs is anticipated to be contaminated and should be direct-loaded to trucks for transport and disposal (per paragraph 4.6 below). During excavation, Contractor is to follow direction of Owner's representative in determining the depth and extent of soil to be handled as contaminated, and assist Owner's representative in taking soil

samples of the sidewalls and bottom of the excavation at the direction of the Owner's representative.

3. The Contractor shall be prepared to lower, contain, manage and dispose of groundwater as described in Section 3.7.
4. The Owner's representative will be watching for signs of settlement of the center column, and will direct the Contractor to apply pressure to the jack to compensate for any settlement observed.
5. After the target depth (10.5 ft bgs) is achieved, and the Owner's representative has recovered adequate confirmation sampling and approved the excavation extents, the slot will be backfilled with CDF to the bottom of the jack stand while raising the trench shield. The CDF will be placed using a tremie pipe to the bottom of the excavation. The CDF will be allowed to cure for a minimum of 48 hours.

D. Once the CDF backfill in the "A" slots has cured, remove the jack from the center column and place a jack at each end of the foundation support beam with 2ft by 2ft wood cribbing. Apply pressure so the jacks are tight against the foundation bottom or beam, but not lifting the building.
E. Complete excavation of the "B" slot (as shown in the Plans) using the same methods and sequence as in Step C above.
F. Once the confirmation sampling is completed and excavation extents are approved by the Owner's representative, backfill slot "B" with CDF to the ground surface, and backfill the previous jack space under the center column with CDF as well. Allow CDF to cure for a minimum of 48 hr.
G. Once the CDF backfill in the "B" slot has cured as approved by the Owner's representative, remove the two jacks and backfill all remaining excavations under the warehouse foundation with CDF, then allow to cure for a minimum of 48 hours.
H. Complete excavation of the "C" slot following Steps C.1 through C.3 above.
I. Once the confirmation sampling is complete and the excavation extent is approved by the Owner's representative, backfill the "C" slot excavation. If groundwater is not present in Slot "C", backfill with stockpiled non-contaminated soil, placed in approximate 8- to 12-inch-thick loose lifts and compact with the excavator equipped with a compaction roller head or tamping pad, or similar method. Backfill shall be compacted to a generally unyielding condition as approved by the Owner's representative. Continue backfilling with non-contaminated soil in compacted horizontal lifts to the ground surface while lifting the trench shield out of the slot. If groundwater is present in Slot "C", place quarry spalls in the bottom of the excavation and lift the trench shield until the quarry spall level is above the observed groundwater level, then backfill the remainder of the excavation with compacted non-contaminated soil above the quarry spalls to the ground surface, placing soil in approximate 8- to 12-inch-thick loose lifts and compacting to an unyielding condition as approved by the Owner's representative.
J. Begin excavation of Slot "D". The northern edge of the excavation will be placed approximately 1 ft south of the warehouse footing to protect the foundation. The trench shield and steel plate on the building side of the trench shield will be advanced

by excavating soil below the box and pushing the shield and steel plate downward using the excavator bucket. During excavation:

1. In Slots "D" though "F", approximately the top 3 ft bgs consists of uncontaminated soil which should be excavated and stockpiled on-site for use as backfill. The actual depth and extent of soil to be stockpiled will be directed by the Owner's representative at the time of excavation.
2. Excavation from approximately 3 ft to 10.5 ft bgs is considered contaminated soil and should be direct-loaded to trucks for transport and disposal (per paragraph 4.6 below). During excavation, assist Owner's representative in taking soil samples of the sidewall and bottom of the excavation at direction of the Owner's representative.
3. The Contractor shall be prepared to manage groundwater as described in Section 3.7.
4. Once the excavation extent is approved by the Owner's representative, backfill the "D" slot excavation as described in Step I above.

K. As shown on the plans, the north end of Slot "E" will require excavation to a greater depth (15 ft bgs) than other areas of the excavation and will likely extend below the groundwater table. From ground surface to approximately 10.5 ft bgs the Contractor shall use the trench shield as generally described in Step J above to advance the excavation. Steel plates may be required on the end of the trench shields if the sidewalls begin to unravel. Next, the northern area (approximately 6-ft by 6-ft) of Slot E will be advanced to 15 ft bgs, and will require a trench box to keep the excavation open. The width of Slot "E" may be expanded to the west (into Slot "F") to make a wider trench shield space for access above the deeper trench box installation if needed. During excavation of Slot "E":

1. Approximately the top 3 ft bgs is expected to consist of uncontaminated soil which should be excavated and stockpiled to the side for future backfill. The actual depth and extent of soil to be stockpiled will be directed by the Owner's representative at the time of excavation.
2. Excavation from approximately 3 ft to 15 ft bgs is considered contaminated soil and should be direct-loaded to trucks for transport and disposal (per paragraph 4.6 below). During excavation, assist Owner's representative in taking soil samples of the sidewall and bottom of the excavation at the direction of the Owner's representative.
3. The Contractor shall be prepared to lower, contain, manage and dispose of groundwater as described in Section 3.7. Once the excavation extent is approved by the Owner's representative, backfill slot "E" by placing quarry spalls in the bottom of the excavation while slowly extracting the trench box and trench shield until the quarry spall level is above the observed groundwater table, then backfill the remainder of the excavation with compacted non-contaminated soil above the quarry spalls to the ground surface as described in step I above.

L. Slot "F" is a larger area to be excavated according to the contractor's selected means and methods using trench shields or other means to keep the excavation stable and

achieve the cleanup action objectives. Excavation and backfill shall include Steps J.1 through J.4 above.

4.7 CONTAMINATED SOILS AND WATER HANDLING

Contaminated soil and water generated from this project must be handled carefully to protect the workers, public and environment.

A. Handle, transport and dispose of contaminated soil, water, and other materials consistent with these technical specifications and directives issued by the Owner's representative, and in conformance with all applicable federal, state, and local waste disposal regulations.

B. Contaminated materials shall be contained within designated areas and shall not, at any time, be placed directly on or otherwise allowed to contaminate the surface of designated uncontaminated areas, except as approved in writing by the Owner.

C. Transport contaminated soil, water, and other materials from the point of removal to the point of temporary storage or loading in such a manner that contaminated material is not placed on and does not spill or fall on designated uncontaminated areas. Extend the construction entrance under the loading areas and clearly stake and mark temporary storage locations and decontamination areas (if needed) for contaminated materials at all times.

D. Assist the Owner when they elect to acquire soil or water samples. Assist the Owner to the maximum extent practicable and facilitate the removal of contaminated materials within the limits specified by the Owner, subject to contractual provisions related to changes in the scope of work.

4.8 DISPOSAL OF SOIL

The Contractor shall negotiate the disposal of contaminated soil at the permitted solid waste disposal facility of their choice, but the disposal facility must be approved by the Owner. The permitted solid waste disposal facility must meet the criteria of this section. The Contractor shall provide the waste profiling information requested by the landfill to accept the contaminated soil. The Owner will provide soil test results from previous investigations for the Contractor to use in waste profiling. The Contractor will coordinate with the Owner to ensure proper designation and signing of waste manifests and other disposal records. Disposal requirements and Contractor responsibilities are as follows:

A. Excavated contaminated soil will be loaded directly into bins or trucks and transported to a RCRA Subtitle D solid waste disposal facility for proper disposal. As indicated in Ecology's Contained-Out Determination letter, contaminated soil at the Site does not warrant management as dangerous waste. It will not require disposal as listed dangerous waste at a RCRA-permitted dangerous waste treatment, storage, and disposal facility provided that all of the following conditions are met, which the Contractor is responsible for achieving:

   1. No standing water may be present within each container holding the contaminated soil. All water must be removed to the maximum extent possible

from each container and managed for proper sampling and disposal. Water shall be transferred to the on-site water storage tank.

2. Soil shall be delivered directly to a solid waste landfill permitted under WAC 173-351 in Washington State, or under RCRA Subtitle D outside Washington. If the soil will be delivered to a landfill outside of Washington State, Contractor must submit to the Washington Department of Ecology a written approval for the contaminated soil disposal from the receiving State hazardous waste program and the out-of-state landfill, before the soil is delivered to the out-of-state landfill. Contaminated soil shall not be offloaded from the containers to the ground at the transfer facility, and shall not be consolidated with any other soil.
3. Dispose of the contaminated soil at a permitted solid waste landfill within 90 days of excavation.
4. Copies of all signed solid waste landfill receipts, or a certificate of disposal (manifests) issued by the receiving landfill, shall be submitted to Charles Hoffman of Ecology within 15 days of receipt.
5. Unauthorized contact with soil shall be prevented.
6. Adequate measures shall be taken during transport to prevent spill and dispersion due to wind erosion.
7. The landfill shall be instructed that contaminated soil is not to be used for daily, intermediate or final cover, and copies of soil analytical data shall be provided to the landfill operator upon request.
8. Contaminated soil shall not be sent to any incinerator, thermal desorption unit, or recycling facility unless that facility is a RCRA Subtitle C permitted dangerous waste facility.

B. Cover or tarp loads prior to exiting the site, unless otherwise approved by the Owner.

C. Transport trucks shall not drip water, or shall be lined as necessary to prevent dripping.

4.9 DISPOSAL OF WASTEWATER

Wastewater may be produced from excavation dewatering, decontamination, and from removal of standing water in transportation bins. The wastewater will be stored in the Contractor-provided water storage tank(s) until it can be tested for disposal. Stored wastewater will be sampled by the Owner's representative and submitted by them for laboratory analysis of pesticides and RCRA-8 metals on an expedited (72-hr) turnaround time. If the results indicate pesticide or metals concentrations are below applicable cleanup levels, the water will be directed into an open trench in the Slot "F" area and allowed to infiltrate. If pesticide concentrations are present above cleanup levels the Contractor shall secure a qualified disposal company to remove and properly dispose of the wastewater. Contractor will coordinate with the Owner to ensure proper designation, signing and documentation of wastewater disposal.

4.10 DECONTAMINATION

Prior to leaving the Site, construction and excavation equipment (e.g., excavator bucket, tools, containers, and sampling equipment) will be decontaminated until visually clean using dry methods (e.g., broom) on areas in contact with contaminated soil. If water is necessary for decontamination, clean potable water shall be used. Decontamination shall be performed over a containment area (e.g., bermed area and on a competent surface covered with plastic sheeting). Soil from decontamination will be loaded for disposal per Section 4.6.

Decontamination water will be contained in the water storage tank and managed along with other wastewater. Decontamination water quality will be characterized before disposal as described in Section 4.7.

4.11 CONTROLLED DENSITY FILL HANDLING

CDF handling will be consistent with Concrete Handling BMP C151 and Concrete Washout Area BMP C154 of the Stormwater Management Manual for Western Washington. Publication No. 14-10-055 from the Water Quality Program, Washington State Department of Ecology, 2014.

4.12 GROUNDWATER MONITORING WELL DECOMMISSIONING

The Contractor shall retain a licensed well driller or professional engineer who will decommission groundwater monitoring wells SW-10 and SW-11 under the oversight of the Owner's representative. The wells are 2-inch diameter PVC wells and extend 16.5 feet below the existing ground surface. Wells will be decommissioned according to regulation (WAC 173-160-460) within seven days prior to excavation. Wells will be decommissioned by pressure grouting or filling with bentonite chips. All piping and associated monuments can be left in place and removed during excavation. The Contractor shall prepare the 72-hour prior notice and well decommissioning reports and submit to Ecology.

4.13 GROUNDWATER MONITORING WELL INSTALLATION

The Contractor shall retain a licensed well driller who will supply and install groundwater monitoring wells SW-17 and SW-18 as shown on the Plan. This work will be conducted under the oversight of the Owner's representative. Installation requirements are as follows:

A. The drilling contractor will be responsible for obtaining and submitting all well drilling permits, logs, and well identification (ID) tags as required by the State of Washington.
B. New wells will be installed using direct-push (DP) drilling technology.
C. All wells will be constructed in accordance with the state's Minimum Standards for Construction and Maintenance of Wells (WAC 173-360) or in accordance with a variance obtained from Ecology with the following specific requirements using the materials specified in Section 3.9:
    1. Well screens will be constructed from pre-packed PVC well screens.
    2. A new, clean, flush-threaded, 2-inch-diameter PVC well riser will be installed from the top of the screen to the ground surface. The riser will be cut flat at the top. A small, V-shaped notch or other permanent mark will be made in the lip as a mark from which all future water level readings will be made. The notch or mark will be located on the north side of the well riser pipe.
    3. Additional equivalent sand will be poured slowly (to prevent bridging) into the annulus to approximately 1 ft above the screen as the drill casing is retracted. The volume of sand emplaced will be recorded on the well construction log.
    4. Granular bentonite will be used to construct the annular seal above the filter pack to within approximately 2 feet below the existing ground surface. Bentonite will be added slowly to minimize the potential for bridging.
    5. A concrete surface seal and well monument will constitute the surface completion. The concrete surface seal will be placed in the upper 2 feet of the boring. The top of the flush monument will be at least 1 inch, but not more than 2 inches above the surrounding surface grade to allow for drainage away

from the well location. A concrete pad approximately 2 feet in diameter will be installed around monuments.

D. The Owner's representative will document boring and well construction, well development and sampling.

MEASUREMENT AND PAYMENT

5.1 MEASUREMENT

A. The units of measurement will be identified on the Proposal Form or subsequent Change Order for each item for which the Owner will compensate the Contractor. All units of measurement will be US Customary Units, unless otherwise specified.

B. There shall be no measurement for "Lump Sum (LS)" items shown on the Form of Proposal. Measurement for this pay item shall be estimated on the basis of the percent complete, relative to the overall bid price and the actual progress toward project completion

C. Measurements by weight will be based on documented or recorded weights on forms provided by the Material Supplier or Receiving Facility (i.e. waste disposal) and acceptable to the Owner.

1. Measurements by "Tons" will be measured by a Commercial Scale (i.e. scale used to weigh materials or products sold to or disposed by the public on a regular basis). Each Commercial Scale shall be approved under rules of the Weights and Measures Section of the Washington State Department of Agriculture, or the Contractor shall provide documentation to the Owner that the scale has been recently serviced and tested with at least 5 tons (10,000 lbs) by an agent of its manufacturer.
2. The Contractor shall furnish weigh and load tickets from the Commercial Scale operator, and all tickets shall contain the following minimum information:
    a. Date of haul;
    b. DNR Project Number or Name;
    c. Contract Item as indicated on the Proposal Form;
    d. Unit of measure (US Customary Units);
    e. Unique Identification Number of hauling vehicle; and
    f. Gross weight of hauling vehicle (loaded).
    g. Tare weight of hauling vehicle (empty).
    h. Net Weight of materials delivered.
3. The Contractor (i.e. operator of each haul vehicle) shall deliver the ticket in legible condition to the Owner at the project site on a daily basis, or other mutually-agreed to delivery point and frequency. Failure to provide legible tickets, or failing to include the minimum information (identified above) on each ticket, will result in no measurement, and subsequently, there will be no compensation provided to Contractor.

D. Measurement by volume (i.e., cubic feet, cubic yards) shall be determined on the basis of onsite measurements of width, depth and length measurement made of the excavations and the in-place volume determined from the product of these

dimensions. The measurements will be agreed to by the Contractor and the Owner's representative.

5.2 PAYMENT OF BID ITEMS

A. Mobilization and Demobilization, per Lump Sum, includes the costs of moving all equipment to and from the job site; traffic control; preparation of all required submittals; acquisition and payment for permits, fees, bonds and insurance; cleaning up and removing any refuse; and restoration of areas disturbed by Contractor's activities, including incidental grading, removal of construction entrance (quarry spalls and geotextile), and replacement of any site features intended to remain that were removed by Contractor to facilitate construction activities. Also includes cost to seed disturbed area with a permanent seed mix after grading.

B. TESC and Site Preparation, Per Lump Sum, shall include the diverting stormwater from adjacent areas to limit runoff from entering the excavation(s); installing and maintaining all necessary temporary erosion and sedimentation control measures needed to protect partially completed work and prevent sediment transport from exposed soil surfaces and temporary stockpiles to surface water or adjacent work and non-work areas; and management of stormwater in accordance with the Plan and technical specifications. Site preparation shall include documenting existing conditions in the work areas by photographs, measurements, and other appropriate means; establishing work zones and traffic control provisions; removing existing trees within the work area as specified in Plans; installing temporary fencing around the work zones; providing temporary construction facilities needed by Contractor; locating, marking, protecting, and physically supporting existing pesticide warehouse building (including foundation support beam installation) within and near the work area that could potentially be damaged by the Contractor's work under this Contract, and any management/restoration/repair of onsite utilities within or near the work area needed to restore the utilities to their pre-existing conditions.

C. Dewatering System, Per Lump Sum, includes the cost of all materials, labor, equipment, and incidentals required to complete the dewatering system including: preparation and submittal of dewatering design, as appropriate; furnishing, installing, operating and maintaining effective dewatering; sediment removal from collected water; and supplying water storage tank(s) as needed.

D. Excavation, per in-place cubic yards determined from measurements of the completed excavations. This Pay item includes the cost of all materials, labor, equipment, and incidentals required to excavate both non-contaminated soil to a temporary stockpile and contaminated soils to bins or trucks to limits shown on the Plans and in accordance with these technical specifications.

E. Transport and Disposal of Contaminated Soil, per Ton, determined by weight tickets from the Solid Waste Disposal Facility. Work under this pay item includes all materials, labor, equipment, and incidentals required for: transport and disposal of contaminated soil within the designated cleanup area, sediment from the water storage tanks and equipment decontamination process, and one 20-gallon drum partially filled with soil left on Site from previous drilling activities; offsite disposal at a permitted solid waste landfill; proper documentation of the materials for

transportation and disposal; and obtaining documentation from the disposal facility certifying the total weight of material disposed at the landfill.

F. Discharge of Collected Water to Ground, per Lump Sum. Used only in the event that the collected wastewater has been tested and can be discharged back to the ground. Work under this pay item includes all materials, labor, equipment, and incidentals required to excavate shallow infiltration trenches in the backfilled excavation areas, draining water storage tank(s) to infiltration trenches, backfilling infiltration trenches and restoring graded surface over backfilled area.

G. Backfill Using Control Density Fill (CDF), per in-place cubic yards, determined from measurements of the before and after filling completed excavations. Work under this pay item includes all materials, labor, equipment, and incidentals required to supply, place, and cure CDF as excavation backfill as described in these technical specifications.

H. Backfill Using Soil, in-place cubic yards placed as backfill in excavations, determined from volume measurements of excavations after placement of CDF to the completely filled excavations. This pay item includes all materials, labor, equipment, and incidentals required to moisture condition, place, and compact on-site soil and imported soil and quarry spalls as excavation backfill.

I. Supply Imported Soil and quarry spalls, per Ton, determined by weight tickets from the supplier. Work under this pay item includes all materials, labor, equipment, and incidentals required to supply imported, verifiably clean soil backfill and quarry spalls and stockpile on the site for use as backfill as described in these technical specifications.

J. Health and Safety, Decontamination and Residuals Management, per Lump Sum, This Pay Item includes all materials, labor, equipment, and incidentals associated with: preparing and implementing a Site-Specific Health and Safety Plan that meets the requirements of the technical specifications; use of properly trained workers; monitoring work activities for compliance with Health and Safety Plan requirements and providing personnel training and required documentation; maintaining flagging and staking of work zone boundaries and controlling personnel and equipment access to contaminated zones; furnishing, installing, operating, and maintaining all required health and safety equipment and facilities, including personnel decontamination facilities and equipment decontamination facilities; furnishing all required worker protection gear and equipment for Contractor and subcontractor personnel; decontaminating construction equipment and personnel health and safety equipment, and collecting and disposal of all solid wastes other than contaminated soils, and residual materials.

K. Groundwater monitoring well decommissioning, per Lump Sum, This Pay Item includes all materials, labor, equipment, and incidentals associated with decommissioning two groundwater monitoring wells in accordance with these technical specifications.

L. Groundwater monitoring well installation, per Lump Sum, This Pay Item includes all materials, labor, equipment, and incidentals associated with installing two groundwater monitoring wells in accordance with these technical specifications.

5.3 TRENCH SAFETY

Payment for Trench Safety Systems shall be on the basis of the lump sum price and is included on the Form of Proposal as a separate bid item if the Contractor intends to have personnel enter excavations to complete work. Work under this pay item includes all design, furnishing, installation, excavation competent person oversight, and removal of trench safety equipment required for excavations. Excavations include utility trenches and contaminated soil removal areas where the depth of excavation will exceed 4 feet in depth. The work includes shoring, sheeting, trench boxes, sloping, inspection, and any other materials, equipment and oversight necessary for trench safety in accordance with all applicable local, state, and federal requirements.

5.4 PAYMENT OF MINOR CHANGES

Minor changes shall consist of payments or credits for changes in labor, materials, equipment costs in accordance with Part 7.01 (G) of the Supplemental Conditions. For purposes of providing a common proposal for all bidders, the Owner has entered an amount in the Form of Proposal for "Minor Change".

5.5 PAYMENT OF ADDITIVE BID ITEMS

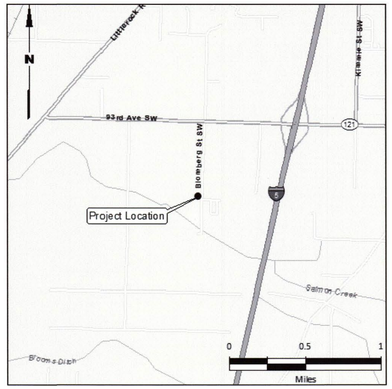
Additive bid items are items in the base bid that are optional items that may be added to the project by the Owner depending on site conditions, bid prices and budgetary considerations. Contractor shall bid these items separately:

A. Transport and Disposal of Wastewater, per Lump Sum In the event that the collected waste water has been tested and cannot be discharged back to the ground per item 5.2 F. Work under this pay item includes all materials, labor, equipment, and incidentals required for: transport and disposal of wastewater developed from the project work, including but not limited to, the disposal cost of wastewater generated from the project work from dewatering, decontamination and other water that contacts contaminated materials. This item shall also include disposal of one 55-gallon drum of water that is present on the site labelled as SW-10 and SW-11 purge water.

END OF TECHNICAL SPECIFICATIONS

SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
9805 BLOMBERG STREET SW
THURSTON COUNTY, WASHINGTON

VICINITY MAP



SITE ADDRESS: 9805 BLOMBERG STREET SW
THURSTON COUNTY, WASHINGTON

OWNER

WASHINGTON DEPARTMENT OF NATURAL RESOURCES
ENGINEERING DIVISION - ENVIRONMENTAL SERVICES
1111 WASHINGTON STREET SOUTHEAST
OLYMPIA, WASHINGTON 98504
CONTACT: JOHN FELDER
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DESIGN ENGINEER

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EDMONDS, WASHINGTON 98020
CONTACT: KENT WIKEN, PE
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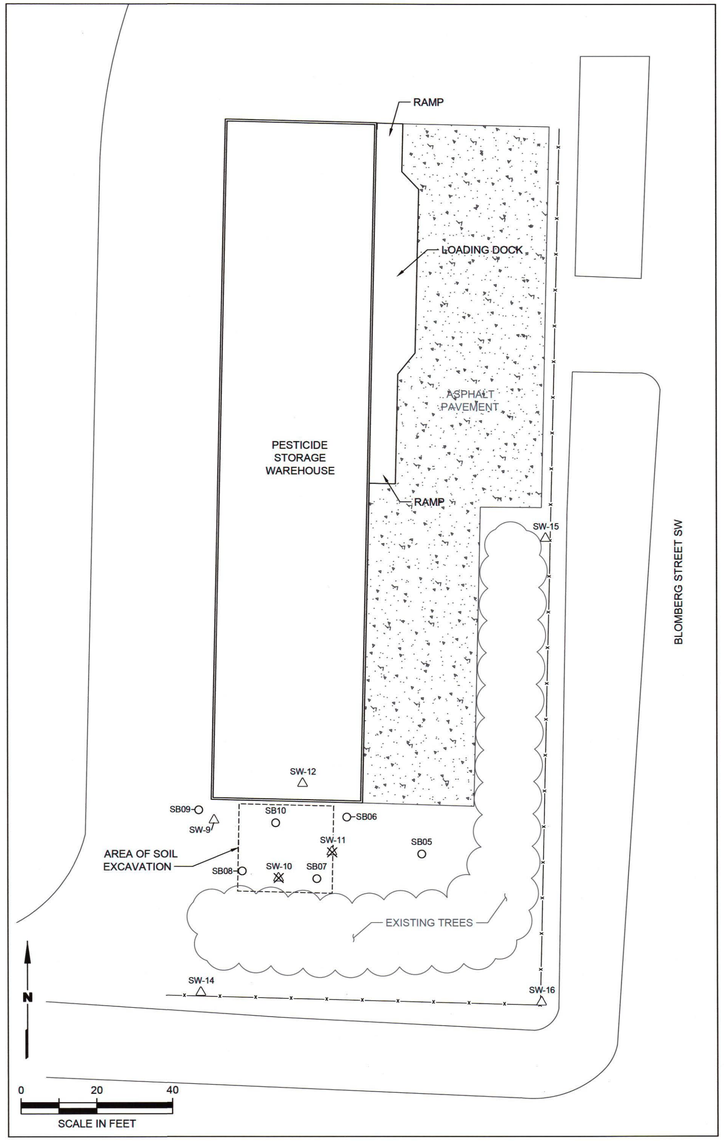
EMAIL: KWIKEN@LANDAUINC.COM

REGULATORY AUTHORITY

WASHINGTON DEPARTMENT OF ECOLOGY
TOXIC CLEANUP PROGRAM
SOUTHWEST REGIONAL OFFICE
PO BOX 47775
OLYMPIA, WASHINGTON 98504-7775
CONTACT: STEVE TEEL
PHONE: (360)407-6247
EMAIL: STEE461@ECY.WA.GOV

SHEET INDEX



SITE MAP

FILL SPECIFICATION

FILL MATERIAL SHALL NOT BE OBTAINED FROM SOURCES IDENTIFIED IN SECTION 3.3 OF THE SPECIFICATIONS NOR CONTAIN PETROLEUM PRODUCTS, OR SUBSTANCES WHICH ARE HAZARDOUS, DANGEROUS, TOXIC, OR WHICH OTHERWISE VIOLATE ANY STATE, FEDERAL, OR LOCAL LAW, ORDINANCE, CODE, REGULATION, RULE, ORDER, OR STANDARD.

TRENCH NOTE

IF WORKERS ENTER ANY TRENCH OR OTHER EXCAVATION FOUR OR MORE FEET IN DEPTH THAT DOES NOT MEET THE OPEN PIT REQUIREMENTS OF WSDOT SECTION 2-09.3(3)B. IT SHALL BE SHORED AND CRIBBED. THE CONTRACTOR ALONE SHALL BE RESPONSIBLE FOR WORKER SAFETY AND LANDAU ASSUMES NO RESPONSIBILITY. ALL TRENCH SAFETY SYSTEMS SHALL MEET THE REQUIREMENTS OF THE WASHINGTON INDUSTRIAL SAFETY AND HEALTH ACT. CHAPTER 49.17 RCW.

UTILITY NOTE

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES THAT INCUR DUE TO THE CONTRACTORS FAILURE TO LOCATE EXACTLY AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. LANDAU ASSUMES NO LIABILITY FOR THE LOCATION OF UNDERGROUND UTILITIES.

ARCHAEOLOGICAL RESOURCES

IN THE EVENT OF INADVERTENT DISCOVERY OF ARCHAEOLOGICAL RESOURCES SUCH AS BUT NOT LIMITED TO HUMAN REMAINS, FUNERARY OBJECTS, SACRED OBJECTS, ARTIFACTS, OR OBJECTS OF CULTURAL SIGNIFICANCE, ALL WORK WILL STOP. THE SITE IN THE IMMEDIATE VICINITY OF THE AREA OF DISCOVERY WILL BE SECURED AND THE DNR CULTURAL RESOURCES ARCHEOLOGIST WILL BE CONTACTED TO DETERMINE THE APPROPRIATE RESPONSE IN ACCORDANCE WITH EXECUTIVE ORDER 0505.

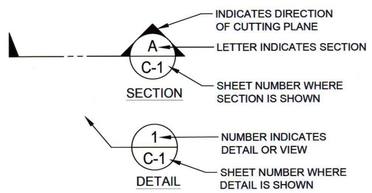
APPENDIX E OF THE REMEDIAL ACTION WORK PLAN INCLUDES A DESCRIPTION OF PROCEDURES THAT WILL BE FOLLOWED IN THE EVENT OF AN UNANTICIPATED ARCHAEOLOGICAL DISCOVERY, INCLUDING NOTIFICATIONS TO THE DEPARTMENT OF ARCHAEOLOGY AND HISTORICAL PRESERVATION AND THE NISQUALLY TRIBE.

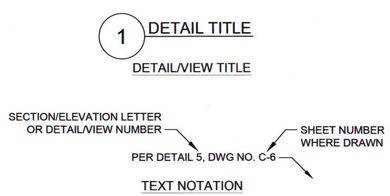
SYMBOL

EXST	PROP	DESCRIPTION
		FENCE
		SILT FENCE
		TRAFFIC DIRECTION
		ASPHALT PAVING
		TREES TO BE REMOVED
SW-xx 1		GROUNDWATER MONITORING WELL
SW-xx X		GROUNDWATER MONITORING WELL TO BE DECOMMISSIONED AS PART OF WORK
SBxx		SOIL BORING

TEXT

∠	ANGLE
Ø	DIAMETER
&	AND
'	FEET, MINUTES
"	INCHES, SECONDS
°	DEGREE
@	AT
℄	CENTERLINE
ℙ	PROPERTY LINE
#	NUMBER
%	PERCENT
ABBR	ABBREVIATION
BTM	BOTTOM
CO	CLEAN-OUT
DIA	DIAMETER
DWG	DRAWING
EXST / EX	EXISTING
FT	FEET
NO.	NUMBER
NTS	NOT TO SCALE
PROP.	PROPOSED
TYP	TYPICAL





Know what's **below.** **Call** before you dig.

KENT W. WIKEN — STATE OF WASHINGTON — 34524 — REGISTERED PROFESSIONAL ENGINEER — 10/27/17

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

NO.	DATE	REVISIONS	DESIGNED	REVIEWED	APPROVED
1.	10/27/17	ISSUED FOR RAWP			

DRAFTED BY:	CAROLYN Q. CARLSTROM	CQC	10/27/17
DESIGNED BY:	DANIEL C. SIMPSON	DCS	10/27/17
REVIEWED BY:	SARAH E. FEES	SEF	10/27/17
APPROVED BY:	KENT W. WIKEN	KWW	10/27/17
STATUS:	FOR BIDDING PURPOSES	INITIAL	DATE

LANDAU ASSOCIATES
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EDMONDS, WASHINGTON 98020
(425) 778-0907, FAX (425) 778-6409

SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
THURSTON COUNTY, WASHINGTON

COVER SHEET

PROJECT NO.	0774006.020
DATE	OCTOBER, 2017
SHEET	1 OF 4
DRAWING NO.	C1.0

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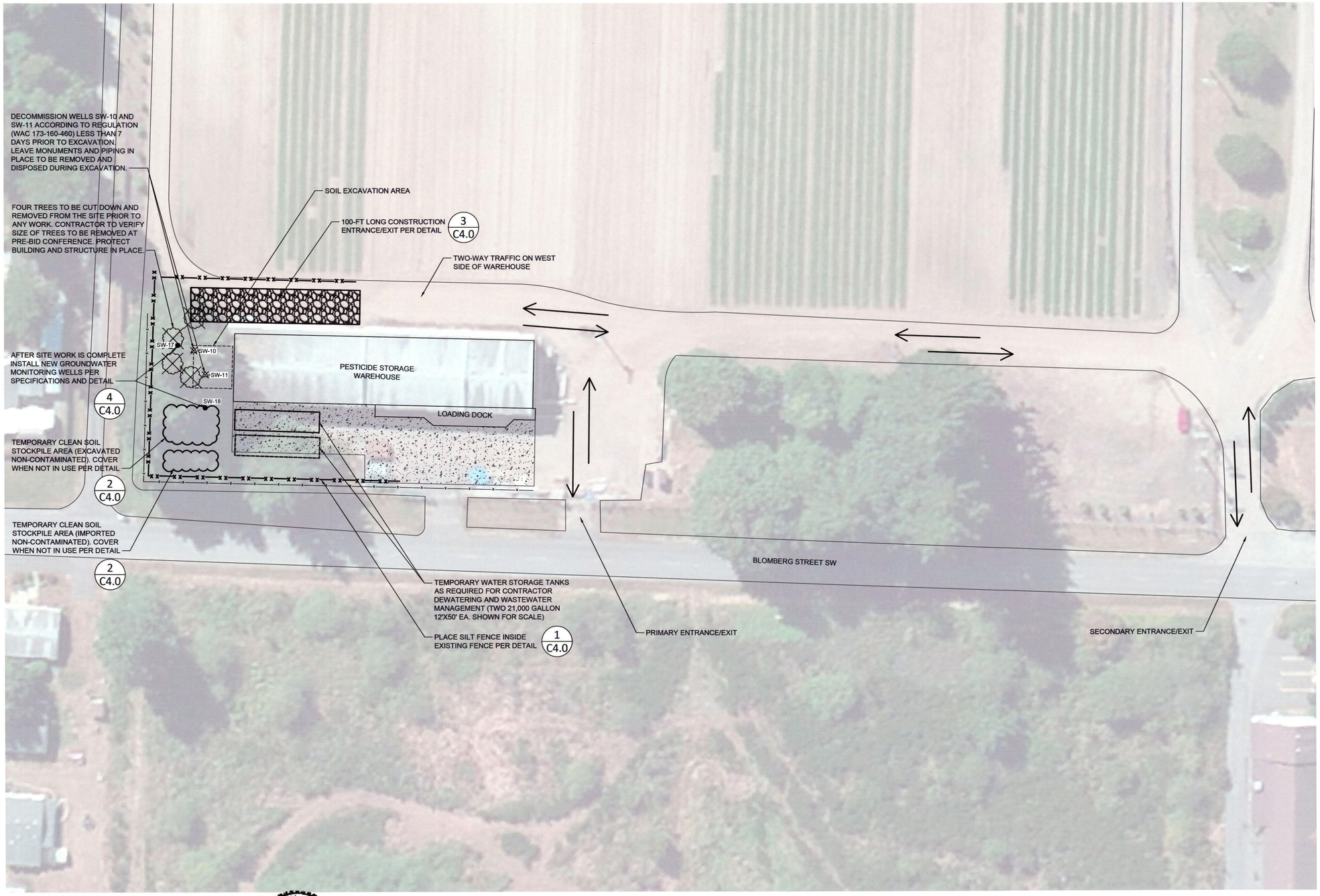

TESC/SWMP NOTES

1. CONTRACTOR SHALL DESIGNATE A WASHINGTON STATE CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) WHO SHALL HAVE THE RESPONSIBILITY TO MONITOR AND IMPLEMENT EROSION CONTROL MEASURES.
2. THE CONTRACTOR (CESCL) WILL BE ON SITE OR ON CALL AT ALL TIMES AND HAVE THE AUTHORITY TO IMPLEMENT THE STORMWATER MANAGEMENT PLAN (SWMP) BASED ON SITE CONDITIONS WITHIN THEIR SCOPE. IF THE METHODS INDICATED FOR EROSION AND SEDIMENT CONTROL ARE NOT ADEQUATE, THE CESCL SHALL IMPLEMENT ADDITIONAL METHODS AS REQUIRED.
3. CONTRACTOR SHALL RETAIN A COPY OF THE SWMP ON-SITE AT ALL TIMES AND AVAILABLE TO THE JURISDICTIONS HAVING AUTHORITY.
4. CONTRACTOR TO COORDINATE AREAS FOR LAY DOWN, STOCK PILE, TRAILERS & PARKING WITH DNR CONSTRUCTION PROJECT MANAGER.
5. PUBLIC NOTIFICATIONS TO BE POSTED AT PRIMARY AND SECONDARY SITE ENTRANCES STATING ANTICIPATED WORK DATES.

N

0 50 100
SCALE IN FEET

Know what's **below.** **Call** before you dig.

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SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
THURSTON COUNTY, WASHINGTON

T.E.S.C. & SITE PREPARATION PLAN

PROJECT NO. 0774006.020
DATE OCTOBER, 2017
SHEET 2 OF 4
DRAWING NO. C2.0

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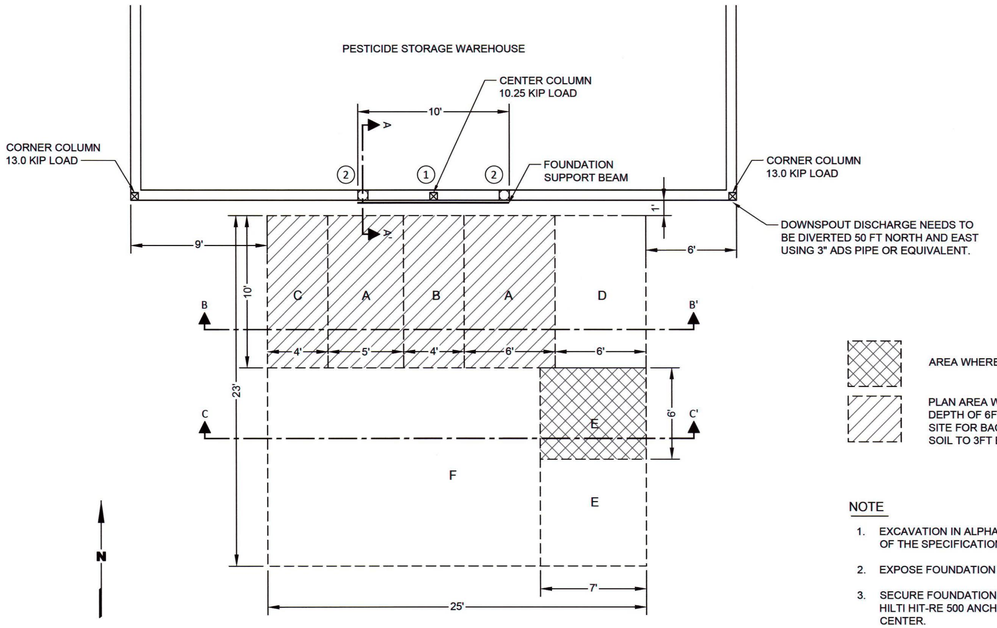
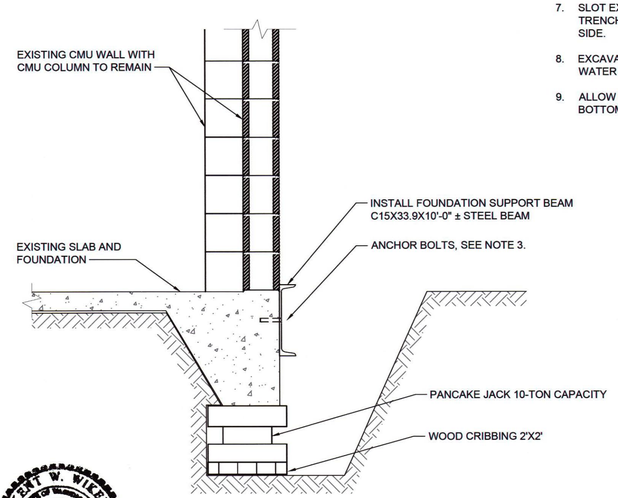


PLAN VIEW

0 5 10

SCALE IN FEET



DETAIL A-A'

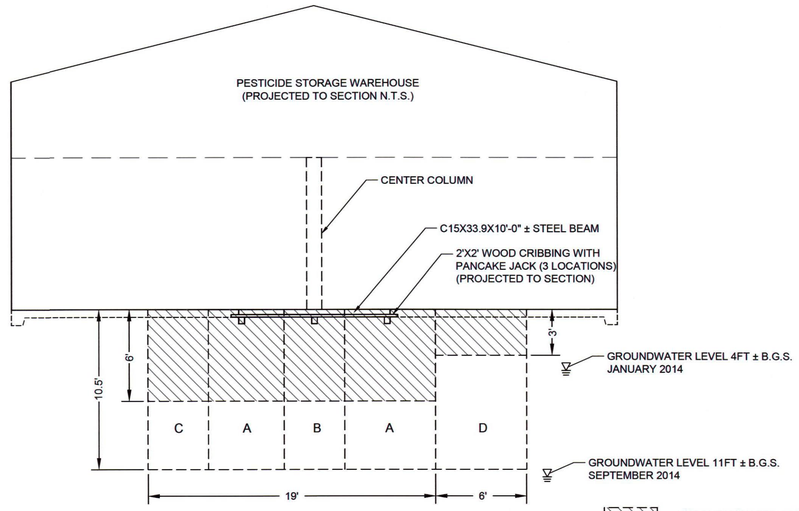
N.T.S.

AREA WHERE EXCAVATION EXTENDS TO 15FT B.G.S.

PLAN AREA WHERE UNCONTAMINATED SOIL WILL BE EXCAVATED TO DEPTH OF 6FT BELOW GROUND SURFACE (B.G.S.) AND STOCKPILED ON SITE FOR BACKFILL. ALL OTHER AREAS EXCAVATE NONCONTAMINATED SOIL TO 3FT B.G.S AND STOCKPILE ON SITE FOR BACKFILL.

NOTE

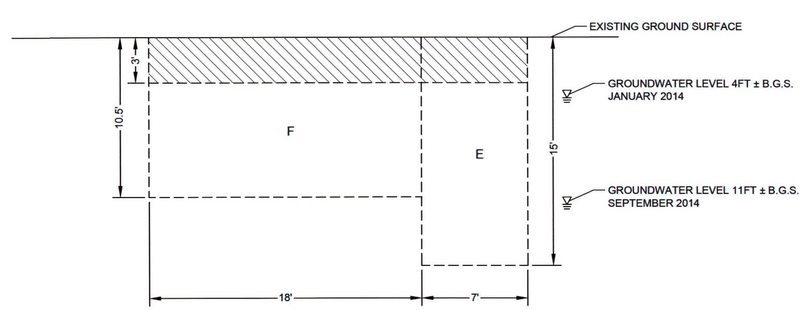
1. EXCAVATION IN ALPHABETICAL SEQUENCE A-F, PER SECTION 4.4 OF THE SPECIFICATIONS.
2. EXPOSE FOUNDATION 6FT ON EACH SIDE OF COLUMN CENTERLINE.
3. SECURE FOUNDATION SUPPORT BEAM TO FOUNDATION WITH 3/4" Ø HILTI HIT-RE 500 ANCHOR, 4" EMBEDMENT SPACED AT 10" ON CENTER.
4. INSTALL PANCAKE JACK AT ① ON 2'X2' WOOD CRIBBING PAD.
5. EXCAVATE AT SLOTS A, BACKFILL WITH CDF, CURE 48 HOURS MINIMUM.
6. INSTALL JACKS AT ② COMPLETE EXCAVATION AT SLOT B.
7. SLOT EXCAVATIONS USE OF APPROPRIATELY SIZED (TYP. 10' HIGH) TRENCH SHIELD DURING EXCAVATION WITH PLATE ON BUILDING SIDE.
8. EXCAVATION E REQUIRES TRENCH BOX AND DEWATERIZING TO WATER STORAGE TANK(S).
9. ALLOW OWNER'S REPRESENTATIVE TO SAMPLE SIDEWALLS AND BOTTOM DURING EXCAVATION.



SECTION B-B'

0 5 10

SCALE IN FEET



SECTION C-C'

0 5 10

SCALE IN FEET

Know what's **below.**
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WASHINGTON STATE DEPARTMENT OF
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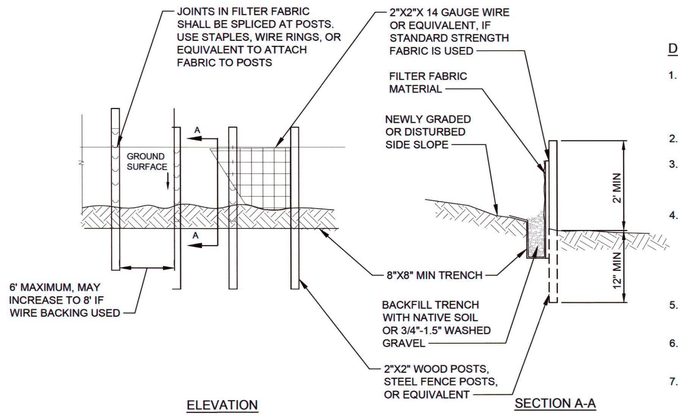
SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
THURSTON COUNTY, WASHINGTON

EXCAVATION PLAN

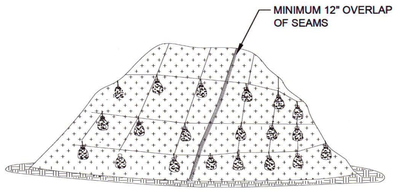
PROJECT NO. 0774006.020
DATE OCTOBER, 2017
SHEET 3 OF 4
DRAWING NO. C3.0



DETAIL NOTE

1. SILT FENCING SHALL BE INSTALLED IN ACCORDANCE WITH WASHINGTON DEPT. OF ECOLOGY WESTERN WASHINGTON STORMWATER MANUAL.
2. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
3. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT POND.
4. THE UPHILL SIDE OF THE FENCE SHALL BE PERIODICALLY CHECKED FOR SIGNS OF CLOGGING CAUSING CHANNELIZATION OF THE FLOWS PARALLEL TO THE FENCE. IN SUCH CASE, REPLACE THE FENCE AND OR MOVE THE TRAPPED DEBRIS AND SEDIMENT.
5. SEDIMENT AND DEBRIS MUST BE REMOVED WHEN 6" HIGH.
6. REMOVE AND REPLACE DETERIORATED FILTER FABRIC DUE TO ULTRAVIOLET BREAKDOWN.
7. UPON COMPLETION OF WORK THE CONTRACTOR SHALL REMOVE ALL FILTER FABRIC FENCE AND GRAVEL. PROVIDE FINISH GRADES WITH SURFACING MATERIAL AND LANDSCAPING AS REQUIRED.

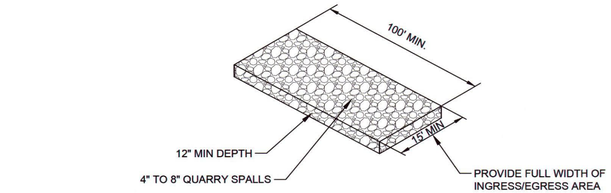
1 C2.0 SILT FENCING
NO SCALE



NOTES

1. STOCKPILE SOIL WILL BE COVERED AND SECURED FROM WIND, RAIN, AND OTHER DISTURBANCES AT ALL TIMES EXCEPT DURING ACTIVE SOIL LOADING AND UNLOADING.
2. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
3. BARRIER REQUIRED AT TOE OF STOCKPILE.
4. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10' GRID SPACING IN ALL DIRECTIONS.
5. NO STOCKPILING OF MATERIALS ALLOWED IN RIGHT-OF-WAY.

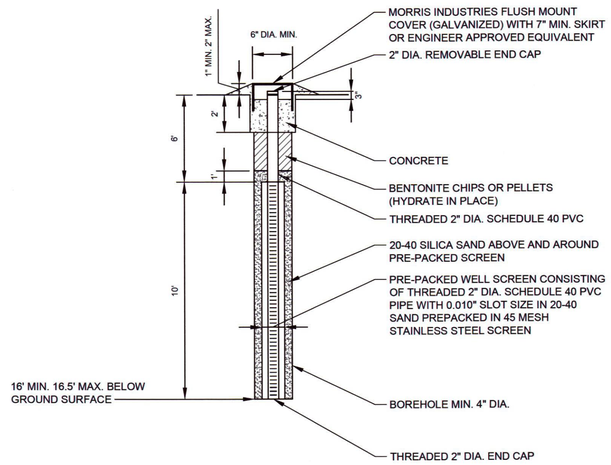
2 C2.0 STOCKPILE COVER
NO SCALE



NOTE

8 OZ/SY NON-WOVEN GEOTEXTILE FABRIC, MUST BE PLACED BENEATH QUARRY SPALLS.

3 C2.0 CONSTRUCTION ENTRANCE
NO SCALE



4 C2.0 MONITORING WELL INSTALLATION (TYP. OF 2)
NO SCALE

TESC STANDARD NOTES

1. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) IS REQUIRED FOR ALL CONSTRUCTION. THE NAMED PERSON OR FIRM WILL BE ESTABLISHED IN COORDINATION WITH THE OWNER.
2. APPROVAL OF THE TEMPORARY EROSION/SEDIMENTATION CONTROL (TESC) PLANS DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. ALL REQUIRED SEDIMENTATION AND EROSION CONTROL FACILITIES INDICATED ON THE PLANS MUST BE CONSTRUCTED AND IN OPERATION PRIOR TO LAND CLEARING AND/OR OTHER CONSTRUCTION ACTIVITIES. THESE FACILITIES SHALL BE MAINTAINED AND UPGRADED, IF NECESSARY, TO INSURE THAT SEDIMENT-LADEN WATER AND STORM DRAINAGE RUNOFF DOES NOT IMPACT THE ADJACENT PROPERTIES, OR NATURAL DRAINAGE WAYS. THE TEMPORARY EROSION CONTROL FACILITIES SHALL REMAIN IN PLACE UNTIL FINAL SITE CONSTRUCTION IS COMPLETED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE TESC FACILITIES SHOWN ON THESE PLANS MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER, OR DISCHARGE STANDARDS.
6. THE SEDIMENTATION AND EROSION CONTROL FACILITIES DEPICTED ON THE APPROVED DRAWINGS ARE INTENDED TO BE MINIMUM REQUIREMENTS TO MEET ANTICIPATED SITE CONDITIONS. ADDITIONAL DRAINAGE AND EROSION CONTROL FACILITIES MAY BE REQUIRED AS SITUATIONS WARRANT DURING CONSTRUCTION. THE IMPLEMENTATION, MAINTENANCE, REPLACEMENT AND ADDITIONS TO THESE CONTROL SYSTEMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR'S CESCL.
7. THE TESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY--TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED WITHIN 24 HOURS (CONSISTENT WITH TESC/SWMP) FOLLOWING A MAJOR STORM EVENT, BY THE CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY--TO ENSURE THEIR CONTINUED FUNCTIONING.
9. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
10. ALL AREAS OF ACTIVE EARTHWORK WHICH HAVE THE POTENTIAL FOR EROSION AND SEDIMENTATION IMPACTS ON ADJACENT PROPERTIES, NATURAL DRAINAGE WAYS, OR THE EXISTING CITY STORM DRAINAGE SYSTEM MUST BE STABILIZED ACCORDING TO THE FOLLOWING SCHEDULE:

    FROM MAY 1ST TO SEPTEMBER 30TH, AREAS AT FINAL GRADE AND THOSE THAT ARE SCHEDULED TO REMAIN UNWORKED FOR MORE THAN SEVEN (7) DAYS SHALL BE STABILIZED.

    FROM OCTOBER 1ST TO APRIL 30TH EARTHWORK ACTIVITIES SHALL BE CONDUCTED IN STAGES IN ORDER TO MINIMIZE SOIL EXPOSURE. EXPOSED SOILS WITH AN AREA GREATER THAN 5,000 SQUARE FEET THAT ARE SCHEDULED TO REMAIN UNWORKED FOR MORE THAN 24 HOURS AND EXPOSED AREAS OF LESS THAN 5,000 SQUARE FEET THAT WILL REMAIN UNWORKED FOR MORE THAN TWO (2) DAYS SHALL BE STABILIZED IMMEDIATELY.
11. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
12. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER.
13. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO NATIONAL RESPONSE CENTER (800)424-8802 AND WASHINGTON STATE EMERGENCY MANAGEMENT (800)OILS-911.
14. EROSION CONTROL MEASURES (BMPS) SHALL BE PER THE 2012 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON BY THE DEPARTMENT OF ECOLOGY.
15. DUST SHOULD BE MINIMIZED DURING SITE WORK TO MAINTAIN A "NO VISIBLE DUST" STANDARD. CONTRACTOR SHALL SPRAY SMALL AMOUNTS OF ONSITE WATER AS NECESSARY TO CONTROL DUST RESULTING FROM CONSTRUCTION ACTIVITY. VEHICLES WILL CROSS UNPAVED SURFACES SLOWLY TO MINIMIZE DUST AND DISTURBANCE. CONTRACTOR SHALL SWEEP AFFECTED ONSITE AND PUBLIC ROADS, AS NECESSARY, TO REMOVE MATERIAL DEPOSITED AS A RESULT OF SITE WORK.

KENT W. WIKEN — STATE OF WASHINGTON — 34524 — REGISTERED PROFESSIONAL ENGINEER — 10/27/17

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SOIL CLEANUP REMEDIAL ACTION
WEBSTER NURSERY SITE
THURSTON COUNTY, WASHINGTON

DETAILS

PROJECT NO. 0774006.020
DATE OCTOBER, 2017
SHEET 4 OF 4
DRAWING NO. C4.0

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APPENDIX B

Health and Safety Plan

Work Location Personnel Protection and Safety Evaluation Form

Project Number:	0774006.020.024	Reviewed by:	Ken Reid
Prepared by:	Sierra Mott	Date:	August 4, 2016
Date:	July 21, 2016		

A. Work Location Description

1.	**Project Name:**	Washington State Department of Natural Resources (DNR) Webster Nursery Cleanup Action
2.	**Location:**	Tumwater, Washington
3.	**Anticipated Activities**	Excavation and disposal of approximately 145 cubic yards of soil contaminated with heptachlor epoxide (HE); confirmation soil sampling; decommissioning two groundwater monitoring wells; installation of two replacement monitoring wells using direct-push drilling method; collection of groundwater samples.
4.	**Size:**	Property is 4 acres; project area is less than 1 acre
5.	**Surrounding Population:**	Residential/Agricultural
6.	**Buildings/Homes/Industry:**	Current DNR tree seedling nursery; equipment storage, warehouse
7.	**Topography:**	Flat
8.	**Anticipated Weather:**	Sun or rain; 30 to 80 degrees Fahrenheit
9.	**Unusual Features:**	None.
10.	**Site History:**	From 1978 until the mid-1990s, organochlorine pesticides were stored in an underground storage tank (UST) located south of the nursery's pesticide storage warehouse. Pesticide containers were rinsed in this building and diluted pesticide wash water leaked over time from the UST. Upon final removal of the UST in 1996, pesticide residues were found in surrounding subsurface soil adjacent to the UST. Contaminated soil was removed and disposed of, but field screening indicated that soil contamination was left in place. Monitoring wells were installed immediately surrounding the former UST location. Subsequently, Ecology issued an Agreed Order to DNR. Additional wells were installed for long-term groundwater monitoring. Recent groundwater and subsurface soil sampling results indicate that HE exceeds applicable MTCA Method B soil and groundwater cleanup levels near the zone of seasonal water table fluctuation in the immediate vicinity of the former UST. Other contaminants at the Site (below cleanup levels) include parent compound heptachlor and alpha- and gamma-chlordane (chlordanes). The proposed cleanup action consists of decommissioning two monitoring wells located inside the excavation area, removal and offsite disposal of contaminated soil located

between 3 ft bgs and 10.5 ft bgs, Site restoration, and installation of two replacement monitoring wells. Periodic groundwater sampling will be performed subsequent to the cleanup action.

B. Hazard Description

1. Background Review: ☒ Complete ☐ Partial
If partial, why? Click here to enter text.

2. Hazardous Level: ☐ B ☐ C ☒ D (Modified) ☐ Unknown
Justification: Existing data regarding site conditions and limited exposure based on field activities and equipment to be used.

3. Types of Hazards: (Attach additional sheets as necessary)

A. ☒ Chemical ☒ Inhalation ☐ Explosive
☐ Biological ☒ Ingestion ☐ O_2 Def. ☒ Skin Contact

Describe: Contact with soil or groundwater impact by HE.

B. ☒ Physical ☐ Cold Stress ☒ Noise ☐ Heat Stress ☒ Other
Describe: Physical hazards associated with drilling, excavations and confirmation soil sampling, and groundwater sampling.

C. ☐ Radiation
Describe: Click here to enter text.

4. Nature of Hazards:

☒ Air Describe: Potential for airborne dust and contamination.

☒ Soil Describe: Potential for contact with or ingestion of contaminated sediment during drilling and sampling.

☐ Surface Water Describe: Click here to enter text.

☒ Groundwater Describe: Potential for contact with or ingestion of contaminated groundwater during drilling and sampling.

☐ Other Describe: Click here to enter text.

5. Chemical Contaminants of Concern ☐ N/A

Contaminant	PEL (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Heptachlor	0.5 mg/m^3	35 mg/m^3	May be present in soil.	Inhalation, absorption, ingestion, dermal contact.	Tremors, convulsion, liver damage (carcinogen).	Dust Control
Heptachlor Epoxide (HE)	0.5 mg/m^3	Not available	Present in groundwater and soil.	Inhalation, absorption, ingestion, dermal contact.	Tremors, convulsion, liver damage (carcinogen)	Dust Control
Chlordane	0.5 mg/m^3	100 mg/m^3	Present in groundwater.	Inhalation, absorption, ingestion, dermal contact.	Blurred vision, delirium, cough, abdominal pain, nausea, vomiting, diarrhea (carcinogen).	Dust Control

Notes: Heptachlor changes to HE once mixed with water (including in the body).
PEL is the Permissible Exposure Limit for an 8 hour day.
mg/m^3 = milligrams per cubic meter

6. Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Minimize Hazard
Drill rig, fork lift, and support vehicles	Moving parts of drill rig, forklift, and the support vehicles can be locations of falling and flying objects and pinch/crush points	Near drill rig for drilling and installation of two monitoring wells	Alert observation of surroundings; minimize time spent near drill rig and get driller's attention before approaching drill rig, forklift, or any vehicle; no loose clothing.
Open excavation	Excavations greater than 4 ft deep pose a hazard of falls and sidewall collapse	Around excavations	Personnel will not be allowed to enter excavations greater that 4 ft deep without shoring. Confirmation soil samples will be collected using an excavator bucket. While in an excavation less than 4 ft deep, workers' heads must not be allowed to break the plane of the top of the excavation so that in the case of a sidewall collapse, the worker's head and upper body are not buried.
Weather stress	Exposure to hot or cold temperatures, wind, and or rain	All areas of the site	Have drinking water accessible, wear appropriate clothing (light for heat, warm for cold), wear sunscreen protection, avoid caffeine, work in the shade when possible, and take short breaks in the shade as needed.
Slips, trips, and falls	Uneven terrain and drilling equipment	All areas of the site	Visual observations of terrain and hazards. Keep work area clear of debris.
Overhead and underground utilities	Damage to utilities through drilling and excavations	Around work area	Client to provide utility maps and a public utility locating service will be utilized. No raised drill rig towers within 20 ft of overhead power lines.
Travel to and from site	Operating motor vehicle in traffic on highways and rural roads.	Route to and from site from Landau Associates office	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection, all vehicles to be maintained and in good working order. Obey all traffic laws including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time for travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish a planned route prior to departure. Be observant of unsafe road conditions and erratic/dangerous drivers.

7. Work Location Instrument Readings ☐ N/A

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

8. Hazards Expected in Preparation for Work Assignment ☒ N/A

Describe: Click here to enter text.

C. Personal Protective Equipment

1. Level of Protection

☐ A ☐ B ☐ C ☒ D (Modified)

Location/Activity: All

☐ A ☐ B ☒ C ☐ D

Location/Activity: If action levels (Attachment A) are exceeded.

2. Protective Equipment (specify probable quantity required)

Respirator ☐ N/A

- ☐ SCBA, Airline
- ☐ Full-Face Respirator
- ☒ Half-Face Respirator (Cart. organic vapor) (Only if upgrade to Level C)
- ☐ Escape mask
- ☐ None
- ☐ Other:
- ☐ Other:

Clothing ☐ N/A

- ☐ Fully Encapsulating Suit
- ☐ Chemically Resistant Splash Suit
- ☐ Apron, Specify:
- ☒ Tyvek Coverall
- ☐ Saranex Coverall
- ☐ Coverall, Specify
- ☒ Other: Dedicated field clothing, highly visible safety vest

Head & Eye ☐ N/A

- ☒ Hard Hat
- ☐ Goggles
- ☐ Face Shield
- ☒ Safety Eyeglasses
- ☒ Other: Hearing protection

Hand Protection ☐ N/A

- ☒ Undergloves; Type: Nitrile
- ☐ Gloves; Type:
- ☐ Overgloves; Type:
- ☐ None
- ☐ Other:

Foot Protection ☐ N/A

- ☐ Neoprene Safety Boots with Steel Toe/Shank
- ☒ Disposable Overboots
- ☒ Other: Chemical Resistant Steel-Toe

Work Boots

3. Monitoring Equipment ☐ N/A

- 0 CGI
- 0 O2 Meter
- 0 Rad Survey
- 0 Detector Tubes (optional)

Type:

- 0 PID
- 0 FID
- 0 Other

D. Decontamination

Personal Decontamination ☒ Required ☐ Not Required

If required, describe: Decontaminate exposed skin before each break in the work shift and before eating or drinking using hot water and soap. Use disposable PPE and discard as solid waste. Avoid hand to mouth contact.

Equipment Decontamination ☒ Required ☐ Not Required

If required, describe: Decontamination of non-dedicated sampling equipment soil and groundwater sampling equipment with dry methods (brushing, scrubbing) and/or Alconox/tap water solution followed by tap water rinse. Field staff will be prepared to set up a wash sink on site. All contaminated water will be stored onsite.

E. Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
1	Monitoring well decommissioning and replacement; well development; initial sampling	September through October 2018
2	Excavation and disposal of contaminated soil; confirmation soil sampling	September through October 2018
3	Groundwater sampling	October 2018

Emergency Facilities and Numbers

Hospital: Capital Medical Center, 3900 Capital Mall Drive SW, Olympia, Washington 98502
Telephone: 360-754-5858
Directions: Attachment B

Urgent Care Clinic: Urgent Care South, 6981 Littlerock Road SW #101, Olympia Washington ,
Telephone: 360-943-3633
Directions: Attachment C

Emergency Transportation Systems (Fire, Police, Ambulance) -- 911

Emergency Routes – Maps (Attachment B and C)

Emergency Contacts:

Name	Offsite	Onsite
Toni Smith	253-926-2493	208-275-9785
Eric Weber	253-926-2493	206-940-2406
Christine Kimmel	425-778-0907	206-786-3801

In the event of an emergency, do the following:

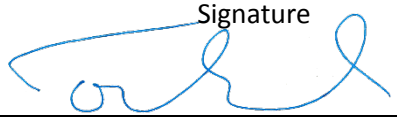
1. Call for help as soon as possible. Call 911. Give the following information:
    a. WHERE the emergency is – use cross streets or landmarks
    b. PHONE NUMBER you are calling from
    c. WHAT HAPPENED – type of injury
    d. WHAT is being done for the victim(s)
    e. YOU HANG UP LAST – let the person you called hang up first.
2. If the victim can be moved, paramedics will transport to the hospital. If the injury or exposure is not life-threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic (avoiding the head and face) prior to transport.

In the event of a non-emergency injury, do the following:

1. Ask the injured person if you can help them.
2. Administer first aid to the skill level for which you have been trained and feel comfortable performing. If you are unsure if the emergency is life threatening or not, immediately call 911 and follow the steps above.
3. If the injury is minor, but some medical attention beyond the skills of site workers is required after administering first aid, the victim can be transported to the hospital following decontamination, if necessary. The directions to the nearest *Urgent Care Clinic* is provided in Attachment C.

Health and Safety Plan
Approval/Sign Off Form

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Toni Smith Task Manager		January 19, 2017
Sierra Mott Site Safety Coordinator		January 19, 2017
Christine Kimmel LAI Health and Safety Manager		January 19, 2017
Eric Weber Project Manager		January 19, 2017

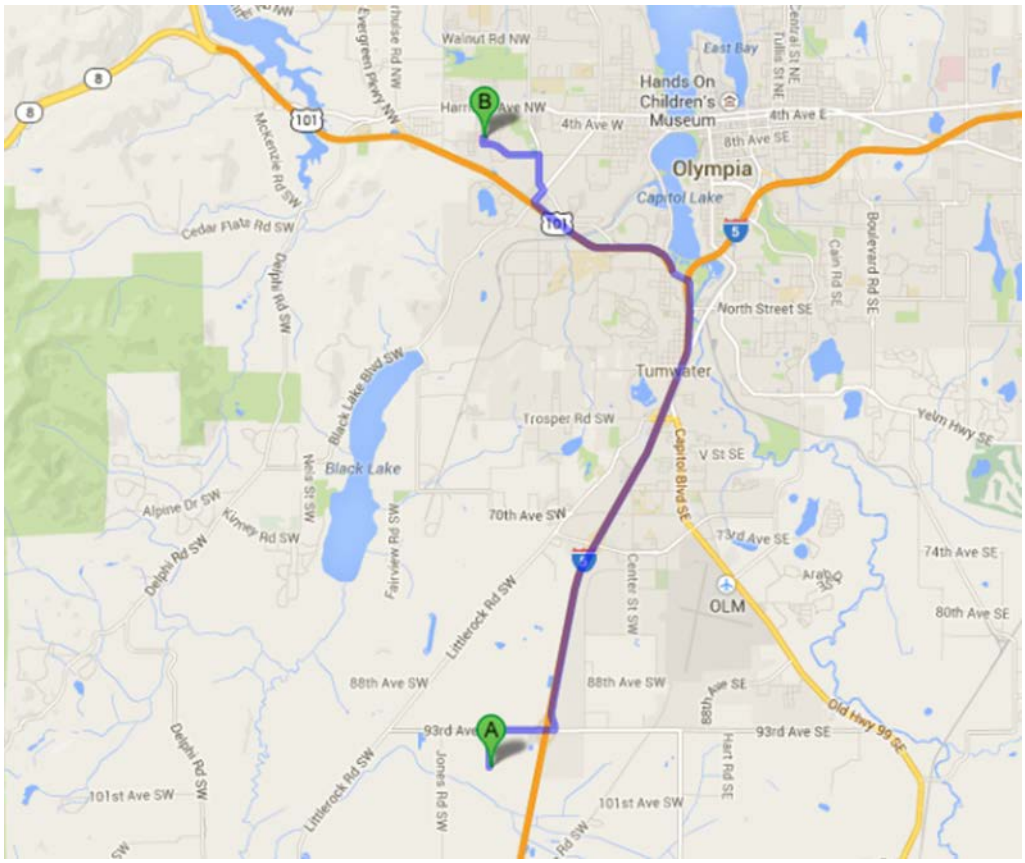
Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date
Sierra Mott		Click here to enter text.

Attachment A
Action Levels for Respiratory Protection

Monitoring Parameter	Reading	Level of Protection
Dust	Visible Dust	Apply moisture to soil, if dust persists then upgrade to Modified Level D PPE and monitor dust level at work perimeter

Attachment B
Directions to Hospital

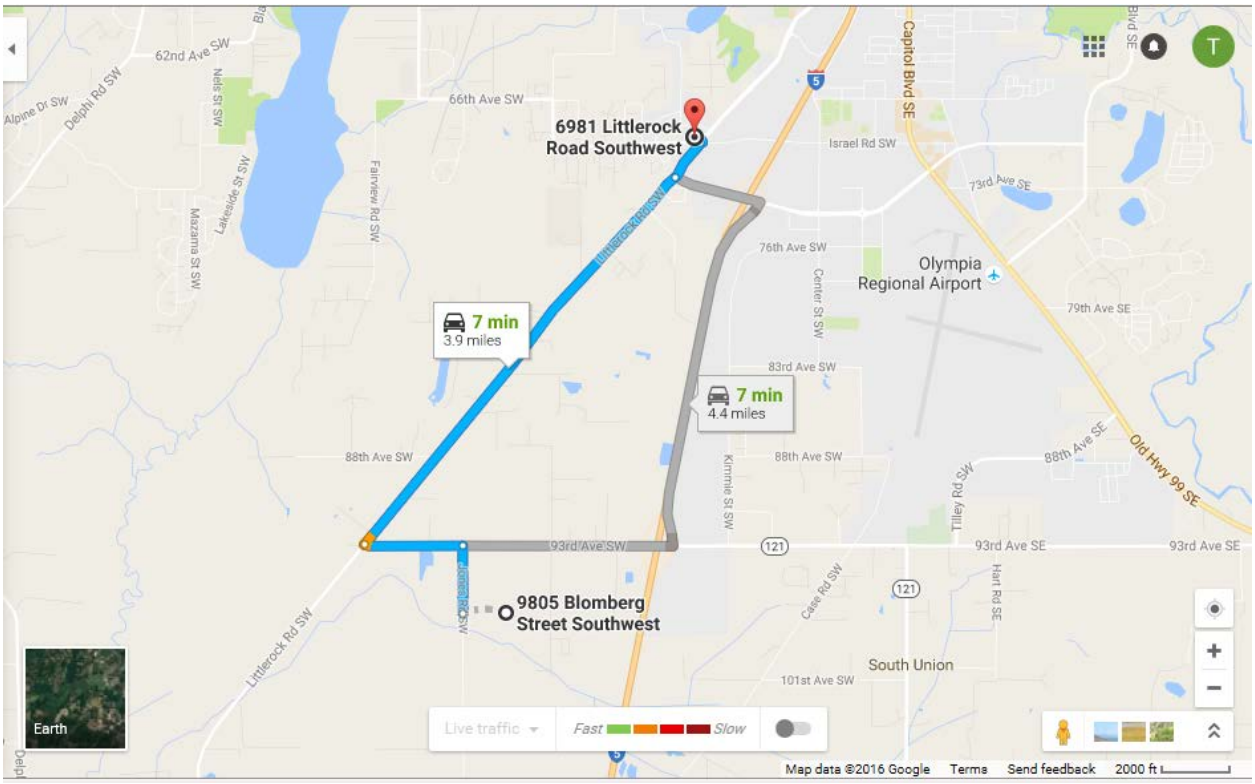


A 9805 Blomberg St SW, Olympia, WA 98512

	1. Head **north** on **Blomberg St SW** toward **93rd Ave SW** About 54 secs	go 0.4 mi total 0.4 mi
↱	2. Take the 1st right onto **93rd Ave SW** About 2 mins	go 0.7 mi total 1.1 mi
5	3. Turn left to merge onto **I-5 N** About 5 mins	go 4.8 mi total 5.8 mi
101	4. Take exit **104** to merge onto **US-101 N** toward **Aberdeen/Port Angeles** About 2 mins	go 1.7 mi total 7.6 mi
↗	5. Take the **Black Lake Blvd** exit toward **W Olympia**	go 0.4 mi total 8.0 mi
↱	6. Keep right at the fork, follow signs for **West Olympia** and merge onto **Black Lake Blvd SW**	go 0.2 mi total 8.1 mi
↰	7. Turn left onto **Cooper Point Rd SW** About 52 secs	go 0.4 mi total 8.5 mi
↰	8. Turn left onto **Capital Mall Dr SW** About 2 mins	go 0.6 mi total 9.1 mi
↱	9. Turn right	go 312 ft total 9.2 mi
↰	10. Turn left Destination will be on the right	go 75 ft total 9.2 mi

B **Capital Medical Center**
3900 Capitol Mall Dr SW, Olympia, WA 98502

Attachment C
Directions to Urgent Care Center



9805 Blomberg Street Southwest

Olympia, WA 98512

1. Head north on Jones Rd SW toward 93rd Ave SW
2. Turn left onto 93rd Ave SW
3. Turn right onto Littlerock Rd SW
4. At the traffic circle, take the 2nd exit and stay on Littlerock Rd SW
5. At the traffic circle, take the 3rd exit onto 70th Ave SW
   Destination will be on the right

6981 Littlerock Road Southwest

Tumwater, WA 98512

APPENDIX C

Sampling and Analysis Plan/ Quality Assurance Project Plan

Sampling and Analysis Plan/ Quality Assurance Project Plan Webster Nursery Tumwater, Washington

October 31, 2017

Prepared for

Washington State Department of Natural Resources
Olympia, Washington

LANDAU ASSOCIATES

2107 South C Street
Tacoma, WA 98402
(253) 926-2493

Sampling and Analysis Plan/Quality Assurance Project Plan
Webster Nursery
9805 Blomberg Street SW
Tumwater, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: _____
Danille Jorgensen, Environmental Data Manager

Document reviewed by: _____
Toni Smith, Senior Project Hydrogeologist/Project Manager

Date:	October 31, 2017
Project No.:	0774006.020.024
File path:	Y:\774\006\R\RAWP\RAWP_Final_Oct2017\Final\Appendices\App C\sig page.docx
Project Coordinator:	Juliann Cooley

LANDAU ASSOCIATES

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FIGURES

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LIST OF ABBREVIATIONS AND ACRONYMS

ARI ..... Analytical Resources, Incorporated
CAP ..... Cleanup Action Plan
CLP ..... Contract Laboratory Program
COC ..... chain-of-custody
CUL ..... cleanup level
DQI ..... data quality indicator
DQO ..... data quality objective
DP ..... direct-push
Ecology ..... Washington State Department of Ecology
EDD ..... electronic data deliverable
ELAP ..... Environmental Laboratory Accredited Program
EPA ..... US Environmental Protection Agency
HASP ..... Health and Safety Plan
HE ..... heptachlor epoxide
ID ..... identification
LAI ..... Landau Associates, Inc.
LCS ..... laboratory control sample
LCSD ..... laboratory control sample duplicate
LL ..... low-level
µg/L ..... micrograms per liter
MQO ..... measurement quality objective
MS ..... matrix spike
MSD ..... matrix spike duplicate
MTCA ..... Model Toxics Control Act
QA ..... quality assurance
QAPP ..... quality assurance project plan
QC ..... quality control
RAWP ..... remedial action work plan
RPD ..... relative percent difference
SAP ..... sampling and analysis plan
SOP ..... standard operating procedure
TA ..... TestAmerica Laboratories, Inc.
WAC ..... Washington Administration Code

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1.0 INTRODUCTION

This Sample and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) describes field sampling and laboratory analytical procedures that will be followed during completion of cleanup activities at the Webster Nursery site (Site) located south of Tumwater, Washington. Soil and groundwater at the Site is affected by a historical release of organochlorine pesticides from an underground storage tank. The proposed cleanup consists of soil removal, confirmation soil sampling, decommissioning wells, and replacing two groundwater monitoring wells located in the area proposed for excavation, sampling of stockpiled clean soil, and groundwater sampling. A detailed description of the Site and cleanup objectives is provided in the Feasibility Study (LAI 2016), Cleanup Action Plan (CAP; Ecology 2016), and Remedial Action Work Plan (RAWP; to which this SAP/QAPP is appended).

The purpose of this plan is to provide sampling and analysis methodologies consistent with accepted procedures that will maintain accuracy, reproducibility, and comparability of data during sampling events. This SAP/QAPP has been prepared in accordance with the requirements of Washington Administrative Code (WAC) 173-340-820 to support the tasks specified in the Washington State Department of Ecology (Ecology) Webster Nursery CAP (Ecology 2016). This SAP/QAPP also references the Site Health and Safety Plan (HASP) presented in Appendix B of the RAWP.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The responsibilities of key project personnel are defined below.

2.1 Management Responsibilities

Toni Smith, Landau Associates, Inc. (LAI) Project Manager

The project manager will have overall responsibility for project implementation consistent with the approved RAWP, and will be responsible for maintaining quality assurance (QA). Tasks include:

- Prepare and review the RAWP, HASP, SAP/QAPP and other key project plans
- Coordinate permitting and pre-construction activities
- Coordinate field activities
- Monitor project activity and quality
- Provide regulatory and technical consulting
- Coordinate proper handling and disposal of excavated soil.

2.2 Quality Assurance Responsibilities

Danille Jorgensen and Kristi Schultz, LAI Data Specialists

The data specialist will be responsible for the management and integrity of analytical and field data generated for this project. Tasks include the following:

- Laboratory coordination and oversight
- Verification and validation of analytical data in accordance with this SAP/QAPP, LAI standard operating procedures (SOPs,) and US Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) guidelines as applicable
- Management and maintenance of the project's structure query language (SQL) server database, which uses the EarthSoft EQuIS™ data management system
- Data queries and reporting from the EQuIS database
- Submittals to Ecology's Environmental Information Management (EIM) database
- Advising on data corrective action procedures.

2.3 Laboratory Responsibilities

TestAmerica Laboratories, Inc. (TA) located in Tacoma, Washington, is an Ecology-accredited laboratory and will perform soil analyses and related analytical services in support of cleanup activities described in the RAWP. In order to identify detections above the groundwater cleanup level (CUL; 0.0048 micrograms per liter [µg/L]), groundwater monitoring analyses are anticipated to be performed by the Analytical Resources, Inc. (ARI) laboratory in Tukwila, Washington, also an Ecology-accredited laboratory, using the EPA 8081B low-level (LL) method.

2.4 Field Responsibilities

Sierra Mott, LAI Field Lead

The field lead will be responsible for leading and coordinating field activities including documentation, sampling, and sample handling. The field lead will report directly to the LAI project manager. Tasks include the following:

- Coordinating with the LAI project manager
- Coordinating and managing field and laboratory activities, including sampling
- Documenting and reviewing field data including field measurements and monitoring
- Following the schedule of work
- Coordinating and overseeing subcontractors
- Drafting the cleanup action completion report.

3.0 QUALITY ASSURANCE

This section presents the QA and quality control (QC) objectives and processes including data quality objectives (DQOs), measurement quality objectives (MQOs), data quality indicators (DQI), and QC procedures for field and laboratory work.

3.1 Data Quality Objectives

DQOs specify the environmental decisions that the data will support and the corresponding level of datum quality required to ensure decisions are based on sound scientific data. The DQOs for this project are to collect data in support of the selected remedial action as detailed in the 2016 CAP, which is being implemented to remove heptachlor epoxide (HE) concentrations in shallow water through excavation of HE-affected soil near the seasonal water table. Data will also be collected in support of documenting the performance of the remedial excavation. While HE is the primary chemical of concern at the Site, soil and groundwater samples will be analyzed for organochlorine pesticides by EPA Method 8081B. Data will be compared to the Model Toxics Control Act (MTCA) Method B soil CULs protective of groundwater, as listed in Table 1 of this plan.

3.2 Data Quality Indicators

DQIs are used to establish quality objectives and are discussed in detail below. A summary of DQIs and their associated MQOs is presented in Table 2.

3.2.1 Precision

Precision is a measure of variability in the results of replicate measurements due to random error (Ecology 2004). Precision is best expressed in terms of the standard deviation or relative percent difference (RPD). QC sample types that can be used to evaluate precision include field and laboratory duplicates, matrix spike duplicates (MSD), and laboratory control sample duplicates (LCSD). The precision of duplicate measurements will be expressed as an RPD, which is calculated by dividing the absolute value of the difference of the two measurements by the average of the two measurements, and expressing as a percentage. The formula for RPD calculation is shown below:

$$\text{RPD} = \left[\frac{|\text{D1} - \text{D2}|}{[(\text{D1} + \text{D2}) \div 2]}\right] \times 100\%$$

Where:
D1 = first measurement value and
D2 = second measurement value (duplicate)

3.2.2 Accuracy

Accuracy is a combination of precision and bias, in that it represents the degree to which a measured value represents the known value (Ecology 2004). Accuracy is expressed as the percent recovery of spiked samples (matrix spike [MS], laboratory control sample [LCS], and surrogate spike). The general

formula used to calculate percent recovery is shown below, for MS/MSD percent recovery the result from the unspiked sample is taken into account in the formula:

$$\%R = \left[\frac{SSR}{C_s}\right] \times 100\%$$

Where:
%R = Percent Recovery
SSR = Spiked Sample Result
C_s = Concentration of the Spike Added

3.2.3 Representativeness

Representativeness is an indicator of how accurately a result reflects the desired characteristic(s) of a defined population, accounting for both temporal and spatial variability (Ecology 2004). Representativeness qualitatively describes how well the analytical data characterize an area of concern. Representativeness is largely determined by the sampling design; analytical parameters for use in its evaluation include method-specified holding times and preservation requirements, and matrix heterogeneity. The sampling design for this project is discussed in Section 7.2.

3.2.4 Comparability

Comparability is the "degree of confidence with which one data set can be compared to another" (EPA 2004). QC procedures and MQOs as stated in this plan will provide for measurements that are consistent and representative of the media and conditions measured.

3.2.5 Completeness

Completeness is a measure of "the amount of valid data obtained from a measurement system compared to the amount that could be expected to be obtained under normal conditions" (EPA 1988). Field completeness is calculated as the number of actual samples collected divided by the number of planned samples. Analytical completeness is calculated as the number of valid data points divided by the total number of data points requested. Data points are considered invalid if they are rejected during data validation. The data validation approach for this project is provided in Section 5.0.

3.3 Quality Control Procedures

This section describes QC procedures which will be implemented in the field and in the laboratory.

3.3.1 Field Quality Control Procedures

QC procedures to be implemented in the field include preventative maintenance/calibration of field instruments, sampling, documentation, and custody procedures.

3.3.1.1 Preventative Maintenance/Calibration Procedures

Field instruments will be properly operated, calibrated, and maintained by qualified personnel according to the manufacturer's guidelines and recommendations. Periodic schedules for preventive maintenance of any field instruments used during the project, including equipment testing, parts replacement, and general cleaning will be followed according to the manufacturer's instructions. Field equipment performance will be evaluated against check standards and calibration blanks, as appropriate, for each parameter before use and at least once during a sampling day or when meter drift is suspected.

Documentation of routine and special preventive maintenance and calibration information will be maintained in a field or laboratory logbook or reference file and will be available upon request. Each maintenance and calibration logbook entry will include the date and initials of the individual performing the activity.

3.3.1.2 Sampling, Documentation, and Custody Procedures

Soil and groundwater samples submitted to the analytical laboratory for analysis will be collected in the appropriate sample containers provided by the laboratory. The samples will be preserved by cooling to a temperature of less than 6 degrees Celsius and, as required, by the analytical method. Sample extraction and analysis will be performed by the analytical laboratory within the recommended holding times. Sample containers, preservatives, and holding times for each chemical analysis are presented in Table 3.

3.3.2 Laboratory Quality Control Procedures

Laboratory analyses for all constituents will be conducted by a laboratory that is certified through the Environmental Laboratory Accreditation Program (ELAP). The laboratory is required to maintain current certification through the duration of time they are performing analytical work for this project. This section describes the QC procedures to be implemented by TA located in Tacoma, Washington and ARI, which are the selected and anticipated analytical laboratories, respectively.

3.3.2.1 Analytical Methods and Reporting Limits

Groundwater and soil samples collected during the excavation, confirmation, and compliance monitoring sampling events will be analyzed for organochlorine pesticides by EPA Method 8081B LL and EPA Method 8081B, respectively. The laboratories shall be qualified to perform the analyses using standard, documented laboratory analytical procedures. All analytical work shall be performed in accordance with this plan, TA's Quality Systems Manual, and ARI's Quality System Manual.

To confirm that soil containing concentrations of contaminants above the cleanup standards is removed and that soil remaining on-site following cleanup meets the cleanup standards to the extent practicable, MTCA Method B CULs protective of groundwater will be achieved by the laboratory's reporting limits, as opposed to the method detection limits. Reporting limit goals and CULs for each

constituent are identified for each analysis. These are only goals because instances may arise where high sample concentrations, non-homogeneity of samples, dry weight reporting, or matrix interferences preclude achieving the desired reporting limits and associated QC criteria. If this occurs, the laboratory will report the reason(s) for deviations from these reporting limits or non-compliance with QC criteria.

3.3.2.2 Instrument Calibration and Maintenance

The analytical laboratory project manager is responsible for maintaining laboratory instruments in proper working order, including routine maintenance and calibration, and training of personnel in maintenance and calibration procedures. Laboratory instruments will be properly calibrated with appropriate check standards and calibration blanks for each parameter before beginning each analysis. Instrument performance check standards, where required, and calibration blank results will be recorded in a laboratory logbook dedicated to each instrument. At a minimum, the preventive maintenance schedules contained in the EPA methods and in the equipment manufacturer's instructions will be followed.

3.3.2.3 Documentation

Analytical data will be provided by the laboratory in an electronic (pdf) report format and an electronic data deliverable (EDD). Both laboratory deliverables will be saved in the project folder, which is on a secure server that is routinely backed up. LAI uses EQuIS environmental data management software for querying and reporting analytical data. Project EDDs will be reviewed to the laboratory report for QA/QC and completeness and then loaded to the project's EQuIS database. Laboratory data reports for this project will be an EPA Tier II equivalent and at a minimum, will include the following:

- Both field and laboratory sample identification number
- Case narrative, including adherence to prescribed protocols, non-conformity events, corrective measures, and/or data deficiencies
- Sample analytical results
- The sample date, the date it was received at the laboratory, and the date that it was extracted and/or analyzed
- The quantified concentration
- The method reporting limit
- Units for reporting
- Laboratory QC sample results (including date and time of analysis, method, and acceptability criteria), such as:
    - Data qualifiers assigned by the laboratory, with definitions presented in each report
    - Surrogate recoveries
    - MS/MSD results

  - LCS/LCSD results
  - Laboratory duplicate results
  - Blank results
- Sample custody (including signed, original chain-of-custody [COC] records, and documentation of condition of custody seals)
- ELAP certification number and method listing.

Upon receipt of laboratory data, the LAI data specialist and project manager will review the data for completeness and format. If any error is noted in the laboratory report, the laboratory will be informed and appropriate corrective action will be performed, including review of raw data, assigning a data qualifier to the sample result, and/or reanalysis of the sample. For minor corrections (such as misspelled sample names), the individual making the correction shall cross a line through the error, enter the correct information, and initial and date the correction.

4.0 SAMPLE HANDLING, DOCUMENTATION, AND CUSTODY PROCEDURES

Sample handling and documentation procedures are summarized in this section. These procedures and protocols for sampling activities were developed to meet the DQOs of the CAP, and are based on proven and acceptable sampling methods as established by EPA guidance documents, Washington State regulations, and professional judgment. Sample preservation and storage requirements are provided in Table 2.

4.1 Sample Handling and Transport

Sample collection procedures and protocols for each sampling activity are described in detail in Section 7.2 of this SAP/QAPP. Sample containers, preservatives, and holding times (Table 3) will vary according to the type of sample collected and the analytical method to be used. Strict precautions will be taken to adhere to maximum sample holding times. Each sample will be documented, labeled, and identified as noted below.

4.1.1 Sample Packaging and Shipping

The following procedures will be followed:

- Samples will be packaged and transported in a manner that protects the integrity of the sample and prevents detrimental effects due to the possible hazardous nature of samples.
- Samples will be placed on sealed, reusable ice packs or ice that is double-bagged using Ziploc® bags in coolers immediately after collection. At the end of each day, samples will be inventoried and sent to the analytical laboratory in a lined cooler containing ice.
- Samples will be packaged carefully to avoid breakage or cross contamination using sufficient packing material. The COC forms accompanying the samples to the laboratory will be placed inside a separate plastic Ziploc bag and taped inside the cooler lid.
- The samples will generally will be delivered to the laboratory in person or shipped by a commercial overnight carrier. If shipped using an overnight carrier, the shipping container will be taped shut with strapping tape and custody seals.

4.2 Sample Custody and Documentation

Sample documentation includes field notes, field sampling forms, field photographs, and container labels. Sample custody procedures include field, shipment, transfer, and laboratory custody procedures.

4.2.1 Documentation

Documentation necessary to meet the field QA objectives for this project includes:

- Field notebooks (logbooks) in which general field observations and activities are recorded
- Field sampling forms specific to sampling (COC, etc.)

- Sample container labels.

If an error is made on any field documentation, corrections will be made by drawing a single line through the error and entering the correct information. Whenever possible, errors will be corrected by the person who made the entry. Corrections will be initialed, dated, and, if necessary, a footnote explaining the correction will be included. The erroneous information will not be discarded. All field documentation and project records will be filed to prevent loss, damage, or alteration. Access to any archived project files or laboratory data will be controlled to maintain integrity of the documentation

4.2.1.1 Field Notebook

Daily field documentation of individual field tasks will be recorded to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. Corrections will be made as explained above. Information documented on field sampling forms need not be repeated in the field notes; however, reference must be made in the field notes to the field forms.

4.2.1.2 Field Sampling Forms

To aid in achieving complete data, field-sampling forms (e.g., COC record, sample collection form, etc.) will be used to document sampling activities.

4.2.1.3 Photographs

Photographs may be taken in the field to document sampling locations and conditions. When taken, time and date of photographs will be recorded in field notes and the photograph archived as an electronic file for future use.

4.2.2 Sample Custody

The primary objective of sample custody is to create an accurate record that can be used to trace the possession and handling of samples so their quality and integrity can be documented and maintained from collection until completion of all required analyses. Adequate documentation of sample custody will be achieved by means of the COC record initially completed by the sampler, and thereafter signed by each individual who accepts custody of the sample. A sample will be considered to be in custody under the following conditions:

- A handler has the sample in physical possession
- The handler has the sample in view
- The sample is locked or secured in a locked container or otherwise sealed so that tampering will be evident
- The sample is kept in a secured area, restricted to authorized personnel only.

Sample control and COC in the field and during transport to the laboratory will be conducted in general conformance with the procedures described below.

4.2.2.1 Field Custody Procedures

The following field custody procedures will be followed:

- As few persons as possible will handle samples
- Sample bottles will be obtained new or pre-cleaned from the laboratory performing the analyses
- The person collecting the sample will be responsible for completing the COC record and for the care and custody of collected samples until they are transferred to another person under standard COC procedures
- The LAI field representative will oversee field custody procedures during the fieldwork and in the event of non-compliance, will determine if corrective action is required.

4.2.2.2 Sample Shipment Custody Procedures

The following custody sample shipment procedures will be followed:

- The coolers in which the samples are shipped will be accompanied by the COC record identifying their contents. The original record and laboratory copy will accompany the shipment (sealed inside the shipping container). The other copy will be distributed, as appropriate, to the LAI project manager.
- If the samples are to be shipped via a commercial carrier, shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the remarks section of the COC record.

4.2.2.3 Transfer of Custody

When samples are transferred, the individual(s) relinquishing and receiving the samples will sign the COC record and document the date and time of transfer. The person who collected the sample(s) will sign the form in the first signature space. If the samples are shipped via commercial carriers, the COC records will be sealed inside the sample container before delivery and the custody signature will be from the person who receives the samples from the carrier at its final destination. Each person taking custody will evaluate the integrity of the shipping container seal and note any observations on the COC record. Project documentation of sample custody will be verified during regular review of the laboratory data package(s).

4.2.2.4 Laboratory Custody Procedures

A designated sample custodian at the laboratory will accept custody of the shipped samples and certify that the sample identification numbers match those on the COC record. The custodian will log the sample identification numbers and requested analyses in accordance with laboratory QA/QC protocols. The laboratory will maintain sample security and custody throughout the analytical process.

5.0 DATA REDUCTION, VALIDATION, AND REPORTING

Analytical reports from the laboratory for this project will be accompanied by QC results and any other necessary analytical information to enable reviewers to determine the quality of the data. The LAI quality reviewer for this project is responsible to the LAI project manager for conducting checks for internal consistency, transmittal errors, laboratory protocols, and for complete adherence to the QC elements in this SAP/QAPP. The LAI data specialist will be responsible for conducting checks for adherence to the QC elements specified in this SAP/QAPP and for performing an EPA-equivalent Level IIA validation, the components of which are listed below. Level IIA validation is performed primarily from information contained on sample result forms and sample related QC summary forms; raw data is not reviewed during this process:

- Case Narrative
- COC documentation
- Sample receipt and condition documentation
- Sample summary or equivalent
- Method summary or equivalent
- Sample results with date, units, and reporting limits
- Laboratory data qualifier definitions
- Contract Laboratory Program (CLP) equivalent forms
- Method/laboratory blank results
- Sample surrogate results
- Field QC results
- LCS/LCSD results
- MS/MSD results
- Lab duplicate results.

Data validation will be performed in accordance with applicable sections of the EPA CLP National Functional Guidelines for Organic Data Review (EPA 2014), analytical methods, LAI data validation SOPs, and this SAP/QAPP. If significant non-conformities are found, additional laboratory data may be evaluated. Corrective action, as described in Section 6.0, will be determined by the LAI project manager and may include any of the following responses:

- Rejection of the data and resampling
- Qualification of the data
- Modification of field and/or laboratory procedures.

Data qualification arising from data validation activities will be described in the reports summarizing the results of the supplemental investigation and compliance monitoring.

6.0 CORRECTIVE ACTIONS

Corrective action will be required if there are deviations from the methods or QA requirements established in this SAP/QAPP or if there are equipment or analytical malfunctions. Corrective action procedures will be implemented based on the type of unacceptable data and will be developed on a case-by-case basis. The following corrective actions may be included:

- Altering procedures in the field
- Using a different batch of sample containers
- Performing an audit of field or laboratory procedures
- Reanalyzing samples (if holding times allow)
- Resampling
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data with no action, acknowledging the level of uncertainty
- Qualification of the data
- Rejecting the data as unusable.

During field operations and sampling procedures, the field personnel will be responsible for conducting and reporting required corrective action. A description of any corrective action taken will be entered in the daily field notebook. If field conditions do not allow for conformance with this SAP/QAPP, the LAI project manager will be consulted immediately. For any corrective action or field condition resulting in a revision of this SAP/QAPP, the LAI project manager will authorize changes or exceptions to the SAP/QAPP, as necessary and appropriate.

During laboratory analysis, the laboratory QA officer will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet data quality goals outlined in this SAP/QAPP, corrective action generally will follow the guidelines in the EPA analytical methods noted in this SAP/QAPP and the EPA guidelines for data validation (EPA 1999, 2004, respectively). If analytical conditions are such that non-conformance with this SAP/QAPP is indicated, the LAI project manager will be notified as soon as possible so that any additional corrective actions can be taken.

The LAI project manager ultimately is responsible for implementation of appropriate corrective action and maintenance of a complete record of QC issues and corrective actions.

7.0 FIELD INVESTIGATION PROCEDURES

Field activities are expected to include monitoring well drilling, installation and decommissioning, soil sampling, and groundwater sampling. Procedures for sampling, sample handling, and documentation are described below.

7.1 Monitoring Wells

Existing monitoring wells SW-10 and SW-11 will be replaced by new monitoring wells SW-17 and SW-18, respectively (see Figure 4 of the RAWP). Well and boring logs for SW-10 and SW-11 are shown on Figures 1 and 2, respectively and should be referenced for consistency. The drilling subcontractor will drill and install monitoring wells under the oversight of an LAI field representative. The drilling contractor will be responsible for obtaining and submitting all well drilling permits, logs, and well identification (ID) tags as required by the State of Washington. Drilling and construction details are provided below.

7.1.1 Well Decommissioning

Wells SW-10 and SW-11 will be decommissioned according to regulation (WAC 173-160-460) prior to excavation. Wells will be decommissioned by pressure grouting or filling with bentonite chips. All piping and associated monuments can be left in place and removed during excavation.

7.1.2 Well Drilling Methods

New wells will be installed using direct-push (DP) drilling technology. DP is accomplished using a truck-mounted, track-mounted, or hand-portable DP rig. Depending on the manufacturer, make, and model, DP drill tooling is advanced by static push, pneumatic impact, or vibratory methods, or a combination thereof. In its standard configuration, DP drilling collects a continuous soil core in a 2.25-inch diameter core barrel with a removable polyethylene liner. Once the desired depth is reached, the core is extracted from the ground and the liner and soil core are removed from the core barrel.

7.1.3 Well Installation

All wells will be constructed in accordance with the state's Minimum Standards for Construction and Maintenance of Wells (WAC 173-360) or in accordance with a variance obtained from Ecology.

7.1.4 Pre-Packed Well Screens

The purpose of the well screen is to allow groundwater to easily enter the well while preventing entry of filter pack sand. Well screens will be constructed from pre-packed PVC well screens. Pre-packed screens help to assure that the sand pack is well distributed along the length of the screen, which can be difficult to achieve using DP drilling methods due the small diameter of the borehole. Well screens will be 10-ft long and factory-slotted with a slot size of 0.010 inch.

Filter pack is intended to minimize transport of fine-grained sediment into the well without restricting the flow of groundwater. The filter pack will consist of size 20-40 sand in a pre-packed screen (or equivalent). Additional equivalent sand will be poured slowly (to prevent bridging) into the annulus to approximately 1 ft above the screen as the drill casing is retracted. This 1 ft of filter pack sand above the top of the well screen will prevent migration of the overlying bentonite seal material into the screened intake zone. The volume of sand emplaced will be recorded on the well construction log.

7.1.5 Well Riser

A new, clean, flush-threaded, 2-inch-diameter PVC well riser will be installed from the top of the screen to the ground surface. The riser will be cut flat at the top. A small, V-shaped notch or other permanent mark will be made in the lip as a mark from which all future water level readings will be made. By convention, the notch will be located on the north side of the well riser pipe.

7.1.6 Well Seal

Granular bentonite will be used to construct the annular seal above the filter pack. Bentonite will be added slowly to minimize the potential for bridging.

7.1.7 Surface Completion

A concrete surface seal and well monument will constitute the surface completion. The concrete surface seal will be placed in the upper 2 ft of the boring.

Flush-mounted monuments (minimum of 6 inches in diameter) will be used. The top of the flush monument will be at least 1 inch, but not more than 2 inches above the surrounding surface grade to allow for drainage away from the well location. A concrete pad will be installed around monuments. No protective metal posts will be required.

7.1.8 Well Development

Well development will be performed 24 or more hours after well installation using the following procedures:

1. The depth to the bottom of the well shall be measured prior to beginning development.
2. Use a weighted 1.5-inch-diameter PVC or stainless steel bailer with a ceramic-ball check valve (or equivalent) to remove sand and fines from the bottom of the well casing. Carefully lower the bailer to the bottom of the well and gently raise and lower it to suspend the fines in the water column. Withdraw the bailer from the well and pour out (rinse if necessary) the fines and purged water. Repeat until no more sediment is retrieved from the bottom of the well.
3. Surge the well screen interval with the bailer or a surge block several times.
4. Pump water from the well using a centrifugal pump or airlift. Raise the pump intake incrementally to remove turbidity through the entire screened interval. Periodically record the pumping rate and the turbidity of discharged water. Continue pumping water from the well until the turbidity is significantly reduced.

5. Again, surge the well with the bailer or a surge block.
6. Measure and record the total depth of the well. Evaluate whether fines are present in the bottom of the casing.
7. Pump again and continue pumping until the well yields water with a turbidity of 10 nephelometric turbidity units (NTUs) or less, unless Ecology agrees that it is not practical to continue development to reach this criteria. If water was added to the well during drilling, a minimum of 200 percent of the volume of water added to the well must be purged during development. Record the final turbidity on the well development log.

Purge water shall be contained on-site and handled as described in Section 3.2.1.7 of the RAWP.

7.1.9 Well Construction Logs

A graphic log showing well construction details will accompany each boring log. Construction logs will include the following:

- Well location and designation
- Date completed
- Boring dimensions
- Ecology Well Tag ID Number
- Well screen and riser pipe material descriptions and lengths
- Composition and depths of filter pack materials, bentonite well seal, and surface concrete
- A description of the surface monument and protective mechanisms.

7.1.10 Well Development Logs

Well development logs will contain the following information:

- Well location and designation
- Screened interval and casing diameter
- Date and time of development
- Weather conditions
- Static water levels measured before and after development
- Total depth of well before and after development
- Volume of water in the well casing
- Descriptions of development equipment (pumps, surge blocks, hose/tubing diameter, etc.)
- Equipment calibration data
- A record showing water volumes purged from the well, purge rates, water quality parameter measurements (turbidity), and presence of fines in the bottom of the well.

7.1.11 Well Surveying

A licensed land surveying subcontractor will survey the horizontal and vertical coordinates of new monitoring well locations, as well as the vertical coordinates of existing monitoring wells. The vertical coordinates will be measured at the lip of the PVC well casing at the marked point that will be used for future groundwater measurements. Horizontal coordinates (x, y) will be measured to the nearest 0.1 ft and vertical (z) elevations will be measured to the nearest 0.01 ft. Horizontal coordinates will be measured in feet using Washington State Plane south zone coordinates referencing the North American Datum 1983. Vertical elevations will be measured referencing the North American Vertical Datum of 1988 (NAVD88).

7.2 Sampling

This section documents field procedures that will be used to collect confirmation soil samples and groundwater samples. Any variation or modification to these procedures that may become necessary will be coordinated with Ecology and documented in field records.

7.2.1 Confirmation Soil Sampling

Confirmation soil sampling will be performed during excavation. Four confirmation samples will be collected from the base of the excavation. Base samples will be collected approximately near the center of each slot. Additionally, one confirmation sample will be collected from each of the north, west, and east exterior sidewalls, and two confirmation samples will be collected from the south exterior sidewall, of the total proposed excavation. Sidewall samples will be collected at a depth corresponding to the depth of the maximum HE detection near the sample (see Figure 6 of the RAWP). Because trench boxes will block the walls of each slot, sidewall samples will be collected with the excavator bucket while the trench box is being advanced downward. The excavator bucket will be used to collect soil from below the exterior trench box wall at the selected location. Soil sample locations will be measured from fixed Site features (e.g., structures and monitoring wells) and plotted on a Site map in the field.

Confirmation soil samples will be submitted to the analytical laboratory for analysis on a standard turnaround time. Expedited turnaround times will not be employed in confirmation sample analyses as the extent of excavation will be limited by physical constraints rather than the extent of contamination. The excavation will be completed to the vertical and horizontal extents presented in the RAWP as practicable at the time of work, and open trenches will be backfilled at the completion of excavation and confirmation sampling as described in the RAWP.

7.2.2 Confirmation Soil Sampling Procedures

Discrete soil samples will be collected from the base and sidewalls of the excavated areas using decontaminated sampling utensils. Samples collected from the base of the excavation will be collected from the top 6 inches of undisturbed soil; samples collected from the excavation sidewalls

will be collected from a discrete depth corresponding to the depth of the maximum HE detection near the sample. The total depth of the excavation is anticipated to be 10 to 15 ft deep; therefore, to adequately protect workers, soil samples will be collected from the base and sidewalls of the excavation using the excavator bucket. Samples will be taken from a location within the bucket that is most representative of intact (least disturbed) soil and where soil is not in contact with the walls of the bucket.

Each soil sample will be placed directly into a clean laboratory-provided sample container and stored in a cooler with ice until delivery to the analytical laboratory. The location and soil conditions for each sample will be recorded on field notes. All sampling equipment will be cleaned in accordance with the decontamination procedures outlined in Section 7.3.2. Soil samples may be collected from depths below the groundwater table using the excavator bucket. One blind field duplicate soil sample will be collected during excavation.

Soil data is screened using the current MTCA Method B groundwater CUL for applicable constituents. The primary constituent of concern at the Site is HE. Confirmation soil samples will be analyzed for organochlorine pesticides by EPA Method 8081B at TA.

7.2.2.1 Stockpile Sampling

Clean soil will be stockpiled on site for use as backfill. Stockpiled soil will include imported clean fill and excavated soil that is expected to be clean. The contractor is required to obtain confirmation of the non-contaminated nature of imported clean fill from the supplier, including laboratory results from three discrete samples of the imported fill material, as specified in Section 3.3 of Appendix A. Additionally, the Owner's representative will confirm the non-contaminated nature of imported clean fill by collecting two, six-point composite soil samples from the imported clean fill stockpile to be analyzed for pesticides using EPA Method 8081B. Soil originating from the following sources and/or sites will not be acceptable (Ecology 2016b):

a. Sites undergoing an environmental cleanup

b. Agricultural sites where soils contain pesticides, herbicides or metals.

c. Industrial and/or commercial sites where hazardous materials were used, handled or stored.

d. Sites where petroleum hydrocarbons could have spilled or leaked into the soil.

e. Street sweepings.

f. Commercial sites including former gasoline service stations.

g. Retail areas that contained dry cleaning facilities or photographic processing facilities, paint stores, auto repair and/or painting facilities.

h. Agricultural supply stores.

i. Industrial facilities including metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, or other similar facilities.

j. Soil from a thermal desorption remediation or treatment process.

k. Soil from a biological remediation or treatment process.

To confirm the non-contaminated nature of excavated soil that is expected to be clean, two, six-point composite soil samples collected from the excavated clean soil stockpile will be analyzed for pesticides using EPA Method 8081B on an expedited (72-hour) turnaround time. If contaminants of concern are detected above applicable CULs in the excavated clean soil stockpile sample, the excavated clean soil stockpile will be handled and disposed of in the same manner as contaminated soil, and additional clean backfill material will be imported to compensate for the lost volume. If the soil sample does not exceed applicable CULs, the excavated clean soil stockpile will be used to backfill the excavation. Laboratory results will be provided in the Cleanup Action Completion Report.

7.2.2.2 Wastewater Sampling

Wastewater will be sampled for waste disposal profiling. Wastewater samples will be analyzed for pesticides by EPA Method 8081B and metals by Resource Conservation and Recovery Act (RCRA) 8 metals with mercury on an expedited (72-hour) turnaround time.

7.2.2.3 Groundwater Monitoring

The existing Site groundwater monitoring well network includes nine wells. Of the nine wells, six (SW-9, SW-14, SW-15, SW-16, SW-17 and SW-18) will be sampled as part of a long-term groundwater quality monitoring program for pesticides. Groundwater quality samples are collected using a peristaltic pump with dedicated tubing stationed at each well. Field parameters are collected while the well is being purged using a YSI multi-parameter probe. Purge water from sampling is collected in a 5-gallon bucket and is transported to and contained in onsite drums provided by Washington State Department of Natural Resources.

Groundwater data are screened using the current MTCA Method B groundwater CUL for applicable constituents. The primary constituent of concern at the Site is HE. Groundwater samples will be analyzed for organochlorine pesticides by EPA Method 8081B LL in order to achieve reporting limits at the HE CUL of 0.0048 µg/L. It is anticipated that groundwater monitoring samples will be analyzed by ARI in order to achieve the desired reporting limits.

7.2.3 Sampling Designation and Labeling

7.2.3.1 Groundwater Sample Designation

Each groundwater sample collected during groundwater monitoring will be identified by a unique sample designation, which will include the well name followed by the date of collection. For example, sample designation SW17-20170607 identifies a groundwater sample collected from well SW-17 on June 7, 2017.

7.2.3.2 Soil Sample Designations

Each confirmation soil sample will be identified by a unique sample designation. The sample designation will be included on the soil sample container and on the corresponding sample collection form. The designation system will include the sequential sample number of each sidewall or base sample and spatial information about the sample, as described below.

Excavation sidewall sample SW1-N-6, where:

- "SW" indicates sample was collected from the excavation sidewall
- "1" is the sequential sidewall sample number
- "N" indicates compass direction of the excavation sidewall
- "6" is the approximate depth in feet below original grade.

Thus, sample SW1-N-6 identifies the first sidewall sample and indicates the sample was collected from the north sidewall at a depth of approximately 6 ft below the original grade.

Excavation base sample B1-A-10.5, where:

- "B" indicates sample was collected from the excavation base
- "1" is the sequential base sample number
- "A" is the slot identifier or location
- "10.5" is the approximate depth in feet below original grade.

Thus, sample B1-A-10.5 identifies the first base sample and indicates the sample was collected from Slot A (or location A) at a depth of approximately 10.5 ft below the original grade.

7.2.3.3 Sample Container Labels

Each sample container will be labeled and sealed immediately after the sample is placed in the container. Sample container labels will be filled out using waterproof ink and will be firmly affixed to the sample containers. The sample container label will contain the following information:

- Soil Sample Designation
- Project name
- Date and time of collection
- Name of sampler(s)

- Preservation (if applicable).

Additional identifiers may be added, as necessary, based on the specific sampling activity. Actual sample locations and other identification information will be recorded in the field notes and on appropriate sample collection forms. Field QC samples (blind duplicates) will be coded as individual samples and identified in the field notes and on sample collection forms.

7.3 Decontamination Procedures

Decontamination procedures are designed to remove trace-level contaminants from sampling equipment and prevent cross-contamination between samples. Sampling equipment will be decontaminated before collecting each sample to avoid cross-contamination. Decontaminated sampling equipment will be handled in a manner that minimizes contact with potentially contaminated surfaces. Nitrile gloves will be worn when handling soil and groundwater samples. New disposable gloves will be used for collection of each sample.

7.3.1 Heavy Equipment

Before leaving the site, heavy equipment will be decontaminated until visually clean using dry methods (e.g., broom) on areas in contact with contaminated soil. If water is necessary for decontamination of large equipment, clean potable water will be used. This decontamination will be performed over a containment area (e.g., bermed area covered with plastic sheeting). Decontamination materials will be contained and managed along with investigation-derived wastes (RAWP Section 3.2.1.7).

7.3.2 Sampling Equipment

Decontamination procedures for sampling equipment will be used to minimize the possibility of cross-contamination. Sampling equipment that comes in contact with potentially contaminated material will be decontaminated before and after each use. Decontamination of sampling equipment will consist of the following steps and will be documented on the sample collection form:

1. Initial tap water rinse to remove large soil particles, if applicable
2. Alconox® and tap water wash
3. Tap water rinse
4. Deionized or distilled water rinse.

7.3.3 Personnel

Personnel decontamination procedures depend on the level of protection specified for a given activity. The HASP (Appendix B of the RAWP) identifies the appropriate level of protection for each type of fieldwork involved in the project, as well as appropriate decontamination procedures.

DRJ/TJS/EFW/jrc
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Figure 1
SW-10 Well Log

TETRA TECH

GEOLOGIC LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

CLIENT DNR
SITE Webster Nursery
LOCATION SW-10

Contractor Cascade Drilling
Ground Surface Elevation 8/1/96
Rig Type CME-55/HSA
Bit Diameter 9" OD, 4" ID
Hole Diameter 9"
Logged By B. Carpenter

PID Record (ppm)	Blow Count per 6-in Sampling Interval (ft) ___/___/___	Depth (feet)	Geology (USCS)	Geologic Log
		0		
ND	5/5/6	5	SM	Brown, loose, poorly graded silty SAND, grading to gray, medium SAND to gray-brown silty SAND, dry
		10	SP/SM	Water @ – 10.5'
ND	4/5/8			Gray-brown, loose, poorly graded medium SAND, dry, grading to gray-brown silty-SAND, wet
ND	8/10/7	15	SP/ML	Gray-brown, loose, poorly graded, medium SAND, grading to gray-brown, medium stiff, poorly graded sandy SILT, wet (2" lense of sandy SILT in sand)
				Total Depth - 16.5 feet
		20		

AS BUILT

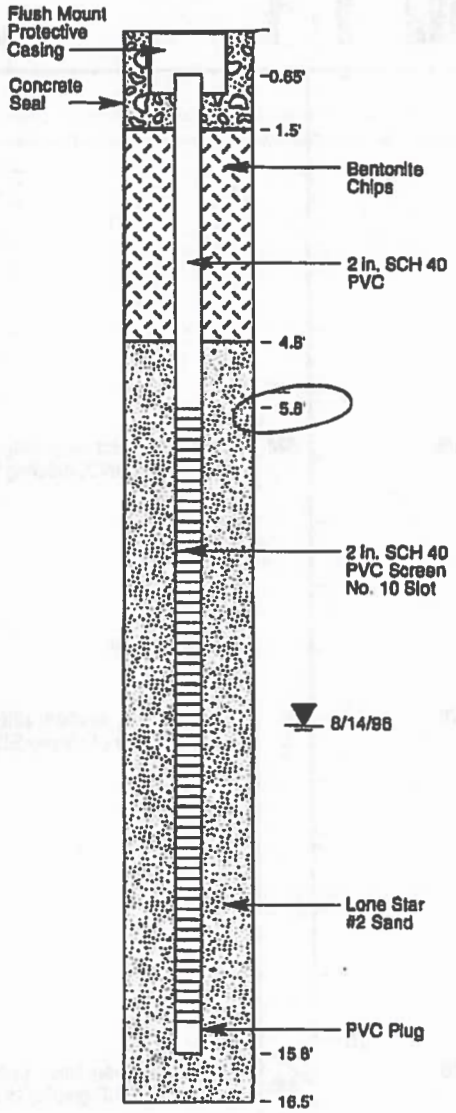

Figure 2
SW-11 Well Log

TETRA TECH

GEOLOGIC LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

CLIENT DNR
SITE Webster Nursery
LOCATION SW-11

Contractor Cascade Drilling
Ground Surface Elevation 8/1/96
Rig Type CME-55/HSA
Bit Diameter 9" OD, 4" ID
Hole Diameter 9"
Logged By B. Carpenter

PID Record (ppm)	Blow Count per 6-in Sampling Interval (ft) ___/___/___	Depth (feet)	Geology (USCS)	Geologic Log
		0		
		5		
ND	5/4/5		SM	Red-brown, loose, poorly graded silty SAND grading to gray silty SAND, grading to brown silty SAND, moist
				Water @ ~ 9'
ND	4/5/9	10	ML	Gray-brown, medium stiff, poorly graded, sandy SILT with 3" lense of clayey SILT, wet
		15	SM / ML	
ND	3/4/5			Gray-brown, very loose, poorly graded silty SAND grading to soft clayey SILT, grading to sandy SILT with trace clay, wet
				Total Depth - 16.5 feet
		20		

AS BUILT

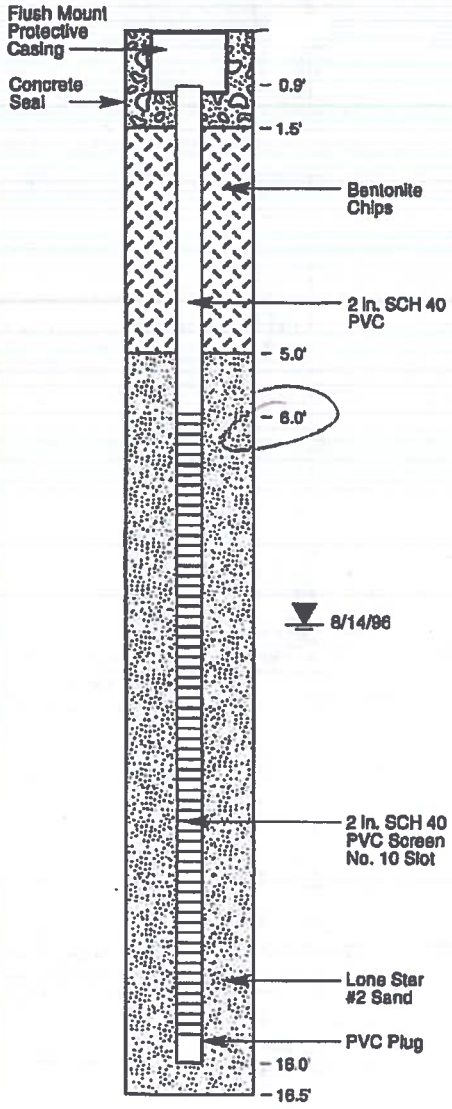

Table C-1
Measurement Quality Objectives
Sampling and Analysis Plan/Quality Assurance Project Plan
Webster Nursery
Tumwater, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Groundwater Samples Analyzed for Organochlorine Pesticides by EPA Method 8081B Low Level (ARI)			
Representativeness	Cooler Temperature	< 6°C	S
Bias	Surrogates	Recoveries within laboratory-specified control limits	A
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <25%	S&A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	95%	S
Soil Samples Analyzed for Organochlorine Pesticides by EPA Method 8081B (TA)			
Representativeness	Cooler Temperature	< 6°C	S
Bias	Surrogates	Recoveries within laboratory-specified control limits	A
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Method performance for matrix, bias	MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	Field Duplicates	RPD <40%	S&A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	95%	S

Abbreviations/Acronyms:

A = analytical
ARI = Analytical Resources, Incorporated in Tukwila, WA
°C = degrees Celsius
DQI = data quality indicator
EPA = US Environmental Protection Agency
LCS = laboratory control spike
LCSD = laboratory control spike duplicate
MQO = measurement quality objective
MS = matrix spike
MSD = matrix spike duplicate
QC = quality control
RL = reporting limit
RPD = relative percent difference
S = sampling
TA = TestAmerica Laboratories, Inc. located in Tacoma, WA

Table C-2
Sample Containers, Preservatives, and Holding Times
Sampling and Analysis Plan/Quality Assurance Project Plan
Webster Nursery
Tumwater, Washington

Matrix	Method	Container	Preservative	Holding Time (a)	Minimum Mass/Volume	Laboratory Performing Analyses
Groundwater	Pesticides by EPA 8081B LL	1-L amber glass	<6°C, $Na_2S_2O_3$	7 days/40 days	1 L	ARI
Soil	Pesticides by EPA 8081B	4-oz glass jar with Teflon lid	<6°C	14 days/40 days	40 g	TA-Tacoma

Note:
(a) Time from sample collection to extraction/Time from sample extraction to analysis.

Acronyms/Abbreviations:
ALS = ALS Environmental laboratory
°C = degrees Celsius
EPA = United States Environmental Protection Agency
g = grams
L = liter
LL = low level
oz = ounces
TA = TestAmerica Laboratories, Inc.

Table C-3
Reporting Limit Goals
Sampling and Analysis Plan/Quality Assurance Project Plan
Webster Nursery
Tumwater, Washington

Analyte	CAS RN	Groundwater		Soil		
		CUL (µg/L)	RL (a) (µg/L)	CUL (µg/kg)		RL (b) (µg/kg)
				Vadose	Saturated	
4,4'-DDD	72-54-8	--	0.00125	--	--	1.00
4,4'-DDE	72-55-9	--	0.00125	--	--	1.00
4,4'-DDT	50-29-3	--	0.001	--	--	1.00
Aldrin	309-00-2	--	0.000625	--	--	0.50
alpha-BHC	319-84-6	--	0.000625	--	--	0.50
alpha-Chlordane	5103-71-9	--	0.000625	--	--	0.50
beta-BHC	319-85-7	--	0.000625	--	--	1.00
beta-Chlordane	5566-34-7	--	0.000625	--	--	0.50
Chlordane	57-74-9	0.25	0.200	2,060	103	5.00
delta-BHC	319-86-8	--	0.000625	--	--	0.50
Dieldrin	60-57-1	--	0.00125	--	--	1.00
Endosulfan I	959-98-8	--	0.000625	--	--	0.50
Endosulfan II	33213-65-9	--	0.00125	--	--	1.00
Endosulfan Sulfate	1031-07-8	--	0.00125	--	--	1.00
Endrin	72-20-8	--	0.00125	--	--	1.00
Endrin Aldehyde	7421-93-4	--	0.00125	--	--	1.00
Endrin Ketone	53494-70-5	--	0.00125	--	--	1.00
gamma-BHC (Lindane)	58-89-9	--	0.000625	--	--	0.50
Heptachlor	76-44-8	0.0194	0.000625	37.8	1.9	1.00
Heptachlor Epoxide	1024-57-3	0.00481	0.000625	80.2	4.02	0.50
Methoxychlor	72-43-5	--	0.00625	--	--	5.00
Toxaphene	8001-35-2	--	0.125	--	--	50.0

Notes:

1. CULs are based on MTCA Method B cleanup levels.

(a) Groundwater samples are anticipated to be analyzed by ARI using EPA Method 8081B LL.
(b) Soil samples will be analyzed by TA using EPA Method 8081B.

Acronyms/Abbreviations:

-- = CUL is not applicable
ARI = Analytical Resources, Incorporated in Tukwila, WA
CUL = MTCA Method B cleanup Level
EPA = US Environmental Protection Agency
LL = low-level
µg/kg = micrograms per kilogram
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
RL = reporting limit
TA = TestAmerica Laboratories, Inc. located in Tacoma, WA

APPENDIX D

Temporary Erosion and Sediment Control and Stormwater Management Plan

Temporary Erosion and Sediment Control and Stormwater Management Plan
Webster Nursery
Tumwater, Washington

October 31, 2017

Prepared for

Washington State Department of Natural Resources
Olympia, Washington

LANDAU ASSOCIATES

2107 South C Street
Tacoma, WA 98402
(253) 926-2493

Temporary Erosion and Sediment Control and Stormwater Management Plan
Webster Nursery
Tumwater, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: _____

Toni Smith, Senior Project Hydrogeologist/Project Manager

Document reviewed by: _____

Eric Weber, Principal Hydrogeologist

Date:	October 31, 2017
Project No.:	0774006.020.024
File path:	Y:\774\006\R\RAWP\RAWP_Final_Oct2017\Final\Appendices\App D\sig page.docx
Project Coordinator:	Juliann Cooley

LANDAU ASSOCIATES

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INTRODUCTION

This Temporary Erosion and Sediment Control (TESC) and Stormwater Management Plan (SWMP) has been prepared in conjunction with and is appended to the Remedial Action Work Plan (RAWP), which describes remedial actions that will be completed at the Webster Nursery site (Site) located south of Tumwater, Washington. The remedial action construction activities will include the excavation of approximately 221 cubic yards of soil contaminated with low levels of pesticides originating from a historical underground storage tank. A site description and background summary are provided in the RAWP.

The purpose of this TESC and SWMP is to outline the planned cleanup action and the TESC and stormwater control measures that will be implemented during the proposed construction and remedial actions at the Site. The objectives of this TESC and SWMP plan are to identify the Best Management Practices (BMP) that will be implemented to prevent stormwater contamination and water pollution from construction activity. The estimated timeframe for the construction and excavation activities is approximately 2 weeks.

Landau Associates, Inc. (LAI) personnel will be responsible for providing oversight during the remedial action construction activities and LAI personnel will be designated as the TESC Supervisor for the project. The TESC Supervisor will be responsible for inspecting TESC measures and ensuring that the implemented BMPs are effective in preventing sediment runoff from the work area. Sierra Mott will act as a TESC Supervisor on behalf of LAI. The Contractor will appoint a Certified Erosion and Sediment Control Lead for this project.

BEST MANAGEMENT PRACTICES

TESC and stormwater management BMPs will be implemented during the proposed cleanup activities to minimize erosion, manage stormwater, prevent sediment runoff, and minimize disturbances to the Site and surrounding areas. Project-specific TESC and stormwater management BMPs include the following:

- The extent and duration of the exposed excavation area will be minimized to the extent practical (approximately 2-4 weeks) and will be performed during a period of little rain to the maximum extent practicable.
- Disturbance to unpaved areas will be avoided to the extent practicable during construction.
- Site access points shall be limited to minimize the tracking of sediment onto public roads. Vehicles will travel slowly across unpaved surfaces to minimize disturbance and control dust.
- If needed to prevent tracking of sediment to offsite roads, filter fabric will be used to line the access/loading area and truck wheels may cleaned by brushing or sweeping prior to exiting Washington State Department of Natural Resources (DNR) property. Visible sediment that is tracked onto pavement shall be removed by dry methods (shoveling or broom sweeping), and collected sediment shall be managed as contaminated soil. Road cleaning shall not be accomplished by wet methods (hosing or rinsing).

- In order to protect the properties adjacent to the Site, stormwater discharges from the Site will be controlled. A downspout located at the southeast corner of the warehouse building will be diverted to approximately 50 ft from the limits of the excavation on DNR property to decrease the likelihood of stormwater entering the excavation area.
- Exposed soil will be stabilized using the following BMPs to prevent erosion:
  - Excavated trenches shall be stabilized by backfilling with controlled density fill to grade as promptly as possible.
  - Stockpiled soil will be temporarily placed on and covered with plastic sheeting.
  - In the event of heavy wind, exposed soil will be wetted slightly to prevent disturbance.
  - Waste material shall be handled and disposed of in a manner that does not cause stormwater contamination, including covering stockpiles and soil loads. The work area will be kept clean, organized, and free of debris.
  - TESC BMPs including barriers, berms, silt fencing and/or straw wattles will be inspected visually at the end of each working day and within 24 hours of a storm event. BMPs shall be maintained and replaced or repaired as needed to assure continued performance during construction.
  - TESC BMPs shall be removed after the completion of excavation and restoration activities or after the temporary BMPs are no longer needed. Soil disturbed by removal of BMPs or vegetation shall be stabilized. The excavation area and surrounding soil will be covered with gravel or seed mix. Straw cover may be applied to protect seeded surfaces until vegetation cover is established.

In conjunction with the above project-specific BMPs, it is anticipated that the following BMPs adapted from the Stormwater Management Manual[1] may be relevant to the proposed construction:

- BMP C103 High Visibility Fence (minimize disturbance, limit Site access, protect exposed areas)
- BMP C105 Stabilized Construction Entrance/Exit
- BMP C120 Temporary and Permanent Seeding
- BMP C123 Plastic Covering
- BMP C140 Dust Control
- BMP C150 Materials on Hand
- BMP C151 Concrete Handling
- BMP C153 Material Delivery, Storage and Containment
- BMP C154 Concrete Washout Area
- BMP C233 Silt Fence

[1] Ecology. 2012. 2012 Stormwater Management Manual for Western Washington as Amended in December 2014. Olympia, WA: Washington State Department of Ecology.

PROJECT SCHEDULE

The proposed cleanup action is planned for 2018 according to the following anticipated schedule:

Activity	Anticipated Schedule
Contractor mobilization; installation of TESC BMPs; delineation of work area	September 2018
Diversion of warehouse downspout	Same day as excavation contractor mobilization
Completed of excavation	3 weeks following contractor mobilization
Removal of TESC BMPs	Within 24 hours of excavation completion
Site restoration including seeding	Within 48 hours of excavation completion
Final inspection	Within 24 hours of site restoration

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APPENDIX E

Unanticipated Discovery Plan

Unanticipated Discovery Plan
Webster Nursery
9805 Blomberg Street SW
Tumwater, Washington

October 31, 2017

Prepared for

Washington State Department of Natural Resources
Olympia, Washington

LANDAU ASSOCIATES

2107 South C Street
Tacoma, WA 98402
(253) 926-2493

Unanticipated Discovery Plan
Webster Nursery
9805 Blomberg Street SW
Tumwater, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: _____

Toni Smith, Senior Project Hydrogeologist/Project Manager

Document reviewed by: _____

Eric Weber, Principal Hydrogeologist

Date:	October 31, 2017
Project No.:	0774006.020.024
File path:	Y:\774\006\R\RAWP\RAWP_Final_Oct2017\Final\Appendices\App E\sig page.docx
Project Coordinator:	Juliann Cooley

LANDAU ASSOCIATES

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INTRODUCTION

This Unanticipated Discovery Plan (UDP) outlines procedures to follow, in accordance with state and federal laws, in the instance that archaeological materials or human remains are unexpectedly discovered. This UDP is a supplement to the Remedial Action Work Plan (RAWP) prepared for the Webster Nursery site (Site) located at 9805 Blomberg Street SW, south of Tumwater, Washington in Thurston County. The RAWP details the Site background and proposed cleanup, which consists of the excavation and disposal of approximately 113 cubic yards of soil contaminated with heptachlor epoxide.

This UDP presents procedures for the unanticipated discovery of human remains or archaeological features during completion of the cleanup, in accordance with state and federal law. No known architecturally or archaeologically significant features are known to exist at the Site. Site personnel will be familiar with this UDP, and will be available and able to implement this plan when soil-disturbing work is planned.

IDENTIFICATION AND DISCOVERY OF ARCHAEOLOGICAL RESOURCES

A cultural resource discovery could be a prehistoric- or historic-period resource, including but not limited to:

- Accumulation of shell, burned rocks, or other food-related materials
- An area of charcoal or very dark stained soil with artifacts
- Stone tools or waste flakes (i.e., an arrowhead or stone chips)
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years
- Buried railroad tracks, decking, or other industrial materials.

When in doubt, assume the material is a cultural resource.

Procedure for Discovery of Archaeological Materials

If suspected cultural resources are encountered at the Site, the following procedure will be followed:

1. Work adjacent to the discovery must stop. The discovery location should be secured and field personnel should notify the Landau Associates, Inc. (LAI) project manager, who will notify the Washington State Department of Natural Resources (DNR) project manager.
2. The DNR project manager shall contact a qualified professional archaeologist. The archaeologist must examine the find to determine whether it is archaeological.
3. If the find is determined not to be archaeological, work may proceed.
4. If the find is determined to be archaeological, the DNR project manager will contact Washington State Department of Ecology Department of Archaeology and Historical Preservation (DAHP), and the Nisqually Tribe (contact information is presented in Contact List Section at the end of this report), and will invite each to attend an on-site inspection with a qualified archaeologist.
5. The archaeologist will document the find in a report for DAHP. The report would be referenced in the cleanup action completion report.

INADVERTANT DISCOVERY OF HUMAN REMAINS

If human remains, including bones and bone fragments, are found at the Site, work will immediately stop at the Site. If human remains are encountered, care will be taken to treat them with dignity and respect at all time. The remains will be covered with a tarp or other materials (not soil or rocks) for temporary protection from the elements or photographs.

Procedure for Discovery of Human Remains

If human remains are encountered at the Site, the following procedure will be followed:

1. Site personnel will notify the LAI project manager.
2. The LAI project manager will notify DNR, the City of Tumwater Police Department, and the Coroner's Office (contact information is presented in Contact List Section at the end of this report). The police department and the coroner have jurisdiction if the remains are found to be human and forensic.
3. If the Coroner and police find the remains to be human yet non-forensic, DAHP and the Nisqually Tribe will be notified and will have jurisdiction.
4. Documentation of any human remains will be completed per State and Federal laws including Revised Code of Washington (RCW) 27.53.030, RCW 68.50, and RCW 68.60.
5. When consultation on and documentation is complete, construction in the discovery area may resume.

CONTACT LIST FOR UNANTICIPATED DISCOVERY PLAN

Eric Weber, Project Manager Landau Associates, Inc. 950 Pacific Avenue, Suite 515 Tacoma, Washington 98402 Office: 253-926-2493 Mobile: 208-275-9785	John Felder, Project Manager Washington State Department of Natural Resources PO Box 47030 Olympia, Washington 98504-7030 Office: 360-902-1158 Mobile: 360-870-5848
Steve Teel, Toxics Cleanup Program Washington State Department of Ecology – Southwest Regional Office PO Box 47775 Olympia, Washington 98503 Phone: 360-407-6247	Allyson Brooks, State Historic Preservation Officer Washington Department of Archaeology & Historic Preservation PO Box 48343 Olympia, Washington 98504-8384 Phone: 360-432-3850
Jackie Wall, Tribal Historic Preservation Officer Nisqually Indian Tribe 4820 She-Nah-Num Drive SE Olympia, Washington 98513 Phone: 360-456-5221 ext. 2180	Gary Warnock, Coroner Thurston County Coroner's Office 2925 37th Avenue SW Tumwater, Washington 98512 Phone: 360-867-2140
Tumwater Police Department 555 Israel Road SW Tumwater, Washington 98501 Non-Emergency Phone: 360-754-4200	

TJS/EFW/jrc
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APPENDIX F

Contained-In Determination Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call (877) 833-8641

April 13, 2017

Mr. John Felder
Department of Natural Resources
P.O. Box 47030
Olympia, WA 98504-7030

Re: Contained-Out Determination for Contaminated Soils from Webster Nursery in Tumwater, Washington (Ecology Cleanup Site Identification No. 3380)

Reference: Email from Toni Smith, Landau Associates, Inc., to Charles Hoffman, dated January 17, 2017

Report from Eric Weber, Landau Associates, Inc., to Ava Edmonson, dated April 22, 2016

Email from Toni Smith, Landau Associates, Inc., to Charles Hoffman, dated October 11, 2016

Dear Mr. Felder:

The Washington State Department of Ecology (Ecology) received a request from your consultant, Landau Associates, Inc., for a contained-out determination for approximately 145 cubic yards of soil to be excavated at the Webster Nursery located in Tumwater, Washington. Landau Associates, Inc., submitted analytical data and supplemental information to determine if the soils are contaminated with listed dangerous waste constituents (identified in the report as D020 and D031) are exempt from management as dangerous wastes according to the "Contained-In Policy"[1].

Based on review of the provided information, Ecology's determination follows:

Ecology understands that approximately 145 cubic yards of U036 and P059 listed waste contaminated soils subject to the contained-out request do not designate under federal characteristics (WAC 173-303-090) or state-only criteria (WAC 173-303-100). Ecology will not require disposal of these soils as listed dangerous wastes at a RCRA permitted dangerous waste treatment, storage, and disposal (TSD) facility, provided that all of the following conditions are implemented.

[1]Washington State Department of Ecology Contained-In Policy, February 19, 1993

You or your consultant, Landau Associates, Inc., shall:

- Ensure that no standing water is present within each container holding the contaminated soils. All water must be removed to the maximum extent possible from each container and managed as U036 and P059 dangerous waste or as otherwise allowed under Chapter 173-303 WAC;
- Directly deliver the soils to a solid waste landfill permitted under WAC 173-351 in the state of Washington. If you plan to deliver the contaminated soils to a landfill outside Washington State, you must submit to Ecology written approval for the contaminated soil disposal from the receiving State hazardous waste program and the out-of-state landfill, before the soils are delivered to the out-of-state landfill. Do not consolidate these contaminated soils with other solids that do not pertain to this contained-out determination. No off-loading of the contaminated soils is allowed between the cleanup site and the permitted solid waste landfill;
- Dispose of the contaminated soils at a permitted solid waste landfill by December 31, 2017, or within 90 days of excavation, whichever comes first. This contained-out determination letter is no longer valid after December 31, 2017, and the contaminated soils must be managed as dangerous wastes after this date;
- Notify Ecology before disposal of the soil if the amount exceeds the amount approved by this letter. Ecology needs assurance that additional soil qualifies for this contained-out determination;
- Provide copies of all signed solid waste landfill receipts or a certificate of disposal issued by the receiving landfill for these contaminated soils to Ecology, attention of Charles Hoffman, within 15 days or your receipt. This is an important verification step for you and your consultation for this Ecology decision to be valid;
- Take measures to prevent unauthorized contact with the soils at all times;
- Plastic line the delivery truck (or roll of boxes) and cover all loads if delivered by truck;
- During transport, take adequate measure to prevent spill and dispersion due to wind erosion;
- Provide instructions to the landfill operator that these soils are not to be used for daily, intermediate, or final cover;
- Provide copies of all soil analytical data to the landfill operator upon request, and
- Do not send these contaminated soils to any incinerator, thermal desorption unit, or recycling facility unless that facility is a RCRA subtitle C permitted dangerous waste TSD facility.

Ecology issued this determination based on the information provided and reviewed to date. This written decision only applies to the approximately 145 cubic yards of soil described in the April 22, 2016, report by Landau Associates Inc. and the January 17, 2017, email message from

Landau Associates Inc., and does not apply to any other area or other media. Any data used for this contained-out determination is intended for use in determining the proper disposal of the soils according to the Washington State Dangerous Waste Regulation, Chapter 132-303 WAC, and Ecology's Contained-in Policy.

This letter is not an Ecology approval for dangerous waste designation process or disposal of soils that may be generated in the future or already excavated.

This letter is not a No Further Action (NFA) letter and not a written approval for any cleanup action plan. Instead, this letter only address the procedures for disposal of contaminated soils according to the Washington State Dangerous Waste Regulation (Chapter 173-303 WAC). Regulatory decisions regarding the cleanup action, applicable soil and groundwater cleanup level, and any other cleanup issues must comply with the requirements under Model Toxics Control Act (Chapter 173-340 WAC).

Local agencies may have the authority to impose additional requirements on this waste stream.

If you fail to comply with the terms of this letter, Ecology may issue an administrative order and/or penalty as provided by the Revised Code of Washington, Sections 70.105.080 and/or .095 (Hazardous Waste Management Act).

Please contact me at (360) 407-6344 or chof461@ecy.wa.gov if I can answer any questions or provided additional information.

Sincerely,

Charles P. Hoffman

Charles P. Hoffman, P.E.
Environmental Engineer
Hazardous Waste and Toxics Reduction Program
Southwest Regional Office

cc: Toni Smith, Landau Associates, Inc.
Gerald Tousley, Thurston County Health Department
Steve Teel, Ecology/SWRO