DEPARTMENT OF ECOLOGY
State of Washington

2016 Draft Cleanup Action Plan
WA DNR Webster Nursery Site
CS ID# 3380
Tumwater, Washington

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LIST OF ABBREVIATIONS AND ACRONYMS

AO	Agreed Order
bgs	below ground surface
CAO	Cleanup Action Objectives
CAP	cleanup action plan
CUL	cleanup level
cy	cubic yard
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
FS	Feasibility Study
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
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act of 1976
RCW	Revised Code of Washington
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SEPA	State Environmental Protection Agency
UST	underground storage tank
WAC	Washington Administrative Code

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1.0 INTRODUCTION

This Cleanup Action Plan (CAP) describes the conceptual design of the recommended cleanup alternative identified in the 2016 Feasibility Study (FS; LAI 2016) for implementation at the Washington State Department of Natural Resources' (DNR) Webster Nursery site (Site; Site ID 3380). The Site is an operating nursery that includes a former pesticide storage warehouse located at 9805 Blomberg Street Southwest in Tumwater, Washington. Soil and groundwater at the Site are affected by a historical release of organochlorine pesticides from an underground storage tank (UST). Heptachlor epoxide (HE) is the primary constituent of concern detected above applicable cleanup levels (CULs) in groundwater at the Site. The Site location and vicinity map is shown on Figure 1.

Contamination of soil and groundwater was identified at the Site in 1996. On June 30, 1999, DNR completed a Remedial Investigation/Feasibility Study (RI/FS) under an initial Agreed Order (AO; No. DE 98TC-S175, effective October 1998) with the Washington State Department of Ecology (Ecology). The 1999 RI/FS documented Site investigations and evaluated cleanup options for the Site. In October 2001, Ecology presented a CAP based on conclusions of the 1999 RI/FS (Ecology 2001). Subsequently, DNR undertook a cleanup action at the Site under AO No. DE 00 TCPSR-295, signed into effect January 8, 2001 (Ecology 2001).

Per the 2001 CAP, a component of the selected cleanup action is monitored natural attenuation, which requires monitoring of pesticide concentrations in groundwater. According to the CAP, the long-term timeframe for the Site remedy is 5 to 10 years. However, groundwater concentrations of HE above the Model Toxics Control Act (MTCA) Method B groundwater CUL have been observed for more than 10 years. The persistence of HE concentrations in groundwater has caused Ecology to question the presence of residual pesticide contamination in soil (Ecology 2014a).

Recent Site investigations characterized the extent of residual soil contamination and determined that HE concentrations are present in soil on site to the south and east of the release area, at depths near the water table (LAI 2014a). A recent FS recommended excavation and disposal as the preferred alternative for expediting cleanup at the Site (LAI 2016). Preliminary results of the FS were discussed with Ecology at a meeting with DNR and LAI (consultant to DNR) on June 17, 2015.

The CAP follows substantive requirements under MTCA, as codified in state regulation (Revised Code of Washington [RCW] 70.105D, Washington Administrative Code [WAC] 173-340-380). This report assumes the reader is generally familiar with the Site history, results of previous investigations, and current Site conditions. For further detail, the reader is referred to the 2016 Feasibility Study (LAI 2016), and other site documents referenced therein.

1.1 Site Background

In 1978, a concrete underground storage tank (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 Site CAP, approximately 70 cubic yards (cy) of contaminated soil was removed for disposal. The excavation depth was approximately 7 feet (ft) below ground surface (bgs). Field screening during excavation indicated soil contamination was left in place. The location of the excavation area is shown on Figure 2.

In August 1996, four shallow groundwater monitoring wells (SW-9, SW-10, SW-11, and SW-12) were installed around the excavation area to characterize groundwater as part of the long-term groundwater monitoring plan. From January 2010 until February 2014, groundwater sampling and water level monitoring were conducted by DNR staff. In February 2014, LAI performed sampling and water level monitoring under contract to DNR staff. Monitoring activities were not completed in 2015 due to budget constraints. Recent and historical groundwater quality analytical results were summarized in semiannual reports (LAI 2014b,c).

In April 1999, six shallow (i.e., 12.5 ft deep) soil borings (SB05 through SB10) were drilled around the excavation area to characterize residual pesticide contamination in soil (Tetra Tech 1999). Additional soil borings were completed by LAI in 2014 (LAI-B11 and LAI-B12; LAI 2014a) and 2015 (LAI-B13 through LAI-B19; Section 1.2.1 of present document). Soil boring locations are shown on Figure 2.

HE (daughter product of heptachlor[1]) is the primary constituent of concern at the Site. Groundwater HE exceeds the MTCA Method B groundwater CUL (0.0048 micrograms per liter [µg/L]) at two monitoring wells, SW-10 and SW-11, located approximately 5 ft from the excavation area margin to the south and east, respectively (LAI 2014b,c). Soil investigations in 1999 and 2014 identified HE in soil beneath and southeast of the excavation area, with the highest concentrations occurring between about 4 and 10 ft bgs (Tetra Tech 1999; LAI 2014a, 2015a). This depth interval corresponds with the seasonal range in groundwater elevations (LAI 2014a,c). In addition, soil HE detections are above the current[2] MTCA Method B soil CUL for protection of groundwater in the saturated zones (4.02 micrograms per kilogram [µg/kg]). The presence of HE in soil appears to correspond with groundwater contamination (LAI 2014a, 2015a).

[1] Soil investigations at the Site have only detected heptachlor in soil below the center of the excavation area in boring SB10, between 6.5 and 10.5 ft bgs. Concentrations were below the MTCA Method B soil CUL (Tetra Tech 1999).
[2] Current as of March 2016.

Alpha- and gamma-chlordane have also been detected at the Site. Most recent groundwater sampling results indicate that total chlordane (the sum of alpha- and gamma-chlordane) come close to, but do not exceed, the CUL (0.25 µg/L). Although concentrations of total chlordane were detected in soil during the 1999 subsurface investigation (pre-excavation), concentrations detected in 2014 were well below the saturated zone CUL (103 µg/kg); therefore, alpha- and gamma-chlordane are not considered constituents of concern.

1.2 Current Site Conditions

As HE is not mobile and has a low potential to leach (Syracuse Research Corporation 2007), the extent of HE in soil is interpreted from soil analytical results obtained in 1999, 2014, and 2015. HE has been detected in soil below the excavation area and adjacent to the south and southeastern margins of the excavation area. Soil HE concentrations exceeding applicable MTCA Method B soil CULs occur between 5.5 and 15 ft bgs (Figure 2)[3].

Concentrations of HE above the MTCA Method B groundwater CUL (0.0048 µg/L) have been detected consistently in groundwater at monitoring wells SW-10 and SW-11. These wells are located about 5 ft south and east of the excavation area margin, respectively, and are screened from approximately 6 to 16 ft bgs. During the wet season (i.e., spring,) groundwater HE concentrations are relatively low (February 2014 maximum of 0.67 µg/L at SW-11), while dry season concentrations are typically higher (September 2014 maximum of 3.0 µg/L at SW-11).

Groundwater below the Site is shallow and unconfined, ranging from 4.19 to 11.28 ft bgs in 2014. Groundwater levels fluctuate approximately 6 ft seasonally in response to surface conditions and precipitation. Although regional groundwater flow is likely west/northwest toward Salmon Creek (LAI 2014c; Ecology 2001; Tetra Tech 1999), shallow groundwater is influenced by local surface conditions, runoff, and infiltration. Groundwater mounding has been interpreted in wells near the excavation area (Ecology 2001; LAI 2014c). Seasonal depths to groundwater observed during 2014, including the minimum observed depth to water (4.19 ft bgs) are presented in Table 1[4].

1.3 Conceptual Site Model

The conceptual site model (CSM) provides a conceptual understanding of a site that identifies sources, types, and concentrations of hazardous substances, potentially contaminated environmental media, and potential exposure pathways for human and ecological receptors (WAC 173-340-200). It considers current conditions and future land use in assessing potential exposure pathways; only complete

[3] Current MTCA Method B soil CULs for protection of groundwater in the vadose and saturated zones are 80.2 µg/kg and 4.02 µg/kg, respectively. As the highest water table observed in 2014 was 4.19 ft bgs, saturated zone soil CULs will be applied at and below a depth of 4.19 ft bgs, and vadose zone CULs will be applied above 4.19 ft bgs.

[4] Table 1 contains depth to water observations from 2014. Additional depth to water data are available for the dry season (August 2009); however, it was not tabulated as it does not improve understanding of historical maximum water table depths during the wet season.

pathways result in exposure. A complete pathway includes a source and a mechanism of release, an exposure medium, and an exposure route by which contact can occur.

The primary release mechanism to soil is the release of pesticide compounds from a UST source. Soil contamination above MTCA Method B soil CULs is observed adjacent to the UST excavation area (i.e., within approximately 5 ft). Based on the distribution of HE in groundwater described above, the primary release mechanism to groundwater appears to be limited back diffusion of HE from soil pore water into shallow groundwater. Media of concern at the Site include soil and groundwater due to HE detections exceeding applicable CULs (Section 2.2). The limited extent of groundwater HE (adjacent to the UST excavation area) suggests that concentrations of HE are back diffusing into groundwater from soil near the water table.

It is anticipated that the Site will retain its current rural character and that future land uses will be consistent with the current use (forest nursery) as well as zoning and land use regulations. There are no likely potential ecological receptors on the Site. Although MTCA requires consideration of terrestrial plants and animals that may be exposed to hazardous substances, the Site qualifies for exclusion from further terrestrial ecological evaluation under WAC 173-340-900. Table 749-3 of this section presents Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals, which are provided for use in eliminating hazardous substances from further consideration under WAC 173-340-7493(2)(a)(i); the total heptachlor/HE[5] CUL protective of wildlife is 400 µg/kg and the chlordane CULs protective of soil biota and wildlife are 1,000 µg/kg and 2,700 µg/kg, respectively. Soil HE and chlordane concentrations do not exceed these protective levels. Furthermore, institutional controls are in place via deed restrictions on the property[6].

Although there is a low potential for exposure at the Site, the complete exposure pathways and potential human receptors identified include:

- Potential exposure of Site employees via ingestion of, or dermal contact with, groundwater.
- Potential exposure of offsite residents via ingestion of, or dermal contact with, groundwater. Groundwater monitoring at the Site conducted since 1995 (20 years) indicates exposure via this pathway is unlikely.

An institutional control may continue to be required under WAC 173-304-440 if hazardous substances remain at the Site at concentrations that exceed the applicable CUL, or if Ecology determines such control is required to assure continued protection of human health and the environment or the integrity of the cleanup action.

[5] Heptachlor and HE are the only constituent detected at the Site listed in Table 749-3.

[6] This restrictive covenant will remain in place only until the new agreed order to implement the 2016 CAP is issued; then a new environmental covenant will be placed on the property.

2.0 CLEANUP STANDARDS

MTCA requires that cleanup standards be protective of human and ecological receptors for the affected media, based on the reasonable maximum exposures expected to occur under current and future site use. CAOs and cleanup standards were initially established in the 2001 CAP. However, cleanup levels been revised by Ecology since the 2001 CAP took effect. The current cleanup levels provided in Ecology's Cleanup Levels and Risk Calculation database will be applicable to the 2016 CAP.

2.1 Cleanup Action Objectives

Site CAOs were outlined in the 2001 CAP include (Ecology 2001):

- 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 impact Salmon Creek.

Supplemental to the existing CAOs, DNR has expressed a further goal of expediting attainment of cleanup standards to the greatest extent practicable.

Execution of the 2001 CAP removed 70 cy of the most highly pesticide-contaminated soil from the Site. To date, no human exposures to contaminated soil or groundwater have occurred, and groundwater monitoring data indicate that groundwater contamination has not migrated away from the area immediately adjacent to the soil excavation (Figure 2); and therefore, has not negatively impacted Salmon Creek. However, HE concentrations in soil and groundwater exceed applicable CULs locally. Soil and groundwater data indicate that the 1996 excavation left soil contamination in place, and that low concentrations of HE are back-diffusing into groundwater near the water table from the remaining affected soil. The objective of the 2016 CAP will be to more completely remove contaminated soil in order to attain currently applicable CULs at the point of compliance (Section 2.3).

2.2 Cleanup Levels

The 2001 and current[7] CULs are presented below.

[7] MTCA Method B groundwater CULs are from Ecology's Cleanup Levels and Risk Calculation database (accessed March 28, 2016).

	Cleanup Level (CUL) Summary					
			Leaching Soil to Groundwater Pathway			
Contaminant	2001 Soil Direct Contact (µg/kg)	2016 Soil Direct Contact (ug/kg)	2016 Soil (Vadose Zone (µg/kg)	2016 Soil (Saturated Zone) (µg/kg)	2001 Groundwater (µg/L)	2016 Groundwater (µg/L)
Total Chlordane	2,860	2,860	2,060	103	0.25	0.25
Heptachlor	222	222	37.8	1.90	0.019	0.19
Heptachlor epoxide	110	110	80.2	4.02	0.009	0.0048
2,4,D	800,000	800,000	NA (a)	NA (a)	160	160
2,4,5,T	8,000,000	800,000	NA (a)	NA (a)	160	160
2,4,5,TP	640,000	640,000	NA (a)	NA (a)	128	128
Dicamba	2,400,000	2,400,000	NA (a)	NA (a)	240	480
Picloram	5,600,000	5,600,000	NA (a)	NA (a)	1,120	1,120
Atrazine	4,550	4,350	NA (a)	NA (a)	0.398	0.380
Simazine	8,330	8,330	NA (a)	NA (a)	0.729	0.729

(a) CLARC does not report a CUL for this constituent.
µg/kg = microgram per kilogram
µg/L = microgram per liter
NA = Not available
Highlighting = Selected CUL

Where available, 2016 CULs will be used. A detailed table showing the selection of current CULs is shown on Table 2.

2.3 Point of Compliance

The point of compliance represents the locations at which CULs are to be attained. The 2001 CAP defined the point of compliance as “throughout the site.” The site was defined as “that portion of the parcel of property owned by DNR where Webster Nursery is located that has been impacted by the release from the pesticide storage tank” (Ecology 2001). Consequently, the 2016 CAP will seek to attain applicable CULs for soil, groundwater, and ecological receptors throughout that portion of the DNR Webster Nursery property impacted by leakage from the pesticide UST.

3.0 PROPOSED CLEANUP ACTION

The recommended cleanup alternative identified in the 2016 FS involves excavation and disposal of HE-affected soil within the zone of seasonal groundwater fluctuation. The following sections provide a conceptual design for the recommended supplemental cleanup action. Further detail regarding implementation of the recommended cleanup action will be provided separately in a Remedial Action Work Plan (RAWP) after Ecology has approved a final CAP.

3.1 Summary of Selection and Rationale

The 2016 FS considered general response actions and process options evaluated in the 2001 CAP (Ecology 2001) in terms of current site conditions. Three cleanup alternatives were selected and evaluated on the basis of selected criteria including: effectiveness in attaining cleanup action objectives, implementability at the Site, restoration timeframe, permanence of the cleanup, and cost. A summary of MTCA criteria rankings are included in Table 3. Specifically, cleanup alternatives evaluated in the 2016 FS included:

- Alternative 1: Status Quo
- Alternative 2: Physical Barrier/Containment
- Alternative 3: Excavation and Offsite Disposal.

It was concluded that Alternative 1, though implementable, was unlikely to be effective at permanently achieving cleanup goals and standards in the desired restoration timeframe, and the estimated costs were high given the long period of monitoring. The probability of Alternative 2 providing long-term effectiveness or timely, permanent attainment of cleanup standards or CAOs was found to be low; implementability was uncertain; and the costs high. Alternative 3 was determined to comply with MTCA requirements (WAC 173-340-360), and presented the most implementable and effective alternative for permanently achieving stated cleanup standards and objectives in a timely and cost-effective manner. Consequently, Alternative 3 was selected as the recommended cleanup alternative.

3.2 General Description

The proposed cleanup action involves excavation and offsite disposal of soil containing HE concentrations within the zone of seasonal groundwater fluctuation. Because two existing monitoring wells are located within the proposed excavation area, they will be decommissioned and replaced with two new monitoring wells. A conceptual design of the proposed excavation area and proposed monitoring well locations is shown on Figure 2. A cross section of the proposed excavation area is shown on Figure 3. Further specifics regarding cleanup procedures will be presented in the RAWP.

3.2.1 Excavation

Excavation will target soil between 4 ft and 15 ft bgs in the area enclosed by boring locations in which HE has been detected, as well as the previous excavation area where HE-affected soil was left in place below 7 ft bgs. After excavating and stockpiling the upper 4 ft of soil, remaining soil from 4 ft to 15 ft bgs will be excavated and loaded into trucks for transportation and disposal. For maximum efficiency and safety, and to minimize the need to remove and dispose of groundwater, it is recommended that excavation occur when the water table is near the seasonal low elevation (likely during September). To protect the integrity of the building, it may be advisable to conduct excavation by sequential “slot-cutting” perpendicular to the building’s south wall.

Clean soil excavated from 0 to 4 ft bgs will be sampled, stockpiled, and used as backfill. The remaining excavated area will be backfilled with imported clean, fine- to medium-grained material comparable to surrounding soil. The source and cleanliness of imported fill will be confirmed with the supplier. Backfill will be compacted in short lifts and graded to match the density and topography of the surrounding soil.

3.2.2 Hauling and Disposal

The estimated volume of soil to be excavated and disposed of is approximately 125 cy. It is anticipated that HE-affected soil will be loaded into trucks and disposed offsite at a Resource Conservation and Recovery Act of 1976 (RCRA) Subtitle D landfill. If the soil designates as a dangerous waste, treatment prior to disposal or disposal at a RCRA Subtitle C landfill would be required. A previous determination from Ecology indicates that soil excavated from the cleanup area may not be designated as a dangerous waste (Ecology 1998). DNR plans to apply to Ecology for a waste designation prior to excavation.

3.2.3 Replacement Wells

Because onsite monitoring wells SW-10 and SW-11 are screened within the defined cleanup area, they will be decommissioned according to regulation (WAC 173-160-381) prior to excavation. Two new monitoring wells would be installed to replace SW-10 and SW-11; the new wells will be developed at least 24 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 to 16 ft bgs. The replacement wells will be identified as SW-17 and SW-18. The approximate locations of proposed SW-17 and SW-18 are presented on Figure 2.

3.2.4 Dewatering

Soil exceeds CULs below dry season water levels at one location (LAI-B12). A trench box will be used to allow for excavation below the water table; groundwater will be pumped (using a sump pump) to an area of the excavation where concentrations in soil and groundwater already exceed CULs.

Depending on site conditions, additional dewatering may be needed to allow the excavation to reach 10 ft bgs. Due to limited resources, it is anticipated that dewatering would be attempted by passive means (e.g., temporary trenching/drains and sump pit within excavation). If generated, discharge water would likely be directed to a primary settling container to allow sedimentation, then pumped to a wastewater container for sampling and appropriate disposal.

3.2.5 Confirmation Sampling

Soil samples will be collected from the finished, open excavation to ascertain soil concentrations of contaminants of concern left in place. Sampling methods, analysis, and further details will be presented in the RAWP and Sampling and Analysis Plan (SAP).

3.2.6 Environmental Covenant

A restrictive covenant is in place as part of the existing site remedy. This covenant will remain in place until the new agreed order is issued to implement this CAP. With the issuance of the new agreed order, a new environmental covenant (EC) will be placed on the property. The EC will be prepared by Ecology consistent with WAC 173-340-440 and RCW 64.70. Once the EC is recorded with the Thurston County Auditor, it shall supersede the existing restrictive covenant.

4.0 GROUNDWATER MONITORING AND REPORTING

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. Following receipt and processing of results from the fourth quarterly event, DNR will submit a data report to Ecology. The report will provide recommendations for future monitoring. Monitoring data will also be uploaded to Ecology's Environmental Information Management database annually by DNR (or contractor to DNR) per existing protocol.

5.0 PUBLIC PARTICIPATION AND COMMUNICATION

Consideration of public concerns is an inherent part of the Site cleanup process under MTCA (WAC 173-340-600). Ecology is responsible for providing public notice and the opportunity for public comments on this CAP per WAC 173-340-600(13). The formal public review and comment period will be 30 days. After review and consideration of public comments, the contents of the CAP may be revised accordingly. Ecology will then issue a final CAP and will publish it via the Site Register and by other appropriate methods per WAC 173-340-380(3).

6.0 APPLICABLE LAWS

Under RCW 70.105D.090, remedial actions conducted under an AO are exempt from the procedural requirements of certain laws and local government permits, but must comply with substantive requirements of state and federal laws (WAC 173-340-710). It is expected that the proposed cleanup action would not require coverage under the construction stormwater general permit because less than 1 acre will be disturbed, and because the Site does not discharge to surface water of the state (Ecology 2015). Nonetheless, cleanup activities will generally observe elements of construction stormwater pollution prevention as described in the Western Washington Stormwater Management Manual (Ecology 2014b), including flow, sediment, and pollution control measures. If generated, water produced from dewatering will be contained for appropriate offsite disposal. Pursuant to applicable State Environmental Protection Agency (SEPA) rules (WAC 197-11-960), DNR, as a state agency, is required to complete a SEPA checklist for the project that will be submitted concurrent with this CAP.

7.0 HEALTH AND SAFETY

A health and safety plan (HASP) will be developed for construction activities at the Site that will be consistent with MTCA requirements in WAC 173-340-810. The HASP will be provided as an attachment to the RAWP. The purpose of the HASP will be to limit worker exposure and minimize dust generation during construction. Elements of the HASP will include:

- Development of a dust control plan. The dust control plan will be consistent with Puget Sound Clean Air Agency regulations for controlling fugitive dust emissions with the goal of "no visible dust" leaving the project area.
- Requirements for worker education and safety.
- Procedures for decontamination and maintaining personal hygiene and associated facility requirements (e.g. hand and boot wash stations).
- Identification of areas where the HASP applies.

8.0 RESPONSIBILITY

DNR is responsible for authorizing, conducting, and funding cleanup actions at the Site. LAI has been retained by DNR as a consultant to conduct sampling and prepare reports including the FS and CAP. It is anticipated that LAI will assist DNR with planning, coordination, construction oversight, and reporting related to the proposed cleanup action.

Ecology will be responsible for reviewing and ultimately approving a final FS and CAP. Ecology will draft an AO and public notice from the approved FS and CAP, and will oversee the public notification and comment process. Ecology will incorporate public comments into a final AO.

Once a final CAP and AO are issued, DNR will prepare a RAWP. The RAWP will include a SAP and a HASP.

After the cleanup action is complete, DNR will prepare a final Construction Completion Report for Ecology review. Ecology will evaluate the overall success of the cleanup and, at its discretion, may issue a letter of satisfaction to nullify the AO.

9.0 IMPLEMENTATION SCHEDULE

Implementation of the recommended cleanup alternative can be initiated after issuance of the final AO by Ecology. Excavation and associated site cleanup work should be performed in early October to minimize the need for water table lowering. At this time, DNR plans to perform the proposed cleanup action in October 2016. Once approved, the schedule is anticipated to include the following milestones (dates are approximate):

1. 2016
   a. June
      i. June 13: Ecology provides draft AO and approved FS, CAP and SEPA to DNR
      ii. June 16: FS, CAP, SEPA and AO finalized
      iii. June 29: DNR submits signed AO to Ecology
   b. July
      i. July 7: Ecology posts publication and allows 30-day public comment period
   c. August
      i. August 8: Public comment period ends.
      ii. August 8: DNR submits draft RAWP, SAP, and HASP
      iii. August 8: DNR advertises specifications for contractor bidding (3 weeks)
      iv. August 22: Ecology addresses public comments and issues final, signed AO
      v. August 26: Ecology provides comments on draft RAWP, SAP and HASP
      vi. August 29: Contractor bids received
   d. September
      i. September 6: DNR submits final RAWP, SAP and HASP
      ii. September 26: DNR Contractor selection
   e. October
      i. October 3: DNR prepares site, coordinates contractors and implements cleanup action (2 weeks)
      ii. October 17: Cleanup action complete
   f. November
      i. November 30: DNR submits Draft Cleanup Action Completion Report for Ecology review
   g. December
      i. December 15: Ecology provides comments on Draft Cleanup Action Completion Report
      ii. DNR conducts first quarterly groundwater sampling event

2. 2017

    a. January

        i. DNR submits first quarterly groundwater monitoring report for Ecology review.

        ii. DNR submits final Cleanup Action Completion Report.

    b. March: DNR conducts second quarterly groundwater sampling event

    c. April: DNR submits second quarterly groundwater monitoring report for Ecology review

    d. June: DNR conducts third quarterly groundwater sampling event

    e. July: DNR submits third quarterly groundwater monitoring report for Ecology review

    f. September: DNR conducts fourth quarterly groundwater sampling event

    g. October: DNR submits fourth quarterly report and recommendations for Ecology review.

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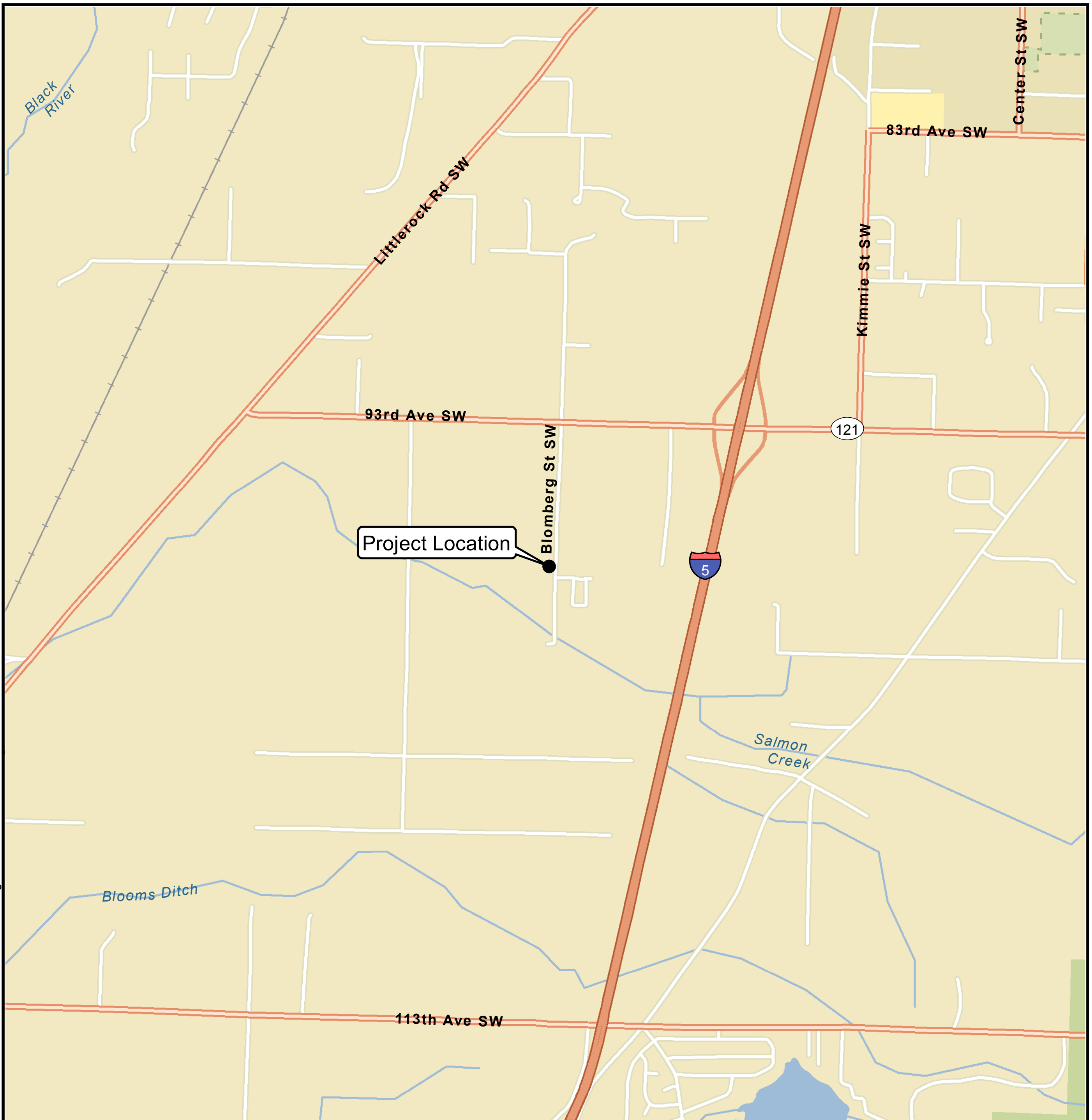
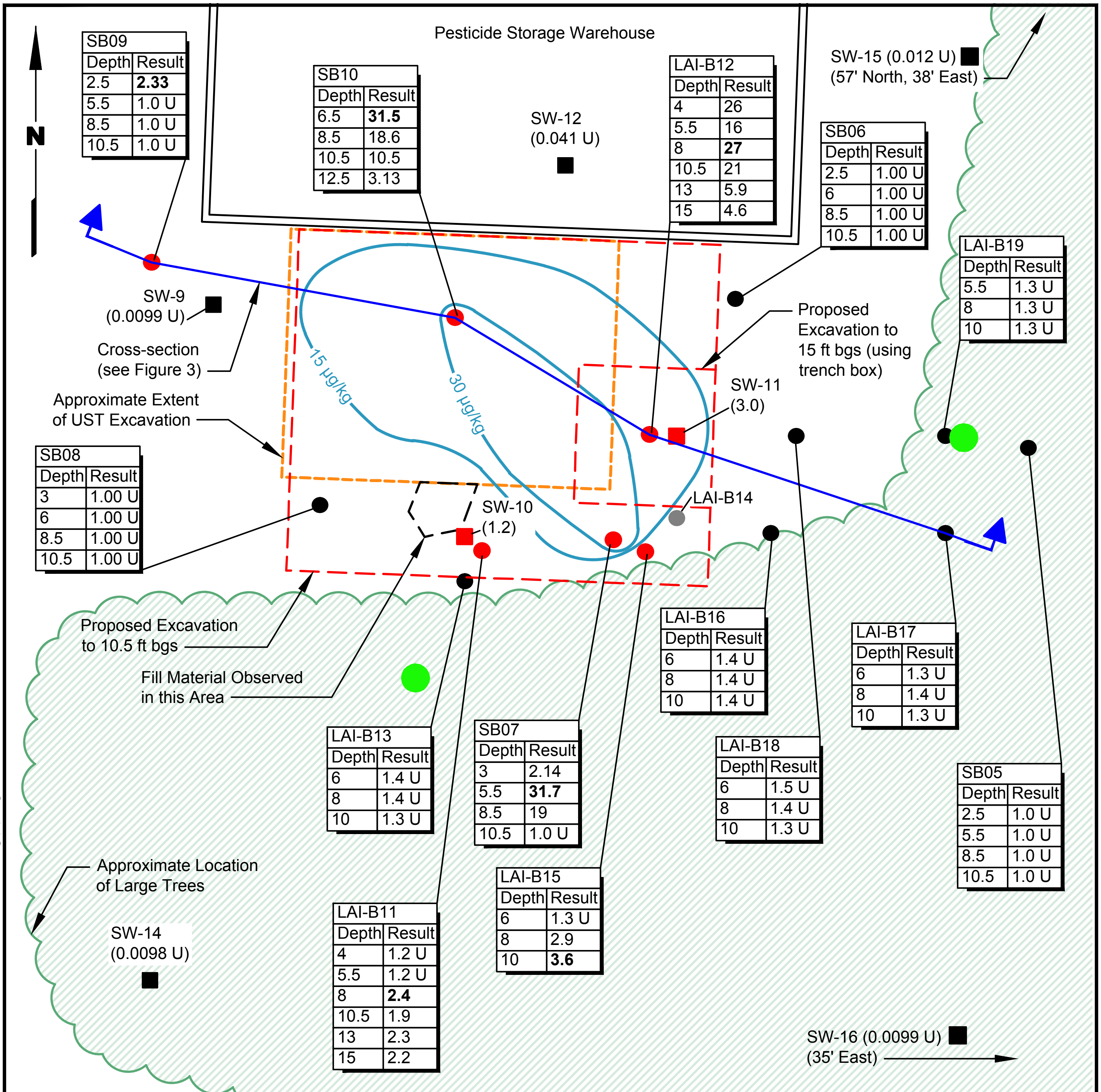


Data Source: Esri 2012

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

G:\Projects\774\006\020\026\CAP\F01VicinityMap.mxd 5/16/2016 NAD 1983 StatePlane Washington North FIPS 4601 Feet



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.

Legend

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

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

0 10 20
Scale in Feet

Source: Tetra Tech, 1999

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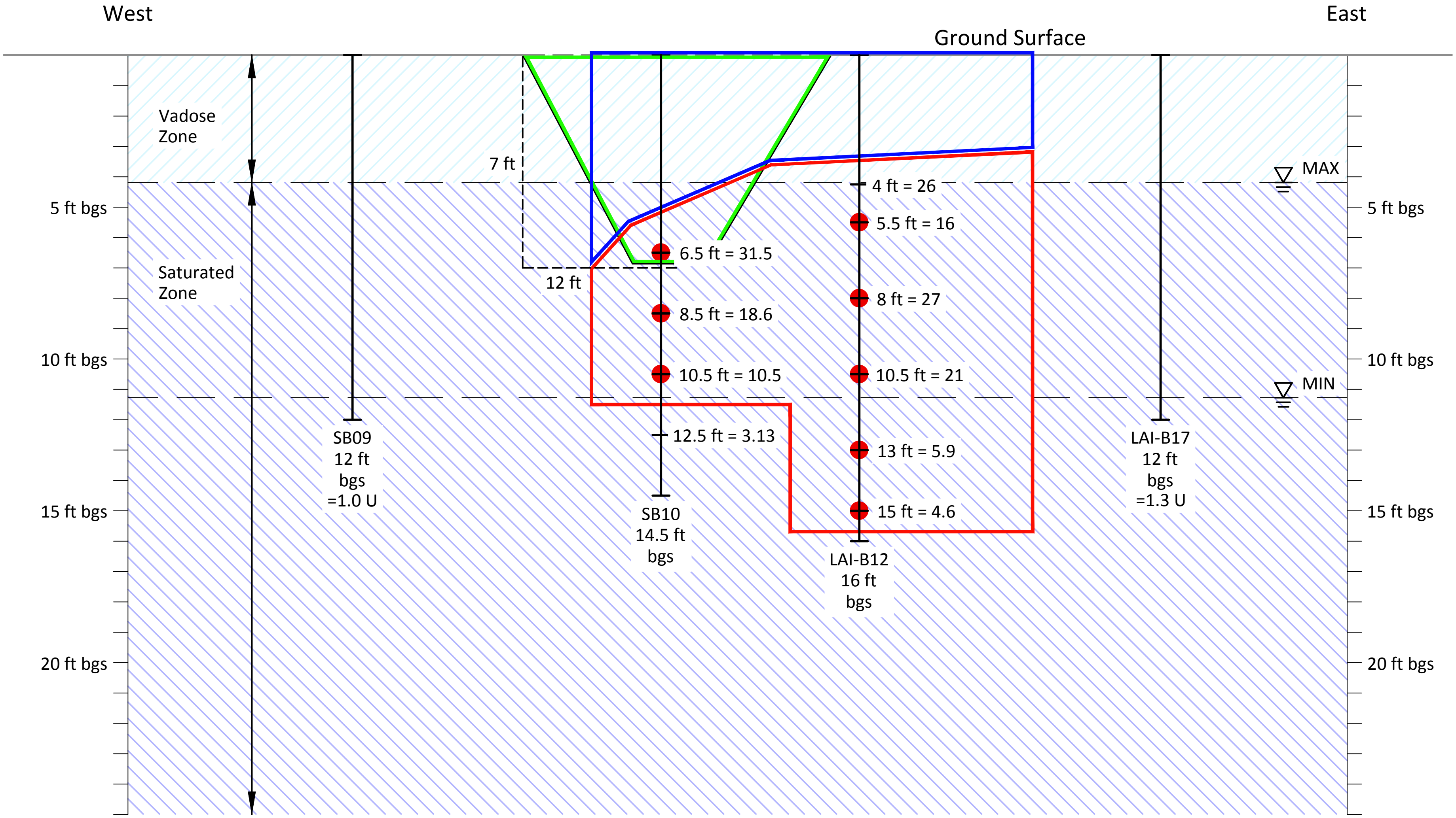
Webster Nursery Site Tumwater, Washington	**Conceptual Cleanup Action Design**	Figure 2



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. 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.

Legend

- Exceedances; MTCA Method B
- Historical Excavation Area
- Clean Overburden
- Proposed Soil Excavation Area

0 10 20

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

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Webster Nursery Site
Tumwater, Washington

Cross Section of Cleanup Action

Figure 3

Table 1
Seasonal Groundwater Levels
Webster Nursery
Tumwater, Washington

Well ID	Top of PVC Elevation (ft, msl)	Depth to Water (ft) 02/24/14	Depth to Water (ft) 09/10/14	Groundwater Fluctuation (ft)
SW-9	192.12	4.19	9.98	5.79
SW-10	193.37	5.37	11.28	5.91
SW-11	192.19	4.19	10.12	5.93
SW-12	192.9	5.17	10.71	5.54
Maximum/Minimim		4.19	11.28	

ft = feet
msl = mean sea level

Table 2
2016 Cleanup Level Selection
Webster Nursery
Tumwater, Washington

Chemical Name	CAS #	Soil Direct Contact Method B Non cancer (mg/kg)	Soil Direct Contact 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)	Ground Water Method B Non cancer (µg/L)	Ground Water 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									

All cleanup criteria are from the Washington State Department of Ecology's Cleanup Levels and Risk Calculation Database, except for the TEE values which are from WAC 173-340-900, Table 749-3

Selected cleanup level (CUL)

(a) Total heptachlor and heptachlor epoxide

Table 3
Summary of MTCA Alternatives Evaluation and Ranking
Webster Nursery
Tumwater, Washington

Alternative Number	**Alternative 1**	**Alternative 2**	**Alternative 3**
Alternative Name	**Status Quo**	**Physical Barrier/Containment**	**Excavation and Offsite Disposal**
Alternative Description	Continuation of the present action, including groundwater monitoring, and MNA as the primary remedial technology, and institutional controls as the secondary remedial technology.	Construction of physical barriers including an impervious cap, vertical impermeable barriers, and drainage control. Two new monitoring wells and 30 years of compliance monitoring.	Excavation of HE contaminated soils and offsite disposal, including dewatering and site restoration. Two new monitoring wells and 1 year of compliance monitoring.
Individual Ranking Criteria			
1 Meets Remedial Action Objectives	Yes	Yes	Yes
2 Compliance With MTCA Threshold Criteria [WAC 173-340-360(2)(a)]			
-Protect human health and the environment	Yes	Yes	Yes
-Comply with cleanup standards	Yes	Yes	Yes
-Comply with applicable state/federal laws	Yes	Yes	Yes
-Provide for compliance monitoring	Yes	Yes	Yes
3 Restoration Time Frame [WAC 173-340-360(2)(b)(ii) and WAC 173-340-360(4)]	30 years	30 years	1 year
-Potential risk to human health and environment	Low	Low	Low
-Practicability of achieving shorter restoration time	See DCA below	See DCA below	See DCA below
-Current use of site, surrounding area, and resources	Unrestricted/Commercial - no offsite migration	Unrestricted/Commercial - no offsite migration	Unrestricted/Commercial - no offsite migration
-Future use of site, surrounding area, and resources	Unrestricted/Commercial - no offsite migration	Unrestricted/Commercial - no offsite migration	Unrestricted/Commercial - no offsite migration
-Availability of alternative water supplies	Yes	Yes	Yes
-Likely effectiveness/reliability of institutional controls	High	High	High
-Ability to monitor migration of hazardous substances	High	High	High
-Toxicity of hazardous substances at the site	Moderate	Moderate	Moderate
-Natural processes that reduce concentrations	Yes	Yes	Yes
-Overall Reasonable Restoration Time Frame	Yes	Yes	Yes

4 Relative Benefits Ranking for DCA
[WAC 173-340-360(2)(b)(i) and WAC 173-340-36093)(f)]

Comparative Overall Benefit	Alternative 1 Comparative Benefit Rating	Score	Weighting Factor	Weighted Score	Alternative 2 Comparative Benefit Rating	Score	Weighting Factor	Weighted Score	Alternative 3 Comparative Benefit Rating	Score	Weighting Factor	Weighted Score
-Overall Protectiveness	Medium	6	0.3	1.8	Medium High	8	0.3	2.4	Medium High	8	0.3	2.4
-Permanence	Medium	6	0.2	1.2	Medium High	7	0.2	1.4	High	9	0.2	1.8
-Long Term Effectiveness	Medium High	8	0.2	1.6	Medium High	8	0.2	1.6	High	9	0.2	1.8
-Manageability of Short Term Risk	Medium High	8	0.1	0.8	Medium High	8	0.1	0.8	Medium High	7	0.1	0.7
-Implementability	High	10	0.1	1	Medium Low	4	0.1	0.4	Medium High	8	0.1	0.8
-Consideration of Public Concerns	High	10	0.1	1	High	10	0.1	1	High	10	0.1	1
Overall Weighted Benefit Score				**7.4**				**7.6**				**8.5**

5 Disproportionate Cost Analysis	Alternative 1	Alternative 2	Alternative 3
Overall Weighted Benefit Score	7.4	7.6	8.5
Estimated Remedy Cost	$336,000	$542,000	$143,000
Most practicable permanent solution	No	No	**Yes**
Lowest Cost Alternative	No	No	**Yes**
Relative Benefit/Cost Ratio*	6.6	4.2	17.8
Incremental Increase/Decrease in Relative Benefit to Most Permanent Alternative	-13%	-11%	0%
Incremental Increase/Decrease in Relative Benefit to Next Most Expensive Alternative	-3%	0%	12%
Incremental Increase/Decrease in Cost Compared to Most Permanent Alternative	135%	279%	0%
Incremental Increase/Decrease in Cost Compared to Next Most Expensive Alternative	0%	135%	-57%
Costs Disproportionate to Incremental Benefits	No	Yes	No
Remedy Permanent to the Maximum Extent Practicable?	No	No	Yes
Preferred Alternative	**No**	**No**	**Yes**