Attachment #2

City of Olympia
Former Downtown Safeway/City Hall Site

Cleanup Action Plan

City of Olympia
City Hall
601 4th Avenue
Olympia, Washington 98501

Issued by

Washington State Department of Ecology
Toxics Cleanup Program
Southwest Regional Office
Olympia, Washington

August 2, 2012

DRAFT

Table of Contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

Abbreviation/ Acronym	Definition
AO	Agreed Order
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below ground surface
CAP	Cleanup Action Plan
City	City of Olympia
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CUL	Cleanup level
DCA	Disproportionate Cost Analysis
Ecology	Washington State Department of Ecology
ESA	Environmental Site Assessment
FS	Feasibility Study

HDPE	High-density polyethylene
IA	Interim Action
MTCA	Model Toxics Control Act
NAPL	Non-aqueous phase liquid
PAH	Polycyclic aromatic hydrocarbon
RCW	Revised Code of Washington
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
Site	Former Downtown Safeway/City Hall Site
TPH	Total petroleum hydrocarbons
UST	Underground storage tank
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Code

1.0 Introduction

This draft Cleanup Action Plan (CAP) describes the cleanup action selected by the Washington State Department of Ecology (Ecology) for the Former Downtown Safeway/City Hall Site (Site). The Olympia City Hall property is located at 609 4th Avenue East in Olympia, Washington; approximately 1.2 acres of property owned by the City of Olympia (City) between 4th and 5th Avenue Southeast and Cherry and Chestnut Streets Southeast, as shown in Figure 1.1. The Site is currently occupied by the new Olympia City Hall Building, which is located at 601 4th Avenue East. The selected cleanup action described in this document fulfills the requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D of the Revised Code of Washington (RCW), administered by Ecology under the MTCA Cleanup Regulation Chapter 173-340 of the Washington Administrative Code (WAC).

This draft CAP was developed using information presented in the draft Remedial Investigation/Feasibility Study (RI/FS) for the Site, which was prepared by Floyd|Snider in 2012 on behalf of the City and reviewed and approved by Ecology. The City and Ecology entered into an Agreed Order (AO; No. DE 5446) on May 15, 2008. The AO required the City to initiate an interim action for removal of underground storage tanks, complete an RI/FS for the Site, and submit a draft CAP to Ecology.

This CAP does not address the soil contamination that is present at depth within the adjacent Chestnut Street Southeast right-of-way. Additional soil and groundwater samples have been collected from within the Chestnut Street Southeast right-of-way to delineate the extent of contamination associated with the Former Downtown Safeway/City Hall Site.

The objective of this document is to satisfy the MTCA requirements for cleanup action plans set forth in WAC 173-340-380(1). Consistent with the requirement of that chapter, this draft CAP provides the following information:

- Site description, background, and characterization
- Cleanup standards for benzene in groundwater
- Description of the selected remedial action, including justification for the selection
- Brief summary of the remedial action alternatives considered in the RI/FS
- Applicable state and federal laws
- Institutional controls
- Implementation schedule and restoration time frame

The draft CAP will be finalized pending incorporation of public comment.

2.0 Site Description and History

The Site is located at 601–609 4th Avenue East, Olympia, Washington 98501 (Figure 1.1). The 1.23-acre site is a rectangular city block, zoned as "Downtown Business" and accessed by 4th Avenue East to the north, 5th Avenue Southeast to the south, Cherry Street Southeast to the west, and Chestnut Street Southeast to the east. The Site is located in Section 14, Township 18N, and Range 2W. The Site is owned by the City and was purchased for the location of the City's new City Hall Building.

2.1 PHYSICAL SETTING

The Site is located in an urban setting in downtown Olympia. The site topography is relatively flat. There is a slight slope to the west-northwest, with the steepest slopes having a grade of less than 5 percent. The properties located to the east, west, and south of the Site are also relatively flat. North of the Site, the ground surface slopes slightly downward toward Budd Inlet. The entire surface area of the Site is impervious and covered by asphalt or the City Hall Building, with the exception of small landscaping areas in the corners of the property.

2.1.1 Geology

Prior to the Interim Action (IA) excavation (discussed in Section 2.3), soil at the Site consisted primarily of fill material, which appears to have been dredged spoils (dredged sediments that are used as fill material). Between 1910 and 1912, a widespread dredge and fill operation occurred in the Olympia area termed the Carlyon Fill. This fill event added almost 22 blocks of land to the downtown Olympia area, created a deep-water harbor, and filled in sloughs and tide flats north and east of what was at the time downtown (Newell 1975, City of Olympia 2003, 2010a, and 2010b). Based on the review of area Sanborn maps, the block that today's Site occupies was filled as part of the Carlyon Fill event or related subsequent fill events sometime between 1908 and 1924 (refer to http://www.sos.wa.gov/library/sanborn/). The following paragraphs describe soil conditions at the Site before the large-scale soil excavation that occurred in 2007–2008 as part of the IA.

Near the ground surface, and in the areas associated with former site operations, other localized fill units were identified and characterized as fill placed from construction and development activities. A thin (0.5- to 1.0-foot thick) compact gravel unit was present immediately under the asphalt pavement area and within the footprint of the former structures. Below the compact gravel unit was well-graded gravel and sand ranging up to several feet thick. In the northeastern quarter of the property, in the area of a former gas station, this gravel unit extended approximately 8–9 feet below ground surface (bgs). Fill in this area was interspersed with building demolition debris, including concrete fragments and other construction materials, and with debris indicative of automotive service businesses, including auto body parts, tires, product lines, and a motor oil advertisement sign.

In general, beneath the shallow construction fill was a gray, well-graded sand unit with silt. Small gravel and shell fragments were interspersed with the sand in this unit. This material was characterized as historical dredge fill based on the composition and presence of shell fragments. The dredge fill varies in thickness and typically extends to a depth of 12–15 feet bgs. Below the dredge fill is clay with dense silt. This is presumed to be native sediment representing the original tide flats of Budd Inlet. The top of this unit was typically at a depth of 12–14 feet bgs.

Site boring logs were used to construct geologic cross-sections throughout the Site, which are included in the RI/FS. The cross-sections depict the highly variable fill deposits encountered during the site investigations.

Following the 2008–2009 IA, the excavated portions of the Site, which extended to 15 feet bgs, were backfilled with a 2-foot layer of quarry spalls and either compacted pit-run gravel (i.e., for the area excavated for the first phase of excavation) or crushed rock to the depth of groundwater and compacted pit-run gravel filled to the surface (i.e., for the area excavated for the second phase of excavation). The excavation extents are shown in Figure 2.1.

2.1.2 Hydrogeology

The primary aquifers in the region were formed by recessional outwash from the Vashon Glaciation and occur in coarse-grained glacial and post-glacial deposits, with the shallowest aquifers occurring primarily in post-glacial alluvial or deltaic deposits in river valleys or in uplands areas. The Vashon recessional outwash was deposited as the Vashon Glacier receded from the Puget Sound Lowlands. The soil types within the recessional outwash aquifers consist of moderately well-sorted sand and poorly to moderately well-sorted gravel, with well-rounded gravel in a matrix of sand with intervening sand lenses.

The recessional outwash aquifers are used extensively as municipal and industrial water sources in the Tumwater area. The Olympia Artesian Well, used for drinking water and located to the northwest of the Site on 4th Avenue East and Jefferson Street Northeast, is located at a depth of 90 feet bgs. Multiple aquitards consisting of fine-grained clay layers separate shallow perched groundwater from the confined Artesian Aquifer (refer to http://www.oly-wa.us/Artesians/Rep970910.php). This confined aquifer has strong upward gradients as demonstrated by the Olympia Artesian Well.

2.1.2.1 Localized Groundwater Hydraulics

Site groundwater is first encountered within the silty sand fill above the clay layer, either in the construction and recent fill layer or in the Carlyon fill layer. Monitoring wells constructed at and adjacent to the Site are shallow and appear to be primarily screened within the fill unit.

Groundwater monitoring at the Site was initiated in October 2009 and included four quarters of monitoring. Monitoring well locations are presented in Figure 2.1. During each groundwater monitoring event, groundwater elevations collected from the monitoring wells displayed significant variability with water level differences as much as 9 feet across the Site during a single monitoring event. The groundwater elevation variability observed is not unusual for wells screened into groundwater perched within a fill unit.

Although the groundwater elevations exhibit a wide range of variability across the Site, the general seasonal trends in Monitoring Wells MW-1, MW-3, MW-4, MW-5, MW-7, and MW-8 show similar patterns with the highest and lowest water levels observed in the spring and fall, respectively. Well MW-4 was observed to have the lowest water level elevations during all monitoring events.

Based on groundwater elevation data, the general trend of water levels and predominant groundwater flow direction across the Site is from west to east, with a localized north to south gradient in the vicinity of the northern portion of the Site, resulting from the near-artesian conditions observed in MW-2. Additionally, a slight mounding of groundwater has been observed in the vicinity of the geomembrane barrier at the southern perimeter of the property.

In April 2011, in addition to site-wide groundwater elevation information, Floyd|Snider collected depth-to-groundwater and conductivity data for Monitoring Wells MW-3 and MW-4 in 10-minute intervals for 2 days using an in-well pressure transducer. The results indicate that Well MW-4 is tidally influenced, as groundwater elevations in this well rose and fell in alignment with the tidal elevation in Budd Inlet. Conductivity data collected from both monitoring wells were consistent over the monitoring period and indicated freshwater conditions. No elevation fluctuations were observed in Well MW-3, but groundwater levels dropped steadily over the 2-day period. Depth-to-groundwater measurements were collected for the remaining wells and the variation of groundwater elevations among the wells was consistent with the previous observations. The potentiometric surface cannot be meaningfully contoured because of the high degree of variability between the wells, continuing to support the assumption that the shallow groundwater system is a poorly connected perched system in fill. Groundwater elevation data for all quarterly monitoring is included in Table 2.1.

Moxlie Creek runs south to north, adjacent to the east side of the Site. The creek is within a culvert for the length of its passage through downtown Olympia, presumably preventing both recharge of groundwater from the creek and discharge of groundwater to the creek. The culvert is believed to have been placed in the historical channel of the Moxlie Creek and backfilled during filling of the area. It is possible that the historical channel bed continues to create a preferential flow path that influences local groundwater flow direction to the east, but this is speculative.

In summary, the heterogeneity of the area-wide fill conditions, site backfill, and adjacent tidal fluctuations result in localized hydrogeologic conditions that appear to strongly influence the variability in the potentiometric surface at the Site. Additionally, the upper water table conditions in the site vicinity are influenced by the character of the fill and the high percentage of impermeable surfaces.

2.1.2.2 Recharge and Discharge

Impermeable surfaces were placed over nearly the entire property following the construction of the new Olympia City Hall Building; therefore, measurable groundwater recharge through infiltration no longer occurs. Instead, runoff is collected through the municipal stormwater system and is discharged to Budd Inlet. Groundwater in the downtown Olympia area flows generally northward, eventually discharging to Budd Inlet of the Puget Sound (CDM 2002a and 2002b, Golder 2008a and 2008b, and PGG 2005). Groundwater flow direction in the immediate vicinity of the Site is generally from west to east, but the lack of hydraulic interconnection between wells makes the determination of actual groundwater flow indeterminate.

2.2 HISTORICAL SITE USE

As discussed in Section 2.1.1, the Site lies in an area of Olympia that was once part of Budd Inlet and was later filled for commercial and light industrial use. Businesses operating on the Site from around the late 1890s and into the early 1900s included a hotel, a sewing machine shop, storage, and offices. In 1894 the first of a long series of dredging and filling efforts occurred to expand the land mass of the city and to create a deep water port (City of Olympia 2004). The most extensive dredge and fill event took place in 1910–1911 and was known as the Carlyon Fill, where nearly 22 blocks were added to the downtown Olympia area. The Site was filled sometime between 1908 and 1924, as part of the Carlyon Fill event or a related subsequent fill event.

By 1924, Budd Inlet in the vicinity of the Site was filled in, with 4th Avenue East, 5th Avenue Southeast, Cherry Street Southeast, and Chestnut Street Southeast in their present alignments. Businesses on the Site in 1924 were comprised of general retail, including a furniture and carpet store, a stove store, a second-hand store, a restaurant, a grocery store, and a butcher. Two automotive businesses including an automobile top manufacturer and an automobile painter were also on the Site in 1924.

By 1936, automotive businesses began replacing the general retail businesses on the Site. A parking lot was constructed on the western quarter of the Site where businesses had previously been located. Beginning in 1936, the Raudenbush Motor Company was located in the southwestern portion of the Site and other businesses on the Site between 1936 and 1946 included a grocery store, an auto wrecking yard, Mike’s Tire Service, Olympia Body and Fender, and Dean’s Auto Service. In 1941 the Armstrong Auto Repair Department replaced Olympia Body and Fender.

According to the Polk’s City of Olympia Directory, by the mid-1940s the original Safeway Store was located on the northwestern portion of the Site, and a gas station was located on the northeast corner of the Site (Polks’ City of Olympia Directory 1936–2007). Additionally, there were two auto repair facilities on the Site; Raudenbush Motor Company was located on the southwest corner of the Site, and a second facility (possibly Andrew’s Auto Repair) was located on the southeast corner of the Site. This facility is reported to have operated between 1941 and 1958, but there are no records regarding closure. Between 1947 and 1963 an auto sales business and auto body work facility operated on the Site and were located west of the gas station. The gas station, auto sales, and auto body work facilities located in the northeast corner of the Site had all ceased operations in approximately the late 1950s. The southeastern portion of the property was shown on historical maps to be vacant in 1947. The Safeway building was remodeled in 1962 to a 20,000-square-foot single story building.

By 1968, the Site had been nearly developed into its former Safeway store configuration. The Raudenbush Auto Repair and Auto Parts business, located on the southwest portion of the Site, was purchased in approximately 1991 by Mr. Steve Brazel. When the Raudenbush Auto Repair business was sold to Mr. Brazel, there were four service bays with hydraulic hoists. The auto repair business remained in operation under the new owners until 1993–1994. After 1994, these buildings were occupied by a tire shop, South Bay BBQ, and a computer retail business. A tire shop and auto wrecking yard may have been located in the southwestern portion of the property near the Raudenbush Auto Repair business likely prior to 1968. The Safeway store was operating in the large building located on the southeast portion of the Site until 2007. In 2008, when the City purchased the Site, the former Safeway store and the two-story structure that historically contained the computer store, tire store, and barbeque restaurant were vacant. The remainder of the Site was covered by a 27,000-square-foot asphalt parking lot.

2.3 INTERIM ACTION SUMMARY

Site contamination was first identified during Phase I and Phase II Environmental Site Assessments (ESAs) conducted at the Site between 2007 and 2008. These investigations indicated the presence of soil and groundwater contamination believed to be associated with the historical gasoline station or auto repair facilities. A ground-penetrating radar survey of the Site identified the potential presence of up to five underground storage tanks (USTs). Following the Phase II ESA, an IA was completed as required by the AO to address the removal of the USTs, associated buried fuel lines, and related soil contamination thought to be present at the Site based on historical operations and the results of previous environmental investigations.

The IA excavations began in 2008 at five test pit locations with the goal of decommissioning and removing suspected USTs and contaminated soil from the Site. No USTs were found during the test pit excavations, but the remains of three small tanks, product piping, gas station debris and rubble, sheen, and non-aqueous phase liquid (NAPL) were found. Test pit excavations indicated the presence of sheen, stained soils, NAPL, and soil contaminated with total petroleum hydrocarbons (TPH) and carcinogenic polycyclic aromatic hydrocarbons (cPAH). Under Ecology direction, excavation activities were expanded from the test pit locations to include areas where NAPL was present as free product and contaminated soils were identified. This expansion resulted in the excavation of the eastern and southern portions of the Site in two excavation phases.

For the first phase of excavation, a test pit located in the northeastern portion of the Site was expanded to remove soil contamination. The extent of excavation was defined by field screening, sidewall sampling, confirmation sampling, and visual presence of NAPL. Visual and olfactory observations of free product, discolored soil, and petroleum odor were noted on an ongoing basis throughout the excavation work. Final excavation sidewall and base samples were considered to be confirmation samples, and no MTCA Method A cleanup level (CUL) exceedances were detected. The first phase of excavation was halted at the east property boundary and the edge of the Safeway building. Based on a soil sample in the excavation side wall that exceeded the MTCA Method A for cPAHs and the continued observation of NAPL, it was determined under Ecology direction to continue excavation to the south following removal of the former Safeway building structure.

The second phase excavation was conducted within the area immediately south of the first phase excavation and extended to the west within the vicinity of former auto repair and tire shop operations and to the south to the property line along 5th Avenue Southeast. Excavation extended to the property boundary as further excavation would have undermined the existing sidewalk and street. The presence of NAPL seeps along the southern sidewall, at the property boundary along 5th Avenue Southeast, consisted of predominantly a heavier NAPL fraction and indicated an off-site source of the contamination. The contamination observed within the first phase of the excavation and within the northeastern portion of the Site predominantly included a light end fraction NAPL and appeared to be consistent with former automotive and fueling related operations at the Site. The contamination observed along the southern site boundary predominantly consisted of a heavier end NAPL fraction and did not appear to be attributable to historical operations at the Site. Over-excavation was completed to the maximum extent practicable but was limited by the edge of the property boundary. To prevent re-contamination of the clean fill, an impermeable 60-millimeter thick high-density polyethylene (HDPE) geomembrane barrier was installed along the entire length of the southern property boundary and along two 50-foot sections extending north from the southern property boundary along

Chestnut and Cherry Streets Southeast (Figure 2.1). To prevent NAPL from passing under the geomembrane, the bottom of the geomembrane was set into the low-permeability clay and silt layer.

Based on soil sampling results, all contaminated soils have been removed from the property, but contamination was detected in a few sidewall samples located off-property (SLAB-21, SLAB-22, SLAB-23, and SLAB-27) as discussed below. Soils with CUL exceedances may be present off-property to the east and south, based on confirmation sampling results in these areas. A total of 39,742 tons of contaminated soils were removed as part of the first and second phase excavations.

2.4 REGULATORY STATUS AND HISTORY

The Site entered into the Ecology Voluntary Cleanup Program (VCP) on October 31, 2007. Ecology, under MTCA, listed the Site in the August 2008 Ecology Hazardous Sites List as having a hazard risk of 3 out of 5. The Ecology Hazardous Site List, which includes all sites that have been assessed and ranked using the Washington Ranking Method, currently lists the site name as "Downtown Safeway" and describes its current status as "Cleanup Started," indicating that it is of moderate concern relative to other sites and remedial actions have been initiated.

Environmental conditions at the Site have been investigated since 2007. The previous property owners conducted a Phase II ESA and associated geophysical survey in October 2007 and entered the Site into the Ecology VCP. To further assess potential impacts to the Site prior to purchase by the City, a Phase II ESA was performed by Brown and Caldwell in 2007 for additional soil and groundwater characterization.

Following the City's purchase of the Site in 2007, and based on the results of the Site's Phase II ESAs (Brown and Caldwell 2007, and AEG 2007), Ecology issued a Potentially Liable Person letter to the City on January 23, 2008. The City accepted Ecology's determination that the City was identified as the "owner or operator" of the Site and that a "release" of "hazardous substances" had occurred at the Site. In May 2008, the City entered into an AO (DE 5446) with Ecology to perform an IA, an RI/FS, and to develop a draft CAP for the Site. In 2008, the City conducted an IA at the Site as required by the AO, to decommission and remove the suspected USTs and remove contaminated soil in the vicinity of the suspected USTs; however, upon initiation of the IA only three small tank remnants were found, and soil contamination was found to be more extensive than anticipated based on the Phase II ESA results. The City proceeded to remove and dispose of the tanks and contaminated soil.

The draft RI/FS was approved by Ecology in April 2012 and concluded that the IA completed at the Site constituted the final clean up action for soil but additional compliance monitoring was required for benzene in one groundwater monitoring well.

3.0 Nature and Extent of Contamination and Cleanup Standards

3.1 NATURE AND EXTENT OF CONTAMINATION

The following subsections provide details on the nature and extent of site contamination for soil and groundwater.

3.1.1 Soil

During the IA excavations in 2009, soil within the property boundary in the vicinity of the historical gas station and western automotive repair area was excavated to a depth of 15 feet and filled with clean backfill (Figure 2.1). The excavation was completed in these areas to a depth where confirmation sampling confirmed that contaminated soils and NAPL had been removed. Because of this excavation it is assumed that no contamination currently exists in the area of the historic gas station or the automotive repair area.

The second phase of the IA excavation removed contaminated soil in the southern portion of the Site to a depth of 15 feet, as supported by excavation floor and confirmation sidewall samples (Table 3.1). Sidewall samples indicated compliance with MTCA Method A CULs in all areas except for four locations (SLAB-21, SLAB-22, SLAB-23, and SLAB-27), which are located adjacent to Chestnut Street Southeast, and adjacent to 5th Avenue Southeast, respectively (refer to Table 3.1 and Figure 2.1). Excavation and removal of soil did not proceed at these locations, as excavation had extended to the property line and did not continue off of the City-owned property, where further excavation would have undermined the sidewalk and street. No other sidewall confirmation samples or excavation floor samples exceeded CULs. The CUL exceedances in SLAB-21, SLAB-22, and SLAB-23 indicated the presence of off-site polyaromatic hydrocarbon (PAH) contamination comingled with gasoline- and diesel-range TPH contamination. In addition, benzene exceeded the CUL in SLAB-22. The SLAB-27 sample had CUL exceedances for PAHs. The TPH contamination likely originated from historical operations at the Site and is addressed by this CAP. Although benzene is a common by-product of manufactured gas plant derived tars, consistent with the results of the Supplemental Remedial Investigation (RI), and may have originated from an off-site source; the benzene contamination is addressed by this CAP. The PAH contamination in the Chestnut Street right-of-way is not addressed by this CAP because we have determined it is associated with an off-site source. The SLAB-21, SLAB-22, SLAB-23, and SLAB-27 sidewall samples were collected deep underneath a paved right-of-way in an area not accessible to the public; institutional controls will prevent disturbance of these soils as discussed in Section 5.0. Re-contamination from off-site sources located to the south of the Site (i.e., SLAB-27) is protected by the geomembrane, discussed in Section 2.3 and shown in Figure 2.1. Maintenance of the geomembrane is an institutional control for the Site, as discussed in Section 5.0.

The TPH exceedances in the SLAB-21, SLAB-22, and SLAB-23 sidewall samples were bounded by the Supplemental RI, where seven Geoprobe soil borings were advanced within the adjacent Chestnut Street Southeast right-of-way located to the east of the SLAB samples and outside of the excavated area. The right-of-way samples were collected in two rows of “step-out” borings and only one soil sample for one analyte collected had a MTCA Method A CUL exceedance. The analytical results from seven borings located in the Chestnut Street right-of-way adjacent to the Site did not show evidence of the right-of-way being impacted by on-property historical automotive or petroleum sources of contamination. The right-of-way impacts, observed during the Supplemental RI, are instead resulting from an off-site contaminant source. Because the SLAB-21, SLAB-22, and SLAB-23 sidewall samples indicated contamination from both an on-site and off-site source, institutional controls to restrict access to the soils at these sidewall sample locations are proposed and discussed below in Section 5.0.

The IA conducted under the Ecology AO for the Site resulted in the removal of all source area soils on the property greater than MTCA Method A CULs. Table 3.1 presents confirmation samples compared to MTCA Method A CULs. Direct contact with right-of-way soils is limited because the residual contamination is at depth (10 feet bgs or deeper) beneath the adjacent right-of-way sidewalk and pavement.

In summary, the following findings regarding soil contamination are relevant:

- Within the property limits, all soil contamination has been removed to a depth of approximately 15 feet bgs; excavation floor samples indicate that the underlying soils are clean.
- The eastern and southern sidewalls contain a zone of deep contamination beneath the Chestnut Street right-of-way. Soils in this area exceed MTCA Method A CULs for cPAHs; these soils are at depth, beneath the paved street right-of-way, and are not accessible to the public. Because the eastern sidewall samples also had TPH exceedances, which are likely attributable to historical operations at the Former Downtown Safeway/City Hall Site, institutional controls to prevent disturbance of these soils are proposed and discussed in Section 5.0.
- Soils along the eastern sidewall also exceed MTCA Method A CULs for several constituents. These CULs are based on the protection of groundwater quality. As discussed in the next section, except for benzene, these constituents have not been detected at concentrations greater than the groundwater CULs, indicating that the residual soil concentrations are protective of groundwater.
- Because of concerns regarding an off-site source to the south and/or southeast, an impermeable geomembrane barrier was installed along the sidewalls to prevent recontamination (refer to Figure 2.1).

3.1.2 Groundwater

The site compliance well network includes eight wells located both within and outside the property boundary. Results from the groundwater compliance monitoring events conducted in 2009–2011, following completion of the IA, indicate the presence of total lead and benzene at levels greater than MTCA Method A CULs. The total lead detections decreased over the sampling period in all wells, and at no time during sampling did dissolved lead levels exceed MTCA Method A CULs (Table 3.2). The observed trends in total lead concentrations are likely attributable to the total suspended solids in the samples.

In Monitoring Well MW-4, benzene was present throughout the RI compliance monitoring events with an increasing trend from less than the MTCA Method A CUL (5 µg/L) during the first three monitoring events to a maximum of 12 µg/L, which was detected during the fourth monitoring event, exceeding the CUL (refer to Table 3.3). Monitoring Well MW-4 was sampled for benzene again in October 2011 as part of the Supplemental RI and benzene was detected at a concentration of 2.7 µg/L, less than the MTCA Method A CUL. The benzene concentration trend in MW-4 is discussed in more detail in Section 4.0.

Because all sources of contamination to groundwater were removed from the Site to a depth of 15 feet, there is no ongoing source from site soils in the top 15 feet that is impacting groundwater. It is possible that the source of the benzene contamination in MW-4 came from deeper-impacted soils or from the SLAB-22 sidewall area soils with a detected benzene CUL exceedance that was not excavated, as described above in Section 3.1.1. Three preliminary groundwater samples collected from Geoprobe borings located in the Chestnut Street Southeast right-of-way in October 2011 were analyzed for benzene, and benzene was not detected in any of the three samples. The analytical reporting limits for the non-detect samples were less than the MTCA Method A CUL. These three samples collected in the right-of-way do not show evidence of being impacted by on-property sources of benzene groundwater contamination and effectively bound the benzene contamination to be localized to MW-4.

A material consisting of dense non-aqueous phase liquid-like contamination and muddy soils was encountered at the bottom of Monitoring Well MW-4 at approximately 20 feet bgs (below the site soil excavation depth) during the Supplemental RI in October 2011. The material was analyzed for TPH (gasoline-, diesel-, and heavy oil-range) and benzene, toluene, ethylbenzene, and xylenes (BTEX). The detected concentrations of benzene and diesel-range TPH exceeded the respective MTCA Method A CULs (refer to Figure 3.1 from the Supplemental RI Data Report). As discussed above, the overlying groundwater in MW-4 was also sampled, contained no MTCA Method A CUL exceedances, and during the October 2011 sampling event did not appear to be impacted by the material in the bottom of the well.

Based on the above evaluation, the only contamination remaining with concentrations greater than MTCA Method A CULs that needs to be addressed for the Site is the benzene detected in Monitoring Well MW-4 during the January 4, 2011 RI groundwater compliance sampling event. The following Sections describe the groundwater remedial actions to address the benzene contamination.

3.2 GROUNDWATER APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected cleanup alternative must comply with MTCA cleanup regulations (WAC 173-340) and with applicable local, state, and federal laws. Under WAC 173-340-350 and WAC 173-340-710, the term "applicable requirements" refers to regulatory cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that specifically address a remedial action, location, chemical of concern, or other circumstance at the Site. The "relevant and appropriate" requirements are regulatory requirements or guidance that do not apply to the Site under law but have been determined to be appropriate for use by Ecology. Applicable or Relevant and Appropriate Requirements (ARARs) are often categorized as location-, action-, or chemical-specific.

3.2.1 Location-specific Applicable or Relevant and Appropriate Requirements

Location-specific ARARs are those requirements that restrict the allowable concentration of hazardous substances or the performance of activities, including remedial actions, solely because they occur in specific locations. Location-specific ARARs include restrictions that may apply to sites located within sensitive or hazard-prone areas such as wetlands, flood plains, or wildlife habitat areas. Location-specific ARARs were evaluated in the Feasibility Study (FS), and the Shoreline Management Act and zoning restrictions were identified as potential ARARs for the property. After analysis, neither the Shoreline Management Act nor the zoning restrictions were found to be ARARs for the property.

3.2.2 Action-specific Applicable or Relevant and Appropriate Requirements

Action-specific ARARs are requirements that define acceptable management practices and are often specific to certain kinds of activities that occur or technologies that are used during the implementation of cleanup actions. The selected remedial alternative will comply with the rules or regulations identified below:

- Federal and State of Washington Worker Safety Regulations (Hazardous Waste Operations and Emergency Response [HAZWOPER], WAC 296-62; Health and Safety 29 CFR 1901.120)
- Occupational Safety and Health Act
- Minimum Standards for Construction and Maintenance of Wells, WAC 173-160
- Washington Industrial Safety and Health Act, WAC 296-62, WAC 296-155, RCW 49.17

3.2.3 Chemical-specific Applicable or Relevant and Appropriate Requirements

The remediation of contaminated site media must meet the CULs developed under MTCA. These potential CULs are considered chemical-specific ARARs. Chemical-specific ARARs consist of those requirements that regulate the acceptable amount or concentration of a constituent that may be found in or released to the environment. The most stringent applicable requirements for cleanup of chemical concentrations on-site were selected as the applicable site CULs. Tables 3.1 and 3.3 include the MTCA Method A CULs as the chemical-specific ARARs applicable to the Site.

3.3 GROUNDWATER CLEANUP LEVELS

MTCA Method A unrestricted CULs for groundwater are appropriate for the Site as the Site meets the applicability requirements of WAC 173-340-704, which includes sites undergoing routine cleanups as defined by WAC 173-340-200 and sites where numerical standards are available for all indicator hazardous substances in the media to which Method A cleanup standards are to be applied. MTCA Method A cleanup standards (Table 3.3) are proposed for groundwater at the Site, as determined in coordination with Ecology and proposed in the Interim Action Work Plan (Brown and Caldwell 2008).

MTCA Method A groundwater CULs protective of potable groundwater were compared to applicable state and federal standards as described in the RI/FS.[1] Their values were found to be the most stringent for the media and pathways identified to be present at the Site; therefore, application of MTCA Method A CULs to groundwater is appropriate.

[1] The MTCA Method A CUL, Method B CUL, and both the state and federal drinking water standards for benzene are all equal to 5.0 µg/L.

3.4 GROUNDWATER POINT OF COMPLIANCE

A point of compliance is defined in MTCA as the point or points on a site where CULs must be met. MTCA defines a standard point of compliance as throughout a site, and unless a site qualifies for a conditional point of compliance, CULs must be met in all media at the standard point of compliance or throughout the site.

The standard point of compliance for groundwater is defined by WAC 173-340-720(8)(b) as "throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site," meaning any groundwater at the site that exceeds the cleanup standard, at any depth. At this Site, only shallow groundwater was tested during the compliance groundwater monitoring events. Below the shallow perched water-bearing zone, multiple clay-confining layers are present that act as an aquitard to separate and protect deeper groundwater. No contamination is expected in groundwater below the shallow perched water-bearing zone.

The groundwater point of compliance will be monitored using MW-4, which will be abandoned and reinstalled as described below in Section 4.0. Compliance with the MTCA Method A CUL for benzene, as a carcinogen, during the proposed four quarterly monitoring events will be determined in accordance with WAC 173-340-720(9)(c)(v)(B) where "For cleanup levels based on chronic or carcinogenic threats, the true mean concentration shall be used to evaluate compliance with groundwater cleanup levels" and WAC 173-340-720(9)(e)(i) which states, "No single sample concentration shall be greater than two times the groundwater cleanup level."

4.0 Groundwater Remedial Actions

4.1 MODEL TOXICS CONTROL ACT REQUIREMENTS

4.1.1 Model Toxics Control Act Threshold Requirements

Section 173-340-360(2) states that all individual cleanup actions shall meet the following requirements:

- **Protect Human Health and the Environment:** Protection of human health and the environment shall be achieved through implementation of the selected remedial alternative.
- **Comply with Cleanup Standards:** Cleanup standards, as defined by MTCA, include CULs for hazardous substances present at the site, the location, or point of compliance where the CULs must be met, and any regulatory requirements that may apply to the site due to the type of action being implemented and/or the location of the site.
- **Comply with Applicable State and Federal Laws:** WAC 173-340-710 states that cleanup standards shall comply with applicable state and federal laws, as ARARs for the site.
- **Provide for Compliance Monitoring:** MTCA requires that all selected cleanup alternatives provide for compliance monitoring as described in Section 173-340-410 of the WAC. Compliance monitoring consists of three different types of monitoring, including the following:
    - *Protection monitoring* during remedial implementation to monitor short-term risks and confirm protection of human health and the environment during construction activities.
    - *Performance monitoring* to confirm compliance with the site CULs immediately following remedial implementation.
    - *Confirmational monitoring* to evaluate long-term effectiveness of the remedial action following attainment of the cleanup standards.

4.1.2 Other Model Toxics Control Act Requirements

Cleanup alternatives that meet the Threshold Requirements must also fulfill the requirements described in WAC 173-340-360(2)(b). These additional requirements are as follows:

- Use permanent solutions to the maximum extent practicable.
- Provide for a reasonable restoration time frame.
- Consideration of public concerns.

4.1.3 Disproportionate Cost Analysis

A MTCA Disproportionate Cost Analysis (DCA) was performed in the FS to compare the alternatives and evaluate whether the cleanup action uses permanent solutions to the maximum extent practicable. Using the DCA, the relative benefits and costs of each the alternatives are compared using protectiveness, permanence, cost, effectiveness over the long-term, management of short-term risks, technical and administrative implementability, and consideration of public concerns as evaluation criteria.

4.2 REMEDIAL TECHNOLOGIES CONSIDERED

Remedial technologies that were considered in the RI/FS included the most commonly implemented remedial technologies for remediation of benzene in groundwater. A technology screening analysis was performed to eliminate technologies that did not meet the Remedial Action Objectives, were not technically feasible, and/or did not address the types of contamination present in groundwater. No action, institutional controls, monitored natural attenuation, source removal, air sparging and soil vapor extraction, and pump and treat were evaluated as groundwater remedial technologies. No action, institutional controls, and monitored natural attenuation were retained for development of alternatives to address groundwater contamination and are discussed below in Section 4.3.

Source removal by excavation was rejected during the technology screening step under MTCA because it was not implementable given site conditions and did not contribute to the achievement of Remedial Action Objectives. Air sparging and soil vapor extraction was rejected during the technology screening step because it does not have proven success at sites with similar conditions (i.e., low-level benzene concentrations) and has limited applicability given physical area conditions. Pump and treat was rejected during the technology screening because of the high pumping rates anticipated, coupled with the limited low-level benzene contamination. Additionally, the off-site conditions made pump and treat infeasible for groundwater treatment. Table 11.1 of the RI/FS provides a summary of the preliminary screening of remedial technologies.

4.3 GROUNDWATER ALTERNATIVES CONSIDERED

In the FS, three groundwater alternatives were evaluated against the MTCA Threshold and Other Requirements and in the DCA to determine the cleanup action that uses permanent solutions to the maximum extent practicable per WAC 173-340-360. The cleanup action alternatives that were evaluated in the RI/FS included the following:

- Alternative 1 was the “No Action” alternative that was included in the analysis as a baseline for the comparison and evaluation of the other remedial alternatives. With Alternative 1, no remedial technologies would have been applied to the Site. Alternative 1 is representative of conditions that would occur if no remedial actions were implemented at the Site.
- Alternative 2 included groundwater compliance monitoring with institutional controls to restrict the use of MW-4 groundwater. Under Alternative 2, MW-4 compliance monitoring and institutional controls would be applied to the Site to manage exposure through administrative controls. The pathways of human exposure would be addressed through restrictions on groundwater withdrawals.
- Alternative 3 is the preferred groundwater remedial alternative and consists of abandonment of the existing MW-4 and installation of a replacement well, and institutional controls to restrict use of MW-4 groundwater. Over time, concentrations of benzene in MW-4 groundwater are expected to continue to decrease, but until

they reach CULs, institutional controls will be used to achieve compliance with remedial action objectives and to ensure that the Site complies with the requirements outlined in the FS and this site CAP.

4.4 PREFERRED GROUND WATER REMEDIAL ACTION

The Preferred Groundwater Remedial Action developed in accordance with WAC 173-340-350 through 173-340-390 and selected through this CAP is Alternative 3 from the FS, which includes abandonment of the existing MW-4 and installation of a replacement well, and ground water compliance monitoring of the new MW-4. The groundwater remedial action is designed to monitor the residual benzene contamination and confirm that benzene concentrations are reduced over time. The groundwater remedial action consists of the following elements:

- Abandonment of the existing MW-4
- Installation of a replacement well
- Four quarters of groundwater compliance monitoring
- Institutional controls to restrict use of MW-4 groundwater

As discussed below, the Preferred Groundwater Remedial Action was selected because it complies with the MTCA Threshold Requirements, the Other MTCA Requirements, and was selected through the DCA to have the lowest cost per unit benefit ratio and highest ranking when compared to the other alternatives because of its long-term effectiveness and implementability. The Preferred Groundwater Remedial Action is more protective of human health and the environment than the other alternatives because the replacement well for MW-4 will provide greater certainty that the alternative is succeeding.

4.4.1 Compliance with Model Toxics Control Act

In the FS, the Preferred Groundwater Remedial Action was determined to meet the MTCA criteria outlined in Section 4.1. The Preferred Groundwater Remedial Action meets the Threshold Requirements for selection of a cleanup action under MTCA WAC 173-340-360(2)(a) because it is protective of human health and the environment, complies with cleanup standards, complies with applicable state and federal laws, and provides for compliance monitoring. The following bullets describe how the Preferred Groundwater Remedial Action meets the MTCA criteria:

- **Protect Human Health and the Environment:** The Preferred Groundwater Remedial Action is protective of human health and the environment through groundwater compliance monitoring and the implementation of institutional controls. The benzene detected in MW-4 groundwater at concentrations greater than MTCA Method A CULs has since declined to concentrations lower than MTCA Method A CULs. Institutional controls restricting groundwater use would prevent exposure in case concentrations were to increase in the future. Because benzene is a carcinogen, the true mean sample concentration for monitoring events within a 1-year period is used to compare to the CUL (WAC 173-340-720(9)(c)(v)(B). During the post-IA time period, the average benzene concentration was 4.6 µg/L, which is less than the CUL and corresponds to a cumulative cancer risk from groundwater at the Site of less than 1.0×10^{-5}. Since 2009, groundwater concentrations were elevated greater than the CUL in only one of five events.

- **Comply with Cleanup Standards:** The Preferred Groundwater Remedial Action complies with all MTCA Cleanup Standards, as it is expected that monitoring will show that benzene has permanently decreased in concentration to less than the MTCA Method A CULs within a reasonable time frame.
- **Comply with Applicable State and Federal Laws:** The Preferred Groundwater Remedial Action will comply with all applicable state and federal laws and ARARs for the Site, as described in Section 3.2.
- **Provide for Compliance Monitoring:** The Preferred Groundwater Remedial Action meets the requirements for compliance monitoring through implementation of a confirmation monitoring program to confirm groundwater compliance. This monitoring program also includes the installation of a replacement well to provide reliable monitoring data that are representative of post-remedial actions and existing site conditions.

The Preferred Groundwater Remedial Action also meets the Other MTCA Requirements for selection under MTCA WAC 173-340-360(2)(b), such as using permanent solutions to the maximum extent practicable, providing for a reasonable restoration time frame, and considering public concerns. The Preferred Groundwater Remedial Action also meets the requirements of expectations for cleanup actions under MTCA WAC 173-340-370(7) where natural attenuation can be appropriate for sites where a) “source control has been conducted to the maximum extent practicable,” b) “leaving contaminants on-site during the restoration time frame does not pose an unacceptable threat to human health or the environment,” c) “there is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site,” and d) “appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.”

The Preferred Groundwater Remedial Action received the lowest cost per unit benefit ratio in the DCA and received the highest ranking in the DCA because of its long-term effectiveness and implementability.

4.4.2 Abandonment and Replacement of Monitoring Well MW-4

The final construction details of the existing MW-4 well are uncertain as a well construction log is not available. Although the target well screened depths for MW-4 were recorded as 5 to 20 feet bgs, during the Supplemental RI, the bottom of MW-4 was measured to be 21 feet bgs, deeper than the IA excavation to 15 feet bgs. For these reasons, the Preferred Groundwater Remedial Action includes abandonment of the existing MW-4 and installation of a replacement well in order to collect reliable compliance monitoring data.

The replacement monitoring well will be located as close to MW-4’s existing location as feasible given the current configuration of the City Hall Building, fence line, and parking structures. This replacement well will be screened within the site backfilled conditions (5 to 15 feet bgs) to provide a monitoring location that will provide reliable compliance monitoring data that are representative of post-remedial actions and site conditions.

4.4.3 Groundwater Compliance Monitoring

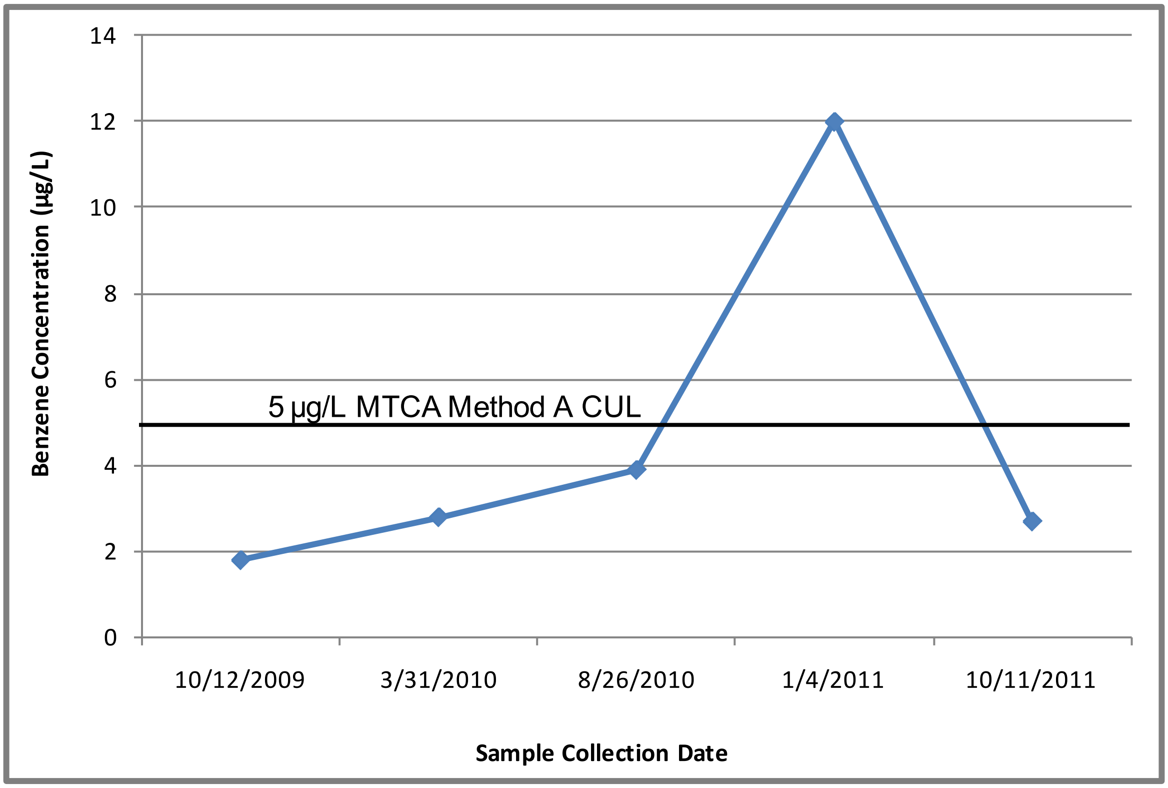
During the RI groundwater monitoring events, MW-4 was the only well to have detections of a chemical at concentrations greater than MTCA Method A CULs. As shown below in Figure 4.1, benzene exceeded the MTCA Method A CUL for benzene during the January 2011 groundwater monitoring event, but the benzene concentration did not exceed the CUL during any other ground water monitoring events. An increasing trend in the benzene concentration in MW-4 was observed for the first four monitoring events, but the concentration decreased during the October 2011 sampling event (Figure 4.1).

Because there were no detections of chemicals at concentrations greater than the MTCA Method A CUL in any other wells, this groundwater remedial action only applies to MW-4. All site sources of contamination were removed during the IA excavation to 15 feet bgs. The groundwater remedial action includes groundwater compliance monitoring from a new MW-4 replacement well (Section 4.3.1) and institutional controls to manage exposure routes via restrictions of groundwater withdrawals.

As part of the Preferred Groundwater Remedial Action, compliance monitoring will be conducted to document groundwater compliance with CULs. Following the abandonment of the existing MW-4 and the installation of a replacement well, confirmation groundwater sampling for benzene in MW-4 will be conducted for four quarters to confirm groundwater concentrations are in compliance with CULs in this area.

Compliance with the MTCA Method A CUL for benzene, as a carcinogen, during the proposed four quarterly monitoring events will be determined in accordance with MTCA WAC 173-340-720(9)(c)(v)(B) where “For cleanup levels based on chronic or carcinogenic threats, the true mean concentration shall be used to evaluate compliance with groundwater cleanup levels” and WAC 173-340-720(9)(e)(i) which states, “No single sample concentration shall be greater than two times the groundwater cleanup level.” If the mean concentration of benzene detected in MW-4 during the compliance monitoring four quarterly events is less than the CUL and no single benzene detected concentration is greater than two times the CUL, then MW-4 is in compliance with MTCA and the applicable CULs and compliance monitoring will be complete.

Detected Concentrations of Benzene in Monitoring Well MW-4 by Monitoring Event



4.4.4 Preferred Groundwater Remedial Action Summary

The Preferred Groundwater Remedial Action for the Site consists of abandonment of the existing MW-4 and installation of a replacement well, compliance monitoring that includes four quarters of monitoring for benzene in MW-4 groundwater, and institutional controls to restrict use of MW-4 groundwater until the benzene CUL is achieved. The Preferred Groundwater Remedial Action is Alternative 3 from the FS, which was demonstrated in the FS to comply with all of the MTCA requirements.

The feasibility study identified and recommended with concurrence from Ecology that the MW-4 groundwater selected remedial action and the soil IA provide a permanent and protective remedy to address contamination and control exposure pathways. Following MW-4 compliance monitoring, and once groundwater is in compliance with CULs, no additional remedial actions to address contamination from on-site releases will be required.

The IA performed at the Site combined with the implementation of institutional controls (discussed in Section 5.0) constitutes the final cleanup action for soils at the Site, consistent with WAC 173-340-350 through WAC173-340-390 as allowed by WAC 173-340-430(1) and the AO. There are no further remedial actions required for soil.

4.5 GROUNDWATER MONITORING AND CONTINGENCY ACTIONS

Consistent with the FS preferred alternative, benzene concentrations will be monitored in MW-4 for four quarters. As described above, compliance with MTCA during the monitoring will be determined in accordance with MTCA WAC 173-340-720(9)(c)(v)(B) where "For cleanup levels based on chronic or carcinogenic threats, the true mean concentration shall be used to evaluate compliance with groundwater cleanup levels" and WAC 173-340-720(9)(e)(i) which states, "No single sample concentration shall be greater than two times the groundwater cleanup level." Currently, the mean benzene concentration in MW-4 is in compliance, but a one time exceedance was more than twice the CUL. Following the four quarters of monitoring, if the well is determined to be in compliance, monitoring will cease, and the remedial action and its monitoring will be complete.

If benzene concentrations are greater than the CUL after compliance monitoring, then Ecology may consider requiring the development of a Contingency Plan and contingent action(s) to be taken. The contingency action could include extending the duration of institutional controls on MW-4 groundwater. If Ecology determines that a Contingency Plan is needed, the City will prepare the plan for Ecology review.

5.0 Institutional Controls

Institutional controls will be used to prohibit activities in the southern and eastern boundaries of the Site due to off-site residual contamination not related to the Site. As discussed in the RI, there is an apparent historical source of contamination located south or southeast of the Site that has contaminated the soils near the base of the fill layer, but above the clay aquitard. The contamination is in the form of residual NAPL and includes detections and CUL exceedances of cPAH. The residual contamination is not soluble to any great extent, and groundwater complies with groundwater cleanup standards, indicating that this is a historical source of contamination.

Within the property, all soil contamination has been removed. A geomembrane was installed along the southern sidewall and for 50 feet extending along the eastern and western sidewalls to prevent re-contamination of the Site by soil sloughing during the IA and any potential NAPL migration in the future. An Environmental Covenant will be placed on the City Hall property to provide notice of the geomembrane layer along 5th Avenue Southeast, Cherry Street Southeast, and Chestnut Street Southeast right-of-ways (refer to Figure 2.1). Controls limiting and/or managing disturbance of the constructed HDPE geomembrane liner will be implemented to prevent liner disturbance and ensure proper reconstruction of disturbed liner areas. Additionally, controls limiting and/or managing disturbance of soils along the eastern site boundary and beneath the Chestnut Street Southeast right-of-way, where excavation sidewall soil samples exceeded soil CULs, will be implemented to prevent and/or manage worker safety during any soil-disturbing activities such as utility work in this area.

Institutional controls also will be used to prevent the withdrawal of groundwater (except for purposes of monitoring) until four quarters of monitoring at the new MW-4 confirm that groundwater concentrations of benzene are in compliance with CULs, as described in Section 4.3.3.

6.0 Cleanup Action Plan Schedule

In general, the following reporting and remedial action implementation activities will occur in accordance with the following schedule. This schedule is subject to change based on Ecology's review schedule, City coordination, and other conditions not foreseen.

There will be a public comment period for this draft CAP concurrent with the draft RI/FS, after which Ecology will address the comments in a Responsiveness Summary and issue the final RI/FS and CAP.

Within 60 days of Ecology issuance of the final CAP, the existing MW-4 well will be abandoned and a new monitoring well will be installed. The first quarter of groundwater monitoring will commence following the well installation. The other three quarters of groundwater monitoring will follow and will be expected to be complete approximately 1 year following issuance of the final CAP. Through compliance monitoring, the concentration of benzene in MW-4 is expected to continue to decrease to be less than the MTCA Method A CUL.

Quarterly data reports will be submitted to Ecology within 30 days of receipt of final validated analytical data, which is expected to be approximately 60 days following each sampling event. The AO requirements for the CAP and the groundwater compliance monitoring will be accomplished according to the schedule presented below.

Document or Event	Date
Final CAP	Following joint RI/FS public comment and responsiveness summary
Draft Focused Compliance Monitoring Work Plan	Within 20 days of the effective date of the final CAP
Final Focused Compliance Monitoring Work Plan	Within 15 days of receipt of Ecology's comments on the draft work plan
Record Environmental Covenant	Within 60 days of the effective date of the final CAP
Abandonment and Installation of the MW-4 Replacement Well	Within 60 days of the effective date of the final CAP
1st Quarter of Groundwater Compliance Monitoring	Within 60 days of the effective date of the final CAP
2nd Quarter of Groundwater Compliance Monitoring	Within 90 days after the first groundwater compliance monitoring event
3rd Quarter of Groundwater Compliance Monitoring	Within 90 days after the second groundwater compliance monitoring event
4th Quarter of Groundwater Compliance Monitoring	Within 90 days after the third groundwater compliance monitoring event
Quarterly Groundwater Monitoring Data Reports	Within 30 days of receipt of final validated data

Note:

1 An Engineering Design Report (EDR) is not required for the implementation of the CAP.

Abbreviations:

CAP Cleanup Action Plan
Ecology Washington State Department of Ecology
RI/FS Remedial Investigation/Feasibility Study

7.0 References

Associated Environmental Group, LLC (AEG). 2007. *Phase II Environmental Site Assessment, Former Safeway Store and Separate Retail Space.* Prepared for John and Glenda Drebick, Olympia, Washington. Olympia, Washington. October.

Brown and Caldwell Engineering (Brown and Caldwell). 2007. *Phase II Environmental Site Assessment, Former Safeway Site, 601 and 609 Fourth Avenue East, Olympia, Washington.* Prepared for the City of Olympia, Olympia, Washington. 30 November.

———. 2008. *Former Safeway Site Interim Action—Work Plan.* Prepared for the City of Olympia, Olympia, Washington. 26 February.

CDM. 2002a. *McAllister Wellfield Numerical Model (Sections 1–4) Interim Report.* Prepared for the City of Olympia Public Works Department, Olympia, Washington. April.

———. 2002b. *McAllister Wellfield Numerical Model (Sections 5–8) Final Report.* Prepared for the City of Olympia Public Works Department, Olympia, Washington. July.

City of Olympia. 2003. "Chapter 1: Overview" in *Comprehensive Plan for Olympia and the Olympia Growth Area.* Last accessed on April 29, 2011 at <http://www.ci.olympia.wa.us/documents/2007CompPlan/Chapter01-Overview.pdf>. 10 October.

———. 2004. "Olympia Downtown Historic District: Listed on the Washington Heritage Register and the National Register of Historic Places, 2004."

———. 2010a. "Streams and Shorelines–Moxlie Creek Watershed." Last accessed on April 29, 2011 at <http://www.ci.olympia.wa.us/en/city-utilities/storm-and-surface-water/streams-and-shorelines/streams-and-shorelines-moxlie-creek-watershed.aspx>.

———. 2010b. "Twentieth Century Growth." Last accessed on July 5, 2011 at <http://www.ci.olympia.wa.us/community/about-olympia/history-of-olympiawashington. aspx>.

Golder Associates. 2008a. *Hydrogeologic Conditions in the City of Olympia Well Field Areas, Thurston County, Washington.* Prepared for the City of Olympia, Olympia, Washington. Seattle, Washington. May.

———. 2008b. *Wellhead Protection Area Delineation for the City of Olympia Wellfield Areas, Thurston County, Washington*. Prepared for the City of Olympia, Olympia, Washington. Seattle, Washington. May.

Newell, Gordon. 1975. *Rogues, Buffoons & Statesmen*. Seattle: Superior Publishing Company. Pp. 242–243.

Pacific Groundwater Group (PGG). 2005. *Proposed City of Olympia Artesian Well, Background Information on Groundwater Flow and Quality in Downtown Olympia.* Prepared for the Friends of the Artesians, Olympia, Washington. Seattle, Washington. June.

Polks' City of Olympia Directory. 1936–2007.

City of Olympia
Former Downtown Safeway/City Hall Site

Cleanup Action Plan

Tables

DRAFT

Table 2.1
Groundwater Elevation Data

Monitoring Well ID	Top of Casing Elevation (NGVD29)	Groundwater Elevation (NGVD29)				
		10/8/2009	3/30/2010	8/26/2010	1/3/2011	4/12/2011
MW-1	12.11	8.66	10.68	10.14	10.45	10.78
MW-2	12.95	12.95	9.26	12.04	12.50	12.95
MW-3	15.27	8.82	9.76	8.09	8.85	11.78
MW-4	14.09[1]	5.06	7.28	4.28	4.55	4.14
MW-5	12.42	8.96	9.82	7.68	8.17	7.91
MW-6	11.93	7.37	8.75	9.30	9.84	9.75
MW-7	12.29	8.54	9.87	8.37	8.85	8.67
MW-8	12.78	5.55	7.37	6.31	6.52	5.18

Note:

1 MW-4 was not resurveyed in 2011 because of access. The elevation listed is approximate and is assumed to be the historical elevation plus the average difference of all other surveyed wells, resulting in an increase of 2.47 feet from the previous survey.

Abbreviation:

NGVD29 National Geodetic Vertical Datum of 1929

Table 3.1
Soil Cleanup Levels and Select Sample Exceedances

			Excavation Floor Samples[1]							Confirmation Sidewall Samples[2]						
		Sample ID	C-2	F-13	F-17	F-18	SLAB-5	SLAB-6	SLAB-19	F-14	F-19	F-20	F-21	SLAB-13	SLAB-14	SLAB-18
		Sample Date	11/14/2008	11/25/2008	11/25/2008	11/25/2008	3/13/2009	3/13/2009	3/25/2009	11/25/2008	11/25/2008	11/25/2008	11/25/2008	3/18/2009	3/18/2009	3/25/2009
		Sample Depth (feet bgs)	15	15	15	15	15	15	15	8	8	8	12	12	12	14
Parameter	**Units**	**MTCA Method A**														
Total Petroleum Hydrocarbons (TPH)																
TPH—Gasoline Range	mg/kg	30	10 U	10 U	10 U	10 U	22	18	10 U	10 U	10 U	10 U	10 U	10 U	**66**	10 U
TPH—Diesel Range	mg/kg	2,000	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
TPH—Heavy Oil Range	mg/kg	2,000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Semivolatile Organic Compounds																
Naphthalenes																
Naphthalene	mg/kg	5	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.13 J	0.96	0.01 U	0.01 U	0.01 U	0.01 U	0.78	0.02 U	0.15
1-Methylnaphthalene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 J	0.07	0.01 U	0.01 U	0.01 U	0.01 U	0.21	0.02 U	0.02 U
2-Methylnaphthalene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.06 J	0.07	0.01 U	0.01 U	0.01 U	0.01 U	0.6	0.02 U	0.02 U
Total Naphthalenes[4]	mg/kg	5	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.21 J	1.1	0.01 U	0.01 U	0.01 U	0.01 U	1.6	0.02 U	0.15
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAH)																
Benzo(a)pyrene	mg/kg	0.1	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.07
Benzo(a)anthracene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U
Benzo(b)fluoranthene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.06
Benzo(k)fluoranthene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.152
Chrysene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.04	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.37
Dibenzo(a,h)anthracene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U
Indeno(1,2,3-cd)pyrene	mg/kg	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U	0.01 U	0.01 U	0.01 U	0.01 U	0.02 U	0.02 U	0.02 U
Summed cPAH TEQ[5,6]	mg/kg	0.1	0 U	0 U	0 U	0 U	0 U	0 U	0.0004	0 U	0 U	0 U	0 U	0 U	0 U	0.095
Summed cPAH TEQ with One-half of the Detection Limits[5,7]	mg/kg	0.1	0.008 U	0.01 U	0.008 U	0.01 U	0.02 U	0.02 U	0.02	0.008 U	0.008 U	0.008 U	0.008 U	0.02 U	0.02 U	0.098
Volatile Organic Compounds																
Benzene, Toluene, Ethylbenzene, and Xylenes																
Benzene	mg/kg	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	--	--	--	0.02 U	0.02 U	0.02 U
Toluene	mg/kg	7	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	0.05 U	0.05 U	0.05 U
Ethylbenzene	mg/kg	6	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	0.05 U	0.05 U	0.05 U
m,p-Xylene	mg/kg	NA		--	--	--	--	--		--	--	--	--	--	--	
o-Xylene	mg/kg	NA		--	--	--	--	--		--	--	--	--	--	--	
Xlyene (total)	mg/kg	9	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	--	--	--	0.15 U	0.15 U	0.15 U
Other Volatile Organic Compounds																
Dibromomethane	mg/kg	NA		--	--	--	--	--	0.05 U	--	--	--	--	--	--	0.05 U
Ethylene dibromide (EDB)	mg/kg	0.005	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	0.05 U	0.05 U	0.05 U

Notes:

BOLD Indicates a detected concentration that exceeds the MTCA Method A cleanup levels.
-- Indicates the sample was not analyzed for specific compounds.
1 Excavation Floor Samples pertain to those samples collected at the base of excavation.
2 Confimation Sidewall Samples pertain to those samples collected at the completed edges of excavation.
3 Confirmation Sidewall Samples at the Property Boundary pertain to those samples collected at the completed edges of excavation at the property boundary.
4 Calculation of total napthalene concentrations included the detected concentrations of naphthalene, 2-methylnaphthalene, and 1-methlynaphthalene presented in Table 740-1 of WAC 173-340-900.
5 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivancy Factors as presented in Table 708-2 of WAC 173-340-900.
6 Calculated using detected cPAH concentrations.
7 Calculated using detected cPAH concentrations plus one-half the detection limit for cPAHs that were not detected.

Abbreviations:

bgs Below ground surface
MTCA Model Toxics Control Act
NA Not available
TEQ Toxic equivalency quotient
WAC Washington Administrative Code

Qualifiers:

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.
U The analyte was analyzed for but was not detected at a concentration greater than the reported limit.

Table 3.1
Soil Cleanup Levels and Select Sample Exceedances

			Confirmation Sidewall Samples at the Property Boundary[3]									
		Sample ID	**SLAB-2**	**SLAB-3**	**SLAB-15**	**SLAB-21**	**SLAB-22**	**SLAB-23**	**SLAB-24**	**SLAB-25**	**SLAB-25 FD**	**SLAB-27**
		Sample Date	**3/4/2009**	**3/4/2009**	**3/20/2009**	**4/5/2009**	**4/5/2009**	**4/5/2009**	**4/15/2009**	**4/15/2009**	**4/15/2009**	**4/15/2009**
		Sample Depth (feet bgs)	**14**	**14**	**12**	**12**	**10**	**12**	**8**	**15**	**15**	**14**
Parameter	**Units**	**MTCA Method A**										
Total Petroleum Hydrocarbons (TPH)												
TPH—Gasoline Range	mg/kg	30	10 U	10 U	10 U	**640**	**2,500**	**1,200**	10 U	10 U	10 U	10 U
TPH—Diesel Range	mg/kg	2,000	50 U	50 U	770 J	**3,000**	**7,300**	**16,000**	50 U	50 U	50 U	1200
TPH—Heavy Oil Range	mg/kg	2,000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Semivolatile Organic Compounds												
Naphthalenes												
Naphthalene	mg/kg	5	0.02 U	0.02 U	0.26	**390**	**500**	**170**	0.17	0.03	0.03	**48**
1-Methylnaphthalene	mg/kg	NA	0.63	0.04	0.12	13	11	70.7	0.22	0.02 U	0.02 U	27
2-Methylnaphthalene	mg/kg	NA	0.44	0.06	0.12	22	22	105	0.09	0.02 U	0.02 U	46
Total Naphthalenes[4]	mg/kg	5	1.1	0.1	0.5	**425**	**533**	**346**	0.5	0.03	0.03	**121**
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAH)												
Benzo(a)pyrene	mg/kg	0.1	0.02 U	0.02 U	0.02 U	**2.6**	**2.8**	**6.4**	0.02 U	0.02 U	0.02 U	**1.5**
Benzo(a)anthracene	mg/kg	NA	0.67	0.02 U	1.28	5.6	6.2	33	0.02 U	0.02 U	0.02 U	13
Benzo(b)fluoranthene	mg/kg	NA	0.02 U	0.02 U	0.02 U	3.8	4	13.4	0.02 U	0.02 U	0.02 U	2.1
Benzo(k)fluoranthene	mg/kg	NA	0.02 U	0.02 U	0.02 U	0.26	0.28	1.4	0.02 U	0.02 U	0.02 U	1.7
Chrysene	mg/kg	NA	0.65	0.02 U	1.55	3.8	5	20	0.02 U	0.02 U	0.02 U	8
Dibenzo(a,h)anthracene	mg/kg	NA	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	2.7	0.02 U	0.02 U	0.02 U	0.02 U
Indeno(1,2,3-cd)pyrene	mg/kg	NA	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	2.94	0.02 U	0.02 U	0.02 U	0.02 U
Summed cPAH TEQ[5,6]	mg/kg	0.1	0.07	0 U	**0.14**	**3.6**	**3.9**	**12**	0 U	0 U	0 U	**3.3**
Summed cPAH TEQ with One-half of the Detection Limits[5,7]	mg/kg	0.1	0.09	0.02 U	**0.16**	**3.6**	**3.9**	**12**	0.02 U	0.02 U	0.02 U	**3.3**
Volatile Organic Compounds												
Benzene, Toluene, Ethylbenzene, and Xylenes												
Benzene	mg/kg	0.03	0.02 U	0.02 U	0.02 U	0.02 U	**0.043**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Toluene	mg/kg	7	0.051	0.05 U	0.05 U	0.099	0.18	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethylbenzene	mg/kg	6	0.05 U	0.05 U	0.05 U	0.067	1.9	0.26	0.05 U	0.05 U	0.05 U	0.05 U
m,p-Xylene	mg/kg	NA	--	--	--							
o-Xylene	mg/kg	NA	--	--	--							
Xlyene (total)	mg/kg	9	0.15 U	0.15 U	0.15 U	0.55	3.8	0.57	0.15 U	0.15 U	0.15 U	0.15 U
Other Volatile Organic Compounds												
Dibromomethane	mg/kg	NA	--	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Ethylene dibromide (EDB)	mg/kg	0.005	0.05 U	0.05 U	0.05 U	**0.47**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

Notes:

BOLD Indicates a detected concentration that exceeds the MTCA Method A cleanup levels.
-- Indicates the sample was not analyzed for specific compounds.
1 Excavation Floor Samples pertain to those samples collected at the base of excavation.
2 Confimation Sidewall Samples pertain to those samples collected at the completed edges of excavation.
3 Confirmation Sidewall Samples at the Property Boundary pertain to those samples collected at the completed edges of excavation at the property boundary.
4 Calculation of total napthalene concentrations included the detected concentrations of naphthalene, 2-methylnaphthalene, and 1-methlynaphthalene presented in Table 740-1 of WAC 173-340-900.
5 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 Toxic Equivancy Factors as presented in Table 708-2 of WAC 173-340-900.
6 Calculated using detected cPAH concentrations.
7 Calculated using detected cPAH concentrations plus one-half the detection limit for cPAHs that were not detected.

Abbreviations:

bgs Below ground surface
MTCA Model Toxics Control Act
NA Not available
TEQ Toxic equivalency quotient
WAC Washington Administrative Code

Qualifiers:

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.
U The analyte was analyzed for but was not detected at a concentration greater than the reported limit.

Table 3.2
Remedial Investigation Groundwater Compliance Monitoring
Analytical Groundwater Data for Lead

		Sample Well	**MW-1**				**MW-2**				**MW-3**				**MW-4**			
		Sample Date	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**
Parameter	**Units**	**MTCA Method A**																
Metals																		
Lead (dissolved)	µg/L	NA	2 U	2 U	2 U	2 U	3.1	2 U	2 U	2 U	2 U	2 U	2 U	2 U	3.3	2 U	2 U	2 U
Lead (total)	µg/L	15	**19**	2 U	2 U	2 U	**99**	14	**53**	2 U	14	2 U	6.8	2 U	**78**	2 U	2 U	2 U

Note:
BOLD Indicates a detected concentration that exceeds the MTCA Method A cleanup levels.

Abbreviations:
MTCA Model Toxics Control Act
NA Not available

Qualifier:
U The analyte was analyzed for but not detected at a concentration greater than the reported limit.

Table 3.2
Remedial Investigation Groundwater Compliance Monitoring
Analytical Groundwater Data for Lead

		Sample Well	MW-5				MW-6				MW-7				MW-8			
		Sample Date	**10/12/2009**	**3/31/2010**	**8/27/2010**	**1/5/2011**	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**	**10/12/2009**	**3/31/2010**	**8/27/2010**	**1/5/2011**	**10/12/2009**	**3/31/2010**	**8/27/2010**	**1/5/2011**
Parameter	**Units**	**MTCA Method A**																
Metals																		
Lead (dissolved)	µg/L	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Lead (total)	µg/L	15	**23**	2 U	2 U	2 U	**88**	2 U	2 U	2 U	**53**	2 U	**47**	2 U	**43**	2 U	2 U	2 U

Note:
BOLD Indicates a detected concentration that exceeds the MTCA Method A cleanup levels.

Abbreviations:
MTCA Model Toxics Control Act
NA Not available

Qualifier:
U The analyte was analyzed for but not detected at a concentration greater than the reported limit.

FLOYD | SNIDER

Former Downtown Safeway/City Hall Site

Table 3.3
Groundwater Cleanup Levels and Analytical Data for Benzene in MW-4

		Sample Well	Groundwater Compliance Monitoring Data MW-4				
		Sample Date	**10/12/2009**	**3/31/2010**	**8/26/2010**	**1/4/2011**	**10/11/2011[1]**
Parameter	**Units**	**MTCA Method A**					
Volatile Organic Compounds							
Benzene, Toluene, Ethylbenzene, and Xylenes							
Benzene	µg/L	5	1.8	2.8	3.9	**12**	2.7

Notes:

BOLD Indicates a detected concentration that exceeds the MTCA Method A cleanup levels.

1 An additional sample of the bottom material encountered in MW-4 was collected from the bottom of the well casing and had a detection of benzene. The results are described in the Supplemental Remedial Investigation Data Report.

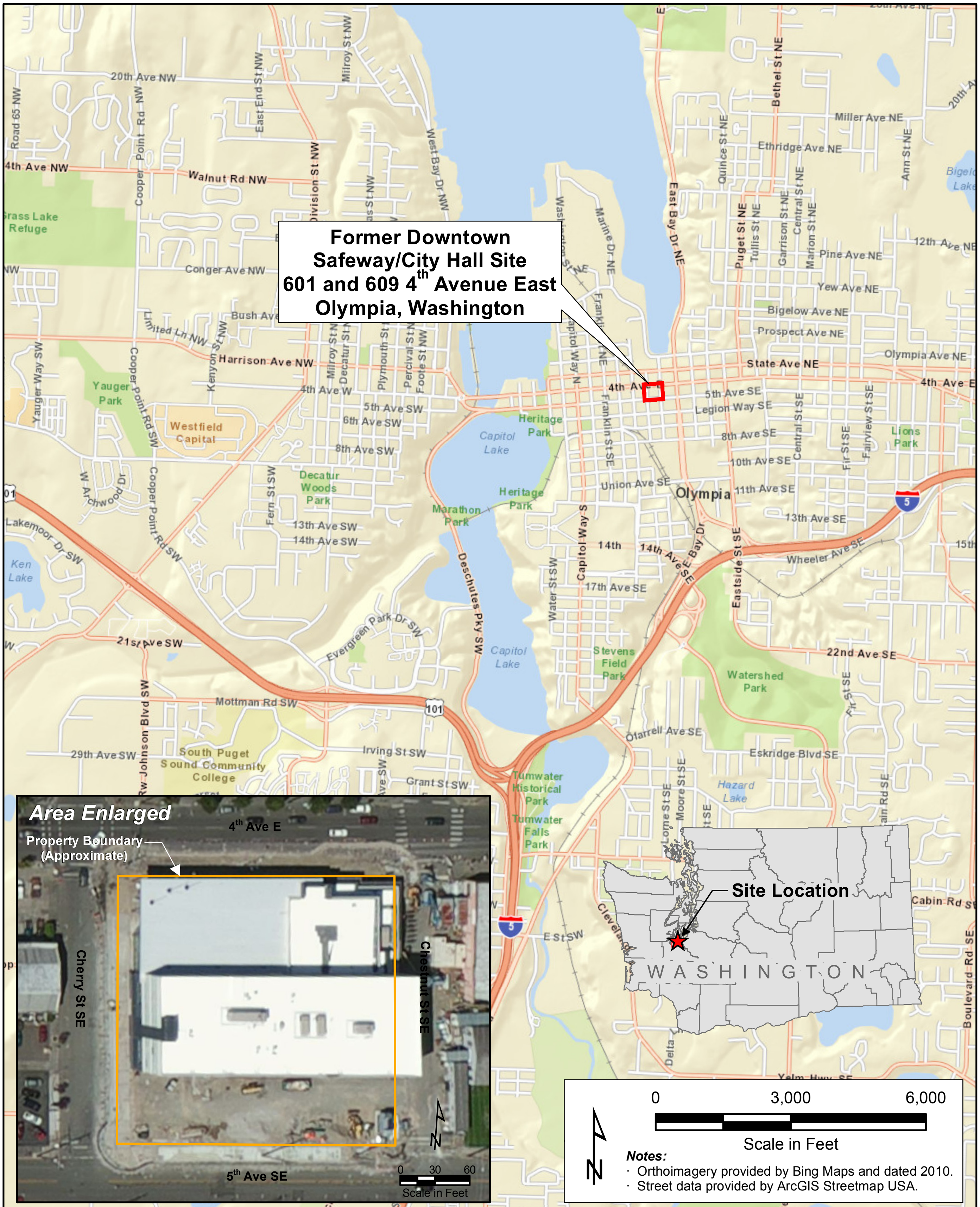
Abbreviation:

MTCA Model Toxics Control Act

City of Olympia
Former Downtown Safeway/City Hall Site

Cleanup Action Plan

Figures



FLOYD | SNIDER
strategy ▪ science ▪ engineering

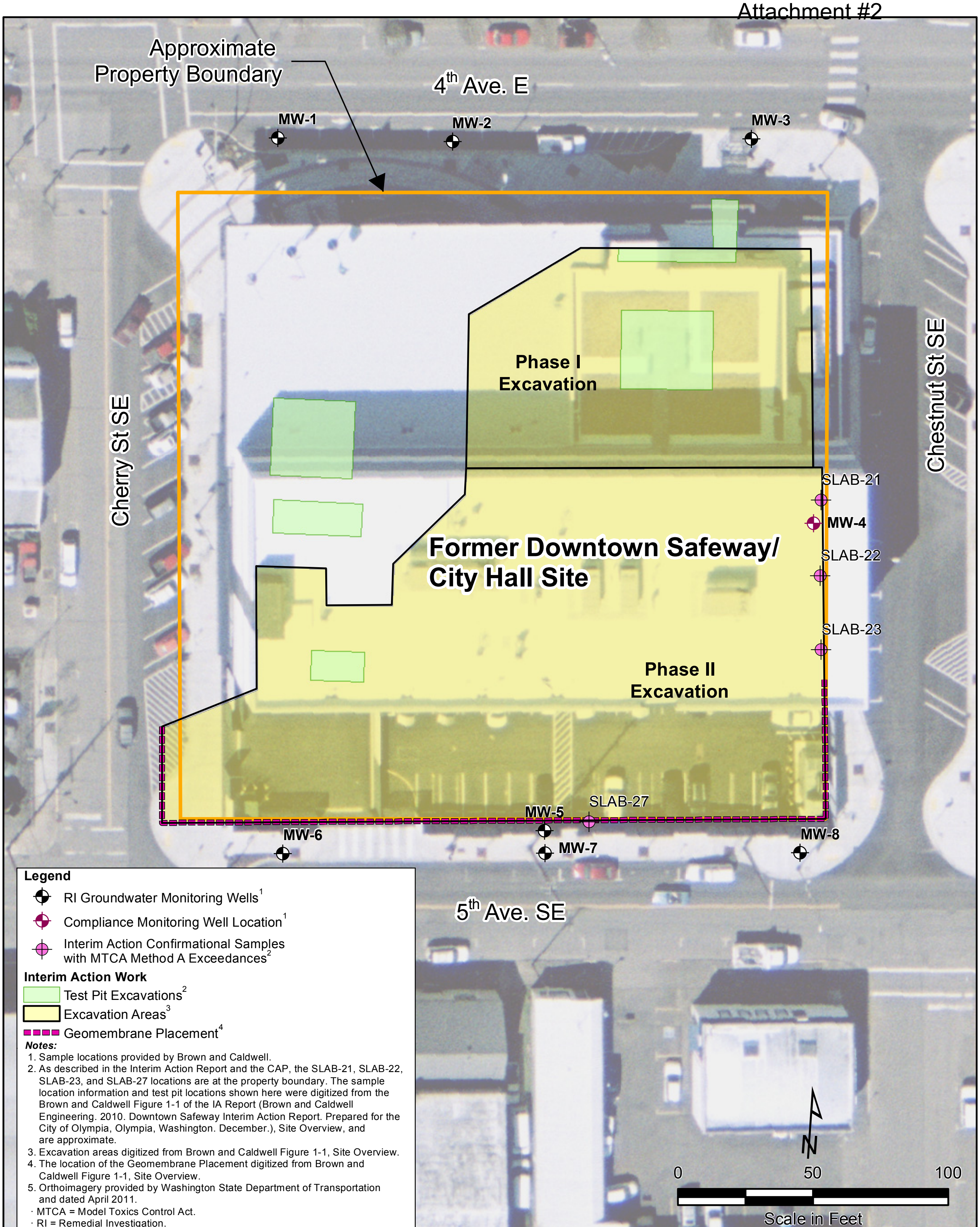
Cleanup Action Plan
Former Downtown Safeway/
City Hall Site
Olympia, Washington

DRAFT

Figure 1.1
Site Vicinity Map

F:\projects\CL-COO\GIS\MXD\Task 5000\Figure 1.1 (Site Vicinity Map).mxd
5/29/2012

Attachment #2



FLOYD | SNIDER
strategy ▪ science ▪ engineering

Cleanup Action Plan
Former Downtown Safeway/
City Hall Site
Olympia, Washington

DRAFT

Figure 2.1
Monitoring Well, Select Soil Sample, and Geomembrane Liner Locations

F:\projects\CL-COO\GIS\MXD\Task 5000\Figure 2.1 (MW, Select Soil Sample & Geomembrane Locations).mxd
5/29/2012