Agency Review Draft Environmental Summary and Mitigation Measures

Y Pay Mor Site
Transit Oriented Development Sites 1 and 2
Federal Way Downtown Station
Federal Way Link Extension
Federal Way, Washington

for
Sound Transit

April 24, 2025

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File No. 4082-039-06
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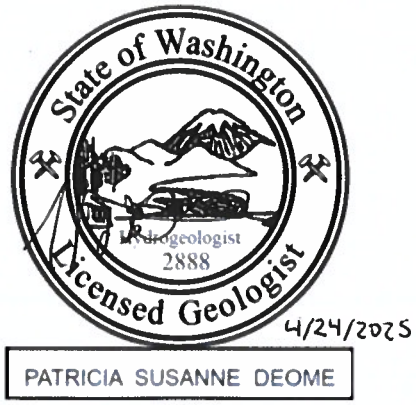

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Acronyms and Abbreviations

bgs - below ground surface

CAP - cleanup action plan

cis-DCE - 1,2-cis-dichloroethene

CLARC - Cleanup Levels and Risk Calculations

Development Properties - Transit Oriented Development Sites 1 and 2

DCE - 1,1-dichloroethene

Ecology – Washington State Department of Ecology

FS - feasibility study

FWD - Federal Way Downtown

FWLE - Federal Way Link Extension

HASP - Health and Safety Plan

HAZWOPER - Hazardous Waste Operations and Emergency Response

µg/L - micrograms per liter

MTCA - Model Toxics Control Act

NAVD88 – North American Vertical Datum of 1988

NFA - No Further Action

NPDES - National Pollutant Discharge Elimination System

OSHA - Occupational Safety and Health Administration

PCE - tetrachloroethene

PCULs - Preliminary Cleanup Levels

RCRA - Resource Conservation and Recovery Act

RC - restrictive covenant

RI - remedial investigation

Sound Transit - Central Puget Sound Regional Transit Authority

SL - Screening Level

trans-DCE - trans-1,2-dichloroethene

TOD - Transit Oriented Development

TCE - trichloroethene

VCP - Voluntary Cleanup Program

WAC – Washington Administrative Code

1.0 Introduction

This letter is a summary of existing conditions, impacts and mitigation measures related to the vinyl chloride groundwater plume on Transit Oriented Development (TOD) Sites 1 and 2 on the western portion of the former King County Tax Parcel 242320-0050. TOD Sites 1 and 2 herein are referred to as the "Development Properties" (Vicinity Map, Figure 1). King County Tax Parcel 242320-0050 is also identified as the Central Puget Sound Regional Transit Authority (Sound Transit) parcel FL358. The Development Properties are within the new Federal Way Downtown (FWD) Station and part of the Federal Way Link Extension (FWLE) project.

The Development Properties are located in Federal Way, Washington, and are bounded by 21st Avenue South to the west, South 319th Street to the south, South 317th Street to the north and 22nd Avenue South to the east (Federal Way Downtown Station, Figure 2). Sound Transit currently owns the Development Properties. Sound Transit is preparing to issue a request for proposals to develop affordable housing on the two sites.

A dry cleaner (Y Pay Mor Cleaners) was located on the eastern portion of the FL358 Parcel. The Y Pay Mor Site is herein referred to as the areas where soil and groundwater contamination is present due to spills and releases of dry cleaning solvents at the former Y Pay Mor Cleaners. The extent of the FWD Station, FL358 Parcel, Development Properties, and Y Pay Mor Site are shown on Figure 2.

1.1 PROPOSED DEVELOPMENT PLANS AND SCHEDULE

The Sound Transit Board of Directors has authorized staff to issue a request for proposals (RFP) to develop affordable housing on TOD Sites 1 and 2. Sound Transit is currently preparing to issue an RFP in the second quarter of 2025. If a developer is selected, Sound Transit and the developer will coordinate with the Washington State Department of Ecology (Ecology) throughout the project lifecycle.

1.2 CURRENT LAND USE FOR DEVELOPMENT PROPERTIES

The majority of the FL358 Parcel is currently an active construction site for the FWD Station area as part of the FWLE project. The elevated rail, light rail transit station, bus loop, most of the new roadways and new stormwater vaults have been constructed at the FWD Station. The bus loop on the eastern portion of the FWD Station is now operational as a transit center. The light rail station, new roadways and elevated rail are not operational. The remainder of the FWD Station, including the Development Properties and the majority of the Y Pay Mor Site, is a construction laydown yard.

Sound Transit has completed a lot line adjustment to consolidate the individual parcels within the southern FWD Station into two large parcels. One parcel is the eastern portion of the FWD Station and includes the bus loop and light rail station. The second parcel is the western portion of the FWD Station and includes the remainder of the area. A final binding site plan is planned prior to light rail revenue service to designate parcel lines for the TOD Sites and the Federal Way right-of-way. The layout of the former, current and future parcels is shown in Appendix A. Two environmental restrictive covenants (RCs) exist for the former Y Pay Mor Cleaners tenant space. The RCs are summarized in Section 2.2.

2.0 Background

The FWD Station is located within the Puget Sound Lowland. The Puget Sound Lowland is a north-south trending trough consisting of a thick sequence of Quaternary deposits (approximately 1.8 million years old to present). The Puget Sound Lowlands experienced at least six periods of continental glaciation during the Pleistocene (Blunt et al. 1987; Easterbrook 1994). The near-surface geologic units in the area consist of weathered and relatively unweathered interglacial and glacial deposits associated with the advance and retreat of the last glacial occurrence and the Holocene-age deposits that overlie the glacial deposits. We reviewed geologic maps of the FWD Station area (Tabor et al. 2014). The surficial soils in the vicinity of the site are mapped as glacial till, with fill noted in the vicinity of Interstate 5.

The FWD Station was part of a larger drainage basin that extended to South 312th Street and has been modified over time based on historical topographic maps and the 1976 Stormwater Detention Report for the Evergreen Plaza Shopping Center (Bush, Roed and Hitchings, 1976). A topographic survey was also generated in the 1970s for the area of the FWD Station during the development of the Evergreen Plaza Shopping Center. The survey shows the former ground surface was variable and ranged from Elevation 396 to 427 feet (NAVD88)[1]. The lowest elevations are in the area of a former pond south of the Y Pay Mor Site (Groundwater Contours March 2025, Figure 3).

The Evergreen Plaza Shopping Center (later known as the SeaTac Plaza) was built in 1979. At least 16 feet of fill was placed to grade the area for development. A stormwater pond was also constructed southwest of the FL358 Parcel. The base of the stormwater pond was approximately Elevation 397 feet based on the 1978 design plans[1]. Y Pay Mor Cleaners occupied the easternmost tenant space (identified as space A-6) of the shopping center building from approximately November 1985 to June 1992 (RZA AGRA 1992). Other commercial businesses occupied space A-6 from 1979 to 1985 and after 1992.

Two tetrachloroethene (PCE) spills occurred inside the Y Pay Mor Cleaners tenant space in 1991. The PCE spills reportedly occurred on the concrete floor in the vicinity of the dry cleaning equipment along the then western wall of the tenant space. Subsequent investigations conducted at the Y Pay Mor Site in 2020 identified an additional PCE release source directly north of the former dry cleaner space.

Sound Transit acquired the FL358 Parcel and surrounding parcels in 2020 as part of the FWLE project. Demolition of the former buildings, including the Y Pay Mor Cleaner tenant space (space A-6), began in May 2020. Up to 15 feet of fill was placed across the FWD Station between late 2020 and 2024, raising the former ground surface elevation from approximately 420 to 435 feet.

2.1 PREVIOUS INVESTIGATION AND REMEDIAL ACTION

Numerous investigations have been completed, starting in 1992 and continuing to the present. Remedial action included the installation and operation of a soil vapor extraction system in the 1990s and remedial excavation in 2020 within the former Y Pay Mor tenant space. Prior reports, documents and correspondence are available at https://apps.ecology.wa.gov/cleanupsearch/site/3180.

[1] The North American Vertical Datum of 1988 (NAVD88) is approximately 3.37 feet different in elevation compared to the 1970s King County Aerial Elevation (i.e., Elevation 430 feet using 1970s King County Aerial Elevation datum is the equivalent to Elevation 426.63 feet NAVD88).

2.2 REGULATORY INVOLVEMENT AND RESTRICTIVE COVENANTS

The Y Pay Mor Site is identified in Ecology's cleanup sites database as "Y Pay Mor Drycleaner" (alternate name "Sea Tac Plaza"), Cleanup Site ID 3180, Facility Site ID 2518. Ecology issued a No Further Action (NFA) determination in 1998 for the Y Pay Mor Site following remediation of the PCE spills. The details of the NFA and associated RCs include:

- Ecology issued an interim conditional NFA letter in June 1995 based on a review of the independent remedial action (preliminary remedial investigation [RI] and interim cleanup action) conducted between 1992 and 1994. An RC dated September 21, 1995, was recorded under King County recording number 9510121424. The 1995 RC applied to the property within the footprint of the former dry cleaner space (space A-6).
- Ecology issued a conditional NFA determination in October 1998. Ecology's 1998 NFA determination was conditioned on a second RC dated July 24, 1998, and recorded under King County recording number 9808101434. The 1998 RC references residual soil contamination exceeding Model Toxics Control Act (MTCA) cleanup levels beneath the former dry cleaner space and prohibits any activity on the property that may result in the release or exposure to the environment of a hazardous substance that remains on the property as part of the independent remedial action, or that may create a new exposure pathway, without prior written approval from Ecology. The 1998 RC also prohibits any activity on the property that may interfere with the integrity of independent remedial action and continued protection of human health and the environment.

Sound Transit is in the process of conducting a cleanup of the Y Pay Mor Site under the MTCA. Sound Transit enrolled in Ecology's Voluntary Cleanup Program (VCP - No. NW3265) in Spring 2020. In 2020, Sound Transit completed a remedial soil excavation of source material. Groundwater monitoring wells have been installed and routinely monitored between 2022 and 2025. Sound Transit is in the process of completing an updated RI, a feasibility study (FS), and a cleanup action plan (CAP) for the Y Pay Mor Site. The CAP is planned to be completed by early 2026.

3.0 Subsurface Conditions

Subsurface conditions are based on the investigations completed between 2020 to 2025 to define the extent of the Y Pay Mor Site. Investigations completed in 2024 and 2025 included the installation of 16 wells and associated quarterly groundwater sampling. Wells FL358-MW24 through FL358-MW30 were installed on the Development Properties.

3.1 Y PAY MOR SITE – SOIL AND GROUNDWATER CONDITIONS

Our interpretation of the subsurface conditions across the Y Pay Mor Site is shown on Cross Sections A-A' and B-B' (Figures 4 and 5). The depth of the fill extends up to 31 feet below the current grade. The fill was placed during the development of the property in the late 1970s and by Sound Transit between 2020 and 2025. We interpret the fill to be underlain by varying thicknesses of recessional outwash, lacustrine deposits, glacial till, and advance outwash. Peat-like organics were observed in borings FL358-MW18, FL358-MW21, and FL358-MW22 completed in the vicinity of the former pond at elevations between Elevation 406 to 395 feet. Glacial till was not observed in these borings.

Groundwater at the Y Pay Mor Site appears to be present in two water-bearing zones (shallow and deep). The shallow water-bearing zone is within fill, recessional outwash, lacustrine deposits, and weathered till that overlies a dense glacial till aquitard and herein referred to as "shallow aquifer. The shallow aquifer is present between 9 and 30 feet below ground surface (bgs) (Elevation 426 and 403 feet). The flow direction for the shallow aquifer is variable and has southern, southwestern and western components (Figure 3). The lower water-bearing unit is confined in the advance outwash beneath the glacial till aquitard and herein referred to as the "deep aquifer." The dense glacial till aquitard is not present southwest of the Y Pay Mor Site (southern portion of the Development Properties) in the area of the former ponds. The deep aquifer is under pressure with an upward vertical gradient. In the area where the glacial till aquitard is not present, the deep aquifer flows upward and combines with the shallow aquifer (Figures 3 through 5).

3.2 DEVELOPMENT PROPERTIES – SOIL CONDITIONS

Our interpretation of subsurface conditions across the Development Properties is shown on Cross Section B-B' (Figure 5). We interpret the fill to be underlain by varying thicknesses of recessional outwash, lacustrine deposits, glacial till and advance outwash. Peat-like organics observed east of the Development Properties are likely present on the southern portion of the Development Properties, based on the mapped extent of the former pond (see the outline of the pond on Figure 3).

3.3 DEVELOPMENT PROPERTIES – GROUNDWATER CONDITIONS

The approximate depth of the shallow aquifer on TOD Site 1 ranges from 7 to 21 feet bgs (Elevation 413 to 423 feet) as measured in wells FL358-MW24 and FL358-MW25. The shallow aquifer flow direction is south on TOD Site 1.

The approximate depth of the shallow aquifer on the northeastern portion of TOD Site 2 is 30 feet bgs (approximate Elevation 403 feet) as measured at FL358-MW26. The groundwater level on the western and southern portion of TOD Site 2 is interpreted to be influenced by the deeper aquifer, as shown on Section A-A' and B-B' (Figures 4 and 5). The groundwater level ranges from 12 to 20 feet bgs (approximate Elevation 408 to 411 feet). Table 1 summarizes groundwater elevations and depths to groundwater encountered during each quarterly groundwater monitoring event.

4.0 Chemical Analytical Results

Chemicals of concern identified for the Y Pay Mor Site based on the source of contamination (historic dry cleaners), documented spills of PCE, and findings of the RI are PCE and associated breakdown compounds trichloroethene (TCE), 1,2-cis-dichloroethene (cis-DCE), trans-1,2-dichloroethene (trans-DCE), 1,1-dichloroethene (DCE) and vinyl chloride. Chemical analytical results discussed in this section are based on groundwater monitoring events completed between March 2024 and March 2025.

The Preliminary Cleanup Levels (PCULs) were developed during the 2023 Updated Remedial Investigation and are based on Site exposure pathways and receptors. Ecology's "Cleanup Levels and Risk Calculations (CLARC) Master Spreadsheet.xlsx" table dated February 2025 was reviewed for recent updates. Screening Levels (SLs) for the protection of indoor air from vapor intrusion were also reviewed to evaluate whether contaminants detected in groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air PCULs. The groundwater SLs protective of indoor air were obtained from the CLARC Table dated February 2025. These SLs have not been incorporated as groundwater PCULs.

The chemical analytical results are summarized in Tables 2 and 3.

4.1 Y PAY MOR SITE - GROUNDWATER ANALYTICAL RESULTS

Analytical results indicate PCE, TCE, cis-DCE and vinyl chloride were detected at concentrations greater than the PCULs in the groundwater samples collected in wells FL358-MW5A, FL358-MW6 and FL358-MW16 located near the former Y Pay Mor Cleaner. Vinyl chloride was also detected at concentrations greater than PCUL in wells to the south and west of the former Y Pay Mor Cleaner (FL358-MW7, FL358-MW9, FL358-MW10, FL358-MW11, FL358-MW14, FL358-MW17, FL358-MW20 and FL358-MW26)[2]. The extent of the vinyl chloride plume is delineated to the north, south and west by existing monitoring wells as shown on Figure 3.

4.2 DEVELOPMENT PROPERTIES - GROUNDWATER ANALYTICAL RESULTS

The extent of the vinyl chloride plume includes well FL358-MW26, which is located in the northeast corner of TOD Site 2. Analytical results indicate that vinyl chloride was detected at concentrations (0.50 and 0.97 micrograms per liter [µg/L]) greater than the PCUL (0.20 µg/L) during the December 2024 and March 2025 sampling events. Vinyl chloride was not detected in groundwater samples collected from the other wells on the Development Properties. The groundwater chemical analytical results are summarized in Table 2.

4.3 DEVELOPMENT PROPERTIES – SOIL ANALYTICAL RESULTS

PCE, TCE, DCEs and vinyl chloride were not detected in the soil samples collected from monitoring wells installed on the Development Properties (FL358-MW24 through FL358-MW30). However, the saturated soil within the vinyl chloride groundwater plume is presumed to be impacted based on the presence of vinyl chloride detected in the groundwater. The soil chemical analytical results are summarized in Table 3.

4.4 DEVELOPMENT PROPERTIES – VAPOR INTRUSION - TIER 1 EVALUATION

A Tier 1 evaluation was completed in accordance with Ecology's Vapor Intrusion Guidance (Ecology 2022). The PCE, TCE, DCEs and vinyl chloride groundwater concentrations were used to complete the evaluation. Vinyl chloride is present in the groundwater at concentrations greater than the Screening Level Protective of Indoor Air (0.33 µg/L) within 100 feet of Development Properties (lateral exclusion distance), as shown in Vapor Intrusion Evaluation, Figure 6. Therefore, there is a potential risk of vapor intrusion into future buildings if constructed.

[2] Vinyl chloride was detected at concentrations greater than the PCUL in well FL358-MW12 and FL358-MW13 during the March 2024 groundwater sampling event. Vinyl chloride was not detected in groundwater samples collected from FL358-MW12 and FL358-MW13 during the June, September and December 2024 and March 2025 sampling events.

5.0 Impacts and Mitigation Measures

This section addresses the anticipated human health and environmental impacts and associated mitigation measures due to the Y Pay Mor Site during the development of the Development Properties. Currently, the RI, FS and CAP for the Y Pay Mor Site are underway, with an expected completion date in early 2026. Although the details of the final cleanup action remain to be finalized, it is predicted that the CAP will incorporate the mitigation measures outlined below to prevent or reduce exposure to residual contaminants at the Development Properties.

We also anticipate that if implemented, active remediation efforts will focus on the upgradient portions of the contamination plume, specifically near the historical site of the Y Pay Mor Cleaners. It is important to note that active remediation is not planned on the downgradient portion of the Y Pay Site and on the Development Properties.

The mitigation measures detailed herein support Sound Transit's endeavor in selecting a developer, aid developers in comprehending the potential impacts and necessary mitigation strategies, and facilitate technical assistance by Ecology under the VCP. The mitigation measures are subject to alterations upon CAP completion, post-developer selection and subsequent finalization of design plans, thereby allowing for adaptations based on the most current assessments.

5.1 VAPOR INTRUSION

There is a potential risk that the vinyl chloride in the groundwater could volatilize and enter the interior future buildings on the Development Properties, posing health risks to occupants. Mitigation measures for potential vapor intrusion will consist of a subslab chemical vapor barrier and a passive venting system. The chemical vapor barrier is expected to be an emulsion-type geomembrane vapor barrier similar in design and installation technique to the Land Science Nitra Shield® or EPRO GeoSeal® barriers (Appendix B). The vapor barrier will likely be installed where the building is exposed to the subgrade. The passive venting system is planned to consist of a series of pipes below the slab with exhaust vents to the exterior of the building. The pipe strength will be sufficient to allow the passive system to be upgraded to an active system if necessary. The vapor mitigation system will be designed by an environmental engineer.

An air monitoring program, operations and maintenance manual, and administrative institutional controls will be developed and implemented. The purpose of the air monitoring program is to evaluate the effectiveness of the vapor mitigation system. The operations and maintenance manual will include training of maintenance personnel and methods to protect the mitigation system. The purpose of the administrative institutional controls is to maintain systems and to limit or prohibit activities that may result in the exposure to hazardous substances.

5.2 SOIL AND GROUNDWATER MANAGEMENT

Vinyl chloride-contaminated groundwater is present in the northeast portion of TOD Site 2 and southeast of TOD Site 1. The source of the vinyl chloride is degradation of PCE from PCE spills at the former Y Pay Mor Site.

Construction activities in this area are expected to remove soil and groundwater, which requires management to prevent further environmental impact. The extent of soil and groundwater removal is not known at this time and will be based on the final design. The soil and water generated during construction

activities within the vinyl chloride plume are classified as F002-listed (spent solvents) hazardous waste and will be managed in accordance with local, state and federal regulations, including Washington Administrative Code (WAC) 173-303.

The soil may be eligible for a contained in determination from Ecology and managed as solid waste for disposal at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill. Additional subsurface investigation could be completed to characterize the soil and groundwater for disposal.

Water generated during construction will likely consist of water dewatered from excavations and stormwater that enters the construction area. Dewatered water consists of groundwater and stormwater that will be removed from open excavations. Stormwater in contact with vinyl chloride-impacted soils is also considered F002-listed hazardous waste. Sound Transit and/or the developer will work with Ecology to develop an appropriate approach to managing stormwater, which may include adding an administrative order to the National Pollutant Discharge Elimination System (NPDES). F002-listed hazardous wastewater will be manifested, transported, and disposed of appropriately in accordance with 173-303 WAC and 40 CFR Part 260.

Building drains (if any) in the area of the vinyl chloride groundwater plume cannot be connected to the sanitary or stormwater system without permitting, water treatment and long-term maintenance. Sound Transit and/or the developer will work with Ecology and the local jurisdictions to develop an approach to managing building drain water (if necessary).

5.3 GROUNDWATER PLUME CHANGES

Dewatering during construction and foundation drainage systems can lead to changes in the Y Pay Mor Site groundwater plume by changing the groundwater flow direction and gradient. Dewatering activities or foundation drainage systems necessary for construction will be designed to limit the Y Pay Mor Site groundwater plume from spreading.

5.4 HEALTH AND SAFETY OF WORKERS DURING CONSTRUCTION

Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site will have Hazardous Waste Operations and Emergency Response (HAZWOPER) training. The requirement is consistent with WAC 296-843-100, Hazardous Waste Operations, which indicates that on-site personnel (contractors, employees) are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) HAZWOPER requirements in 29 CFR 1910.120 to work within the contaminated areas of this project. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written Health and Safety Plan (HASP) for their employees involved in hazardous waste operations under 29 CFR 1910.120.

5.5 REGULATORY COMPLIANCE

TOD Sites 1 and 2 may be subject to two existing restrictive covenants due to the presence of the Y Pay Mor Site. The restrictive covenants require obtaining approval from Ecology before proceeding with subsurface investigation and construction. This ensures that all activities meet the regulatory requirements to protect human health and the environment. Changes in the extent of contamination, parcel boundaries and ownership, and/or future remedial actions might necessitate modifications to existing restrictive

covenants. Sound Transit and the developer will coordinate with Ecology for appropriate approvals for development under the existing RCs and/or to develop new RCs.

Sound Transit is enrolled in the Ecology's Voluntary Cleanup Program, and the preferred remedial approach for the larger Y Pay Mor Site is not known at this time this letter was written. Sound Transit and the developer will coordinate with Ecology regarding impacts (if any) of the development on the preferred remedial approach.

5.6 EXISTING MONITORING WELLS

Existing monitoring wells located within the Development Properties' boundaries may be decommissioned in accordance with WAC 173-160 before construction. The wells to be decommissioned will be based on the building design plans. Well replacement will be evaluated following the completion of the CAP.

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7.0 Limitations

This report has been prepared for use by Sound Transit for the proposed development on TOD Sites 1 and 2 within the Federal Way Downtown Station of Federal Way Link Extension Project located in Federal Way, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Tables

Table 1

Groundwater Elevations

Y Pay Mor Site

Federal Way, Washington

Monitoring Well[1] (TOC Elevation)	Date Measured	Screened Interval (feet bgs)	Top of Well Casing Elevation[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation[3] (feet)
FL358-MW5A	06/27/22	21 - 26	435.70	10.14	425.56
	07/20/22			11.25	424.45
	10/19/22			13.69	422.01
	11/28/22			11.95	423.75
	03/14/23			10.30	425.40
	06/07/23			12.46	423.24
	09/12/23			15.33	420.37
	12/08/23			8.74	426.96
	03/21/24			9.72	425.98
	06/19/24			11.79	423.91
	09/20/24			14.05	421.65
	12/30/24		Casing Modified - Elevation Not Known	11.53	--[4]
	03/07/25			12.19	--[4]
FL358-MW5B	06/27/22	32 - 37	435.66	9.34	426.32
	07/20/22			10.42	425.24
	10/19/22			12.60	423.06
	11/28/22			10.77	424.89
	03/14/23			9.36	426.30
	06/07/23			11.37	424.29
	09/12/23			14.52	421.14
	12/08/23			7.84	427.82
	03/21/24			9.19	426.47
	06/19/24			10.90	424.76
	09/20/24			12.83	422.83
	12/30/24		Casing Modified - Elevation Not Known	10.18	--[4]
	03/07/25			10.97	--[4]
FL358-MW6	06/27/22	17 - 37	435.64	11.59	424.05
	07/20/22			12.70	422.94
	10/19/22			15.25	420.39
	11/28/22			13.72	421.92
	03/14/23			11.63	424.01
	06/07/23			13.51	422.13
	09/12/23			16.17	419.47
	12/08/23			10.12	425.52
	03/21/24			10.39	425.25
	06/19/24			12.52	423.12
	09/20/24			14.84	420.80
	12/30/24		Casing Modified - Elevation Not Known	12.44	--[4]
	03/07/25			13.01	--[4]

Monitoring Well[1] (TOC Elevation)	Date Measured	Screened Interval (feet bgs)	Top of Well Casing Elevation[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation[3] (feet)
FL358-MW7	06/27/22	14 - 34	433.50	11.75	421.75
	10/19/22			15.34	418.16
	11/28/22			14.09	419.41
	03/14/23			11.60	421.90
	06/07/23			13.84	419.66
	09/12/23			16.13	417.37
	12/08/23			9.98	423.52
	03/21/24			10.03	423.47
	06/19/24			12.53	420.97
	09/20/24			14.82	418.68
	12/30/24			12.93	420.57
	03/07/25			13.44	420.06
FL358-MW8	06/27/22	18 - 38	435.87	9.68	426.19
	10/19/22			12.99	422.88
	11/28/22			11.17	424.70
	03/14/23			9.70	426.17
	06/07/23			12.05	423.82
	09/12/23			14.71	421.16
	12/08/23			7.42	428.45
	03/21/24			9.40	426.47
	06/19/24			11.15	424.72
	09/20/24			13.54	422.33
	12/30/24		Casing Modified - Elevation Not Known	10.88	--[4]
	03/07/25			11.65	--[4]
FL358-MW9	06/27/22	21 - 41	435.50	12.52	422.98
	10/19/22			15.68	419.82
	11/28/22			14.14	421.36
	03/14/23			12.05	423.45
	06/07/23			14.15	421.35
	09/12/23			16.24	419.26
	12/08/23			9.70	425.80
	03/21/24			10.53	424.97
	06/19/24			12.81	422.69
	09/20/24			14.59	420.91
	12/30/24		Casing Modified - Elevation Not Known	12.00	--[4]
	03/07/25			12.81	--[4]
FL358-MW10	06/27/22	18 - 38	433.97	11.97	422.00
	10/19/22			15.31	418.66
	11/28/22			14.02	419.95
	03/14/23			11.86	422.11
	06/07/23			14.14	419.83
	09/12/23			16.85	417.12
	12/08/23			9.12	424.85
	03/21/24			10.12	423.85
	06/19/24			12.60	421.37
	09/20/24			14.49	419.48
	12/30/24		Casing Modified - Elevation Not Known	12.05	--[4]
	03/07/25			12.91	--[4]

Monitoring Well[1] (TOC Elevation)	Date Measured	Screened Interval (feet bgs)	Top of Well Casing Elevation[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation[3] (feet)
FL358-MW11	06/27/22	15 - 35	432.78	11.89	420.89
	10/19/22			15.25	417.53
	11/28/22			14.07	418.71
	03/14/23			11.68	421.10
	06/07/23			13.96	418.82
	09/12/23			15.99	416.79
	12/08/23			9.98	422.80
	03/21/24			10.12	422.66
	06/19/24			12.54	420.24
	09/20/24			14.92	417.86
	12/30/24		Casing Modified - Elevation Not Known	13.33	--[4]
	03/07/25			15.16	--[4]
FL358-MW12	06/27/22	18 - 38	435.11	12.21	422.90
	10/19/22			16.04	419.07
	11/28/22			13.08	422.03
	03/14/23			12.51	422.60
	06/07/23			14.49	420.62
	09/12/23			17.17	417.94
	12/08/23			11.25	423.86
	03/21/24			11.12	423.99
	06/19/24			13.46	421.65
	09/20/24			15.58	419.53
	12/30/24			13.63	421.48
	03/07/25			13.99	420.57
FL358-MW13	06/27/22	21 - 41	435.68	13.40	422.28
	10/19/22			16.62	419.06
	11/28/22			15.17	420.51
	03/14/23			14.85	420.83
	06/07/23			15.68	420.00
	09/12/23			17.95	417.73
	12/08/23			13.22	422.46
	03/21/24			12.62	423.06
	06/19/24			14.55	421.13
	09/20/24			16.10	419.58
	12/30/24			13.95	421.73
	03/07/25			14.54	421.14
FL358-MW14	06/27/22	19 - 39	434.32	12.05	422.27
	07/20/22			13.22	421.10
	10/19/22			15.59	418.73
	11/28/22			14.43	419.89
	03/14/23			12.81	421.51
	06/07/23			14.34	419.98
	09/12/23			16.20	418.12
	12/08/23			10.24	424.08
	03/21/24			10.32	424.00
	06/19/24			12.85	421.47
	09/20/24			15.40	418.92
	12/30/24		Casing Modified - Elevation Not Known	13.35	--[4]
	03/07/25			13.95	--[4]

Monitoring Well[1] (TOC Elevation)	Date Measured	Screened Interval (feet bgs)	Top of Well Casing Elevation[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation[3] (feet)
FL358-MW15	09/20/24	18-38	439.00	18.85	420.15
	12/30/24			16.98	422.02
	03/07/25			17.30	421.70
FL358-MW16	09/20/24	25-45	438.77	24.98	413.79
	12/30/24			23.02	415.75
	03/07/25			23.02	415.75
FL358-MW17	09/20/24	20-40	437.43	21.57	415.86
	12/30/24			19.87	417.56
	03/07/25			20.53	416.90
FL358-MW18	09/20/24	22-42	433.56	21.63	411.93
FL358-MW19	09/20/24	22-42	433.01	18.95	414.06
	12/30/24			13.48	419.53
	03/07/25			14.27	418.74
FL358-MW20	09/20/24	18-38	437.44	27.34	410.10
	12/30/24			22.60	414.84
	03/07/25			25.04	412.40
FL358-MW21	09/20/24	26-46	433.84	24.58	409.26
	12/30/24			25.65	408.19
	03/07/25			23.49	410.35
FL358-MW22	09/20/24	20-40	429.87	17.46	412.41
	12/30/24			16.66	413.21
	03/07/25			19.76	410.11
FL358-MW23	12/30/24	12-32	438.00	14.11	423.89
	03/07/25			14.80	423.20
FL358-MW24	12/30/24	12-32	430.72	7.22	423.50
	03/07/25			7.55	423.17
FL358-MW25	12/30/24	16-36	434.35	20.55	413.80
	03/07/25			21.04	413.31
FL358-MW26	12/30/24	18-38	437.35	32.53	404.82
	03/07/25			33.50	403.85
FL358-MW27	12/30/24	20-30	435.04	23.03	412.01
	03/07/25			23.20	411.84
FL358-MW28	03/07/25	15-35	427.10	15.68	411.42
FL358-MW29	03/07/25	10-30	431.04	20.38	410.66
FL358-MW30	03/07/25	10-30	424.55	16.66	407.89

Notes:

[1] Approximate monitoring well locations are shown on Federal Way Downtown Station, Figure 2.

[2] Groundwater elevations relative to NAVD88. Top of casing elevations were surveyed by Kiewit in June 2022 for wells FL358-MW5A through FL358-MW14. FL358-MW15 through FL358-MW30 were surveyed by True North Surveying at the time of drilling.

[3] Groundwater elevation contours for March 2025 are shown on Figure 3.

[4] The top of casing was modified and a survey has not been completed to date.

bgs = below ground surface

TOC = top of casing

Shading indicates this well is present on either Transit Oriented Development Site 1 or 2

Table 2

Groundwater Chemical Analytical Data - VOCs

Y Pay Mor Site

Federal Way, Washington

Location ID[1]	Sample Date	VOCs[2] (µg/L)					
		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Groundwater Preliminary Cleanup Level[3] (µg/L)		5	5	70	100	7	0.2
Protection of Indoor Air/Vapor Intrusion Commercial Use[4] (µg/L)		120	12	1,600	650	1,100	1.6
Protection of Indoor Air/Vapor Intrusion Residential Use[4] (µg/L)		25	1.4	180	77	130	0.33
FL358-MW5A	06/2022	**91**	**50**	**37**	1.0 U	1.0 U	**2.3**
	08/2022	**24**	**27**	**60**	**0.50**	0.40 U	**2.0**
	11/2022	**21**	**28**	**55**	**0.49**	0.40 U	**4.0**
	03/2023	**48**	**93**	**160**	**1.3**	0.80 U	**14**
	06/2023	**170**	**140**	**210**	2.0 U	2.0 U	**20**
	09/2023	**110**	**110**	**110**	0.80 U	0.80 U	**11**
	12/2023	**120**	**110**	**100**	1.0 U	1.0 U	**8.2**
	03/2024	**73**	**94**	**68**	2.0 U	2.0 U	**6.0**
	06/2024	**97**	**91**	**67**	2.0 U	2.0 U	**7.2**
	09/2024	**82**	**120**	**80**	2.0 U	2.0 U	**6.4**
	12/2024	**55**	**63**	**45**	2.0 U	2.0 U	**3.4**
	12/2024	**52**	**64**	**47**	2.0 U	2.0 U	**3.8**
	03/2025	**87**	**68**	**50**	2.0 U	2.0 U	**3.0**
	03/2025	**84**	**66**	**49**	2.0 U	2.0 U	**2.9**
FL358-MW5B	06/2022	**3.4**	**0.83**	0.20 U	0.20 U	0.20 U	0.20 U
	08/2022	**0.26**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	11/2022	**0.20**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	06/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	09/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	12/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	12/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	06/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW6	06/2022	**38**	**100**	**86**	1.0 U	1.0 U	**1.5**
	08/2022	**53**	**130**	**110**	**1.1**	0.80 U	**1.8**
	11/2022	**32**	**100**	**71**	0.80 U	0.80 U	**1.0**
	03/2023	**39**	**150**	**96**	**0.88**	0.80 U	**1.4**
	03/2023	**37**	**140**	**91**	**0.85**	0.80 U	**1.4**
	06/2023	**34**	**99**	**64**	0.80 U	0.80 U	**1.2**
	06/2023	**36**	**96**	**65**	0.80 U	0.80 U	**1.2**
	09/2023	**18**	**110**	**86**	0.80 U	0.80 U	**1.3**
	09/2023	**17**	**100**	**83**	0.80 U	0.80 U	**1.3**
	12/2023	**17**	**96**	**52**	1.0 U	1.0 U	*1.0 U*
	03/2024	**6.1**	**120**	**76**	2.0 U	2.0 U	**0.95**
	03/2024	**7.4**	**130**	**77**	2.0 U	2.0 U	**0.98**
	06/2024	**2.7**	**77**	**62**	2.0 U	2.0 U	**0.97**
	06/2024	**2.8**	**76**	**62**	2.0 U	2.0 U	**1.0**
	09/2024	**2.9**	**70**	**76**	2.0 U	2.0 U	**0.99**
	09/2024	**2.8**	**71**	**77**	2.0 U	2.0 U	**1.0**
	12/2024	**2.5**	**100**	**73**	**0.79**	0.40 U	**0.56**
	03/2025	**13**	**120**	**72**	2.0 U	2.0 U	**0.49**
FL358-MW7	06/2022	**0.33 B**	0.20 U	**6.0**	0.20 U	0.20 U	**3.7**
	08/2022	**0.28**	0.20 U	**7.1**	0.20 U	0.20 U	**4.6**
	11/2022	0.20 U	0.20 U	**5.3**	0.20 U	0.20 U	**4.9**
	03/2023	**0.35**	0.20 U	**4.7**	0.20 U	0.20 U	**4.0**
	06/2023	**0.25**	0.20 U	**3.4**	0.20 U	0.20 U	**3.3**
	09/2023	0.20 U	0.20 U	**9.5**	0.20 U	0.20 U	**9.2**
	12/2023	0.40 U	0.40 U	**7.4**	0.40 U	0.40 U	**10**
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.1**
	06/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.4**
	09/2024	2.0 U	2.0 U	**2.2**	2.0 U	2.0 U	**2.7**
	12/2024	2.0 U	2.0 U	**3.5**	2.0 U	2.0 U	**3.7**
	03/2025	2.0 U	2.0 U	**4.0**	2.0 U	2.0 U	**4.6**

Location ID[1]	Sample Date	VOCs[2] (µg/L)					
		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Groundwater Preliminary Cleanup Level[3] (µg/L)		5	5	70	100	7	0.2
Protection of Indoor Air/Vapor Intrusion Commercial Use[4] (µg/L)		120	12	1,600	650	1,100	1.6
Protection of Indoor Air/Vapor Intrusion Residential Use[4] (µg/L)		25	1.4	180	77	130	0.33
FL358-MW8	06/2022	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	08/2022	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	11/2022	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2023	0.20 U	**0.25**	0.20 U	0.20 U	0.20 U	0.20 U
	06/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	09/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	12/2023	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	06/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW9	06/2022	**0.87 B**	**2.6 J**	**2.6 J**	0.20 U	0.20 U	0.20 U
	06/2022	**0.58 B**	**1.8 J**	**1.8 J**	0.20 U	0.20 U	0.20 U
	08/2022	**1.7**	**2.9**	**2.0**	0.20 U	0.20 U	0.20 U
	08/2022	**1.6**	**2.8**	**2.0**	0.20 U	0.20 U	0.20 U
	11/2022	0.20 U	0.20 U	**1.8**	0.20 U	0.20 U	0.20 U
	03/2023	0.20 U	**0.23**	**1.8**	0.20 U	0.20 U	0.20 U
	06/2023	0.20 U	**0.86**	**2.7**	0.20 U	0.20 U	0.20 U
	09/2023	0.20 U	**0.86**	**5.6**	0.20 U	0.20 U	0.20 U
	12/2023	0.20 U	**1.6**	**12**	0.20 U	0.20 U	**0.61**
	03/2024	2.0 U	2.0 U	**6.9**	2.0 U	2.0 U	**0.32**
	06/2024	2.0 U	2.0 U	**2.9**	2.0 U	2.0 U	**0.21**
	09/2024	0.20 U	**0.67**	**6.1**	0.20 U	0.20 U	**0.25**
	12/2024	0.20 U	**0.34**	**3.4**	0.20 U	0.20 U	**0.26**
	03/2025	2.0 U	**2.2**	**13**	0.20 U	0.20 U	**0.61**
FL358-MW10	06/2022	0.20 U	**0.36**	**7.6**	0.20 U	0.20 U	**0.22**
	08/2022	0.20 U	**0.36**	**9.0**	0.20 U	0.20 U	**0.36**
	11/2022	0.20 U	**0.28**	**6.2**	0.20 U	0.20 U	**0.31**
	11/2022	0.20 U	**0.29**	**6.2**	0.20 U	0.20 U	**0.33**
	03/2023	0.20 U	**0.25**	**6.4**	0.20 U	0.20 U	**0.52**
	06/2023	0.20 U	0.20 U	**4.9**	0.20 U	0.20 U	**0.46**
	09/2023	0.20 U	0.20 U	**1.0**	0.20 U	0.20 U	0.20 U
	12/2023	0.20 U	0.20 U	**0.44**	0.20 U	0.20 U	0.20 U
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	06/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.28**
	09/2024	0.20 U	0.20 U	**2.5**	0.20 U	0.20 U	**0.54**
	12/2024	0.20 U	0.20 U	**0.51**	0.20 U	0.20 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW11	06/2022	0.20 U	0.20 U	**7.7**	0.20 U	0.20 U	**4.8**
	08/2022	0.20 U	0.20 U	**8.8**	0.20 U	0.20 U	**5.5**
	11/2022	0.20 U	0.20 U	**6.1**	0.20 U	0.20 U	**4.1**
	03/2023	0.20 U	0.20 U	**6.1**	0.20 U	0.20 U	**5.0**
	06/2023	0.20 U	0.20 U	**4.2**	0.20 U	0.20 U	**3.3**
	09/2023	0.20 U	0.20 U	**5.1**	0.20 U	0.20 U	**4.5**
	12/2023	0.20 U	0.20 U	**4.9**	0.20 U	0.20 U	**5.1**
	03/2024	2.0 U	2.0 U	**4.0**	2.0 U	2.0 U	**1.7**
	06/2024	2.0 U	2.0 U	**2.1**	2.0 U	2.0 U	**2.2**
	09/2024	2.0 U	2.0 U	**2.4**	2.0 U	2.0 U	**0.85**
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**1.1**
FL358-MW12	06/2022	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	08/2022	0.20 U	0.20 U	**0.32**	0.20 U	0.20 U	0.20 U
	11/2022	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
	03/2023	0.20 U	0.20 U	**0.29**	0.20 U	0.20 U	0.20 U
	06/2023	0.20 U	0.20 U	**0.25**	0.20 U	0.20 U	0.20 U
	09/2023	0.20 U	**0.23**	**0.52**	0.20 U	0.20 U	0.20 U
	12/2023	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	**0.29**
	03/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.61**
	06/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U

Location ID[1]	Sample Date	VOCs[2] (µg/L)					
		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Groundwater Preliminary Cleanup Level[3] (µg/L)		5	5	70	100	7	0.2
Protection of Indoor Air/Vapor Intrusion Commercial Use[4] (µg/L)		120	12	1,600	650	1,100	1.6
Protection of Indoor Air/Vapor Intrusion Residential Use[4] (µg/L)		25	1.4	180	77	130	0.33
FL358-MW13	06/2022	**8.0**	**2.9**	**4.3**	0.20 U	0.20 U	0.20 U
	08/2022	**5.1**	**2.5**	**4.2**	0.20 U	0.20 U	0.20 U
	11/2022	**1.1**	**0.56**	**0.79**	0.20 U	0.20 U	0.20 U
	03/2023	**5.7**	**2.6**	**4.9**	0.20 U	0.20 U	0.20 U
	06/2023	**4.0**	**1.8**	**3.5**	0.20 U	0.20 U	0.20 U
	09/2023	**3.0**	**1.5**	**2.8**	0.20 U	0.20 U	0.20 U
	12/2023	**3.2**	**1.5**	**3.3**	0.20 U	0.20 U	0.20 U
	03/2024	**4.4**	2.0 U	**3.2**	2.0 U	2.0 U	**0.24**
	06/2024	**3.5**	2.0 U	**2.5**	2.0 U	2.0 U	0.20 U
	09/2024	**3.0**	2.0 U	**2.2**	2.0 U	2.0 U	0.20 U
	12/2024	**3.0**	2.0 U	**2.1**	2.0 U	2.0 U	0.20 U
	03/2025	**3.5**	2.0 U	**2.7**	2.0 U	2.0 U	0.20 U
FL358-MW14	06/2022	0.20 U	**0.35**	**16**	0.20 U	0.20 U	**2.5**
	08/2022	0.20 U	0.20 U	**4.9**	0.20 U	0.20 U	**1.1**
	11/2022	0.20 U	0.20 U	**7.1**	0.20 U	0.20 U	**1.5**
	03/2023	0.20 U	**0.20**	**9.7**	0.20 U	0.20 U	**2.3**
	06/2023	0.20 U	0.20 U	**9.2**	0.20 U	0.20 U	**2.5**
	09/2023	0.20 U	0.20 U	**9.1**	0.20 U	0.20 U	**1.8**
	12/2023	0.40 U	0.40 U	**8.2**	0.40 U	0.40 U	**1.9**
	03/2024	2.0 U	2.0 U	**7.9**	2.0 U	2.0 U	**1.5**
	06/2024	2.0 U	2.0 U	**6.7**	2.0 U	2.0 U	**1.9**
	09/2024	2.0 U	2.0 U	**7.8**	2.0 U	2.0 U	**2.4**
	12/2024	0.20 U	0.20 U	**8.0**	0.20 U	0.20 U	**1.5**
	03/2025	2.0 U	2.0 U	**6.3**	2.0 U	2.0 U	**2.6**
FL358-MW15	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW16	09/2024	**39**	**43**	**130**	2.0 U	2.0 U	**5.8**
	12/2024	**15 J**	**15 J**	**50 J**	2.0 U	2.0 U	**1.6 J**
	12/2024	**26 J**	**24 J**	**73 J**	2.0 U	2.0 U	**2.3 J**
	03/2025	**43**	**55**	**170**	2.0 U	2.0 U	**6.0**
	03/2025	**43**	**56**	**170**	2.0 U	2.0 U	**6.2**
FL358-MW17	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.52**
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.24**
	03/2025	2.0 U	2.0 U	**3.2**	2.0 U	2.0 U	**0.68**
FL358-MW18	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW19	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	0.20 U	0.20 U	**0.44**	0.20 U	0.20 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW20	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.96**
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.50**
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.60**
FL358-MW21	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW22	09/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW23	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW24	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW25	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW26	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.50**
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.97**
FL358-MW27	12/2024	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U

Location ID[1]	Sample Date	VOCs[2] (µg/L)					
		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Groundwater Preliminary Cleanup Level[3] (µg/L)		5	5	70	100	7	0.2
Protection of Indoor Air/Vapor Intrusion Commercial Use[4] (µg/L)		120	12	1,600	650	1,100	1.6
Protection of Indoor Air/Vapor Intrusion Residential Use[4] (µg/L)		25	1.4	180	77	130	0.33
FL358-MW28	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW29	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U
FL358-MW30	03/2025	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	0.20 U

Notes:

[1] Sample locations are shown on Figure 2.

[2] Volatile organic compounds (VOCs) analyzed by United States Environmental Protection Agency (EPA) Method 8260 by OnSite Environmental in Redmond, Washington. Other parameters/chemical were analyzed but not reported here. The full analytical data package will be included in the Remedial Investigation report planned to be completed in quarter 3 of 2025.

[3] Preliminary cleanup levels calculated as shown in the Remedial Investigation (GeoEngineers, 2023)

[4] Groundwater screening level protective of indoor air.

NE = not established

B = Result is shown as estimated because laboratory quality control testing did not meet standards. The concentration presented is biased high due to potential cross contamination indicated by low-level PCE detections in the rinsate samples. Flag applied by Shannon & Wilson.

J = Estimated result due to quality control failures. Flag applied by Shannon & Wilson for the 2022 events. Flag applied by GeoEngineers for 2023 and 2025 events.

JL = Estimated result, biased low, due to quality control failures. Flag applied by Shannon & Wilson.

N/A = not applicable

U = analyte was not detected above the Practical Quantitation Limit (PQL)

µg/L = micrograms per liter

-- = not analyzed

Shading indicates this well is present on either Transit Oriented Development Site 1 or 2

Bold indicates analyte was detected above the Practical Quantitation Limit (PQL).

Italic indicates the analyte was not detected but the laboratory reporting limit is greater than the cleanup level.

Shading indicates analyte was detected at a concentration greater than the preliminary cleanup level.

Table 3

Soil Chemical Analytical Data Collected in 2024 and 2025

Y Pay Mor Site

Federal Way, Washington

Location ID[1]	Sample ID	Sample Date	Approximate Sample Depth Below Current Ground Surface[3] (feet)	VOCs[2] (mg/kg)					
				PCE Degradation Products					
				Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Soil Preliminary Cleanup Levels[4] (mg/kg)				0.05	0.03	0.0052	0.032	0.0025	0.001
FL358-MW15	FL358-MW15_27.5-29	9/12/2024	27.5	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
	FL358-MW15_30-31.5	9/12/2024	30	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U
	FL358-MW15_35-36.5	9/12/2024	35	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
	FL358-MW15_40-41.5	9/12/2024	40	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
FL358-MW17	FL358-MW17_27.5-28	9/10/2024	27.5	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
	FL358-MW17_32.5-34	9/10/2024	32.5	0.0010 U	0.0010 U	**0.0011**	0.0010 U	0.0010 U	0.0010 U
	FL358-MW17_35-36	9/10/2024	35	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U
	FL358-MW17_40-41.5	9/10/2024	40	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
FL358-MW18	FL358-MW18_20-21.5	9/12/2024	20	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
	FL358-MW18_25-26.5	9/12/2024	25	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
	FL358-MW18_27.5-29	9/12/2024	27.5	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U	0.0021 U
	FL358-MW18_30-31.5	9/12/2024	30	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U
	FL358-MW18_42.5-44	9/12/2024	42.5	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
FL358-MW23	FL358-MW23_24-25	12/19/2024	24	0.00095 UJ	0.00095 UJ	0.00095 UJ	0.00095 UJ	0.00095 UJ	0.00095 UJ
	FL358-MW23_29-30	12/19/2024	29	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ
	FL358-MW23_33-34	12/19/2024	33	0.00093 UJ	0.00093 UJ	0.00093 UJ	0.00093 UJ	0.00093 UJ	0.00093 UJ
FL358-MW24	FL358-MW24_23-24	12/19/2024	23	0.00081 UJ	0.00081 UJ	0.00081 UJ	0.00081 UJ	0.00081 UJ	0.00081 UJ
	FL358-MW24_29.5-30	12/19/2024	29.5	0.00087 UJ	0.00087 UJ	0.00087 UJ	0.00087 UJ	0.00087 UJ	0.00087 UJ
	FL358-MW24_34-35	12/19/2024	34	0.0016 UJ	0.0016 UJ	0.0016 UJ	0.0016 UJ	0.0016 UJ	0.0016 UJ
FL358-MW25	FL358-MW25_24-25	12/18/2024	24	0.00044 U	0.00044 U	0.00044 U	0.00044 U	0.00044 U	0.00044 U
	FL358-MW25_34-35	12/18/2024	34	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	FL358-MW25_37-37.5	12/18/2024	37	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U

Location ID[1]	Sample ID	Sample Date	Approximate Sample Depth Below Current Ground Surface[3] (feet)	VOCs[2] (mg/kg)					
				PCE Degradation Products					
				Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Soil Preliminary Cleanup Levels[4] (mg/kg)				**0.05**	**0.03**	**0.0052**	**0.032**	**0.0025**	**0.001**
FL358-MW26	FL358-MW26_24-25	12/17/2024	24	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
	FL358-MW26_37-37.5	12/17/2024	37	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
	FL358-MW26_39-40	12/17/2024	39	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
FL358-MW27	FL358-MW27_24-25	12/17/2024	24	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	FL358-MW27_27-27.5	12/17/2024	27	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
	FL358-MW27_32-32.5	12/17/2024	32	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
FL358-MW28	FL358-MW28_25-26	2/25/2025	25	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
	FL358-MW28_29-30	2/25/2025	29	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
FL358-MW29	FL358-MW29_10-11	2/24/2025	10	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
	FL358-MW29_15-16	2/24/2025	15	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
	FL358-MW29_20-21	2/24/2025	20	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
	FL358-MW29_25-26	2/24/2025	25	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
	FL358-MW29_29-30	2/24/2025	29	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
FL358-MW30	FL358-MW30_20-21	2/25/2025	20	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
	FL358-MW30_DUP	2/25/2025	20	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
	FL358-MW30_29-30	2/25/2025	29	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U

Notes:

[1] Sample locations are shown on Federal Way Downtown Station, Figure 2.

[2] Volatile organic compounds (VOCs) analyzed by U.S. Environmental Protection Agency (EPA) Method 8260 by OnSite Environmental in Redmond, Washington. Other parameters/chemicals were analyzed but not reported here. The full analytical data package will be included in the Remedial Investigation report planned to be completed in quarter 3 of 2025.

[3] Ground surface elevation measured at time of respective drilling and/or confirmation samples taken.

[4] Preliminary cleanup levels calculated as shown in the Remedial Investigation (GeoEngineers, 2023).

bgs = below ground surface; mg/kg = milligrams per kilogram

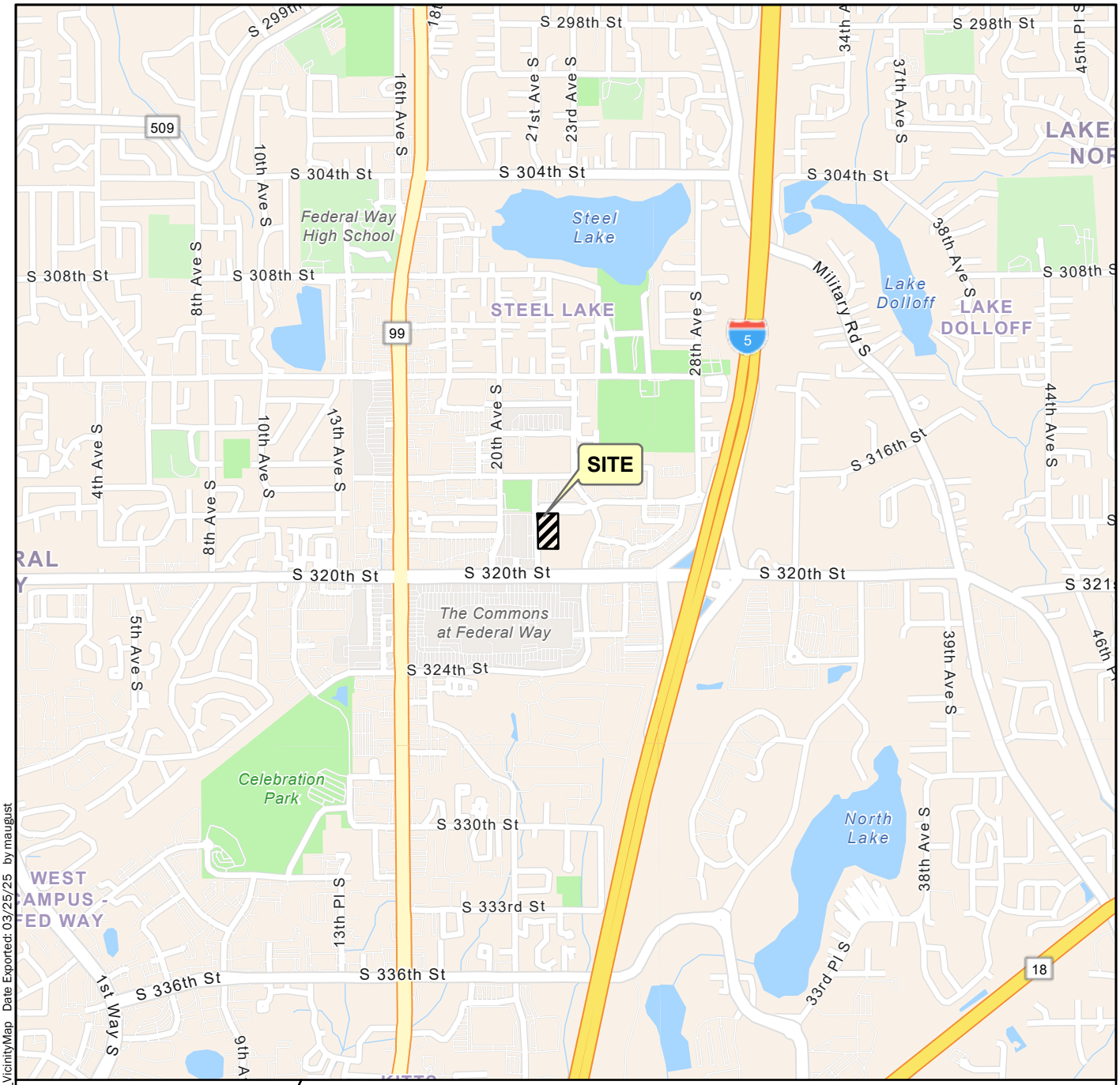
U = analyte was not detected above the Practical Quantitation Limit (PQL)

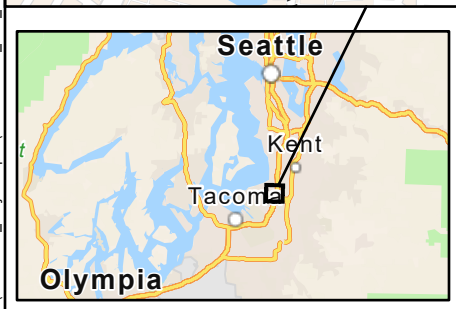
UJ = analyte was not detected above the PQL; the PQLs are qualified as estimates because the holding time for this analysis was exceeded

Bold indicates analyte was detected above the PQL.

Shading indicates well is present on either Transit Oriented Development Site 1 or 2.

Figures





N

0 2,000

Feet

Source(s):
- King County Aerial Imagery 2023

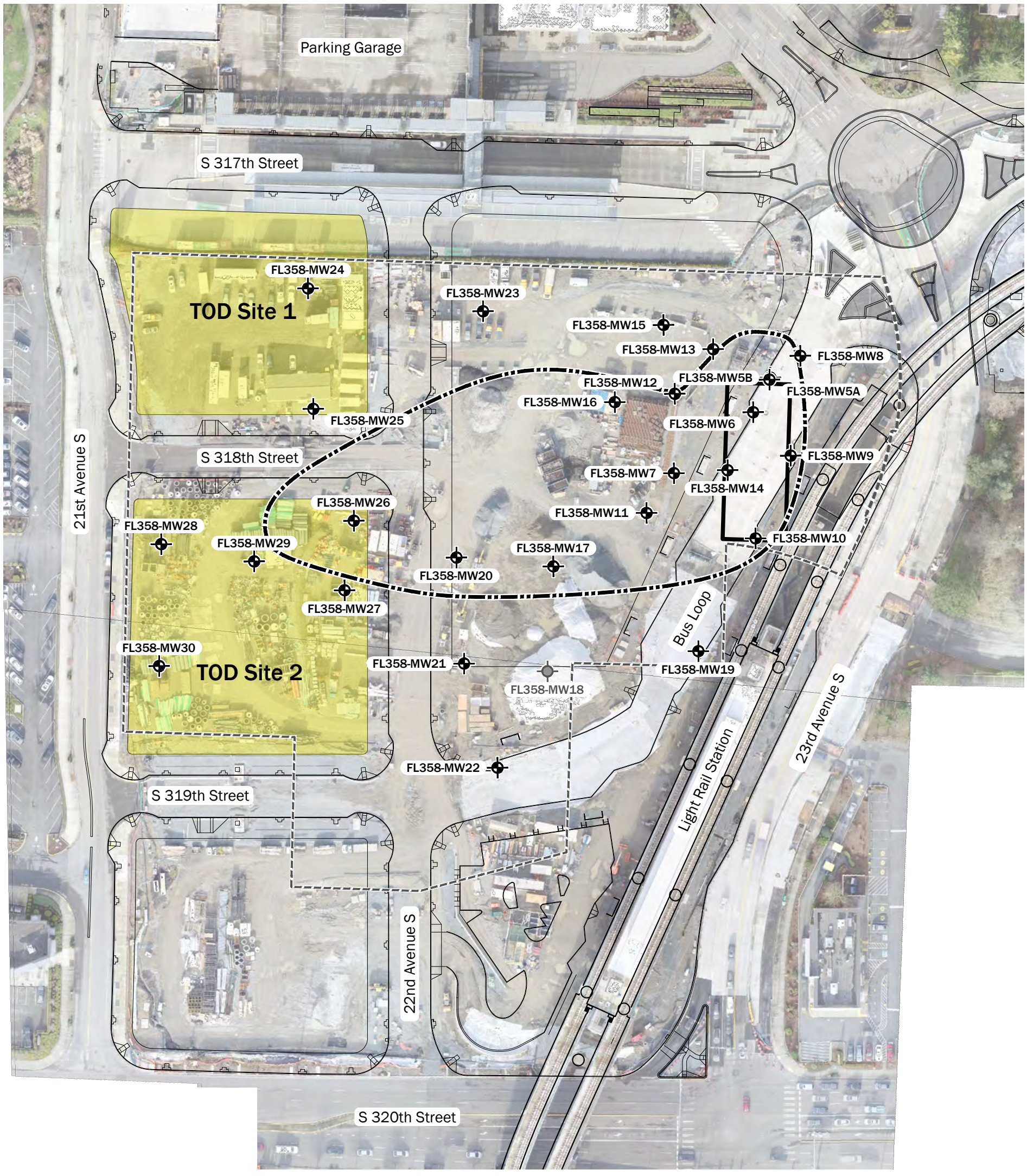
Coordinate System: NAD 1983 UTM Zone 10N

Vicinity Map

Y Pay Mor Site
Federal Way, Washington

GeoEngineers

Figure 1



Legend

- Development Properties (TOD Sites)
- FL358 Former Parcel Boundary
- Former Y Pay Mor Cleaners (Space A-6)
- Approximate Extent of Y Pay Mor Site
- Monitoring Well Location
- Decommissioned Monitoring Well

Notes:

Features and infrastructure shown are proposed or currently under construction.
TOD = transit oriented development

Data Sources:

- Design plans S3.15 S07-CDP536, S07-UCP336 dated October 28, 2021 completed by Kiewit/Parsons
- Aerial from Furtado & Associates dated 1/20/2024
- Wells FL358-MW-23 to FL358-MW-27 Surveyed by True North Land Surveying, INC, dated 12/20/24
- Wells FL358-MW-28 to FL358-MW-30 & Borings Surveyed by True North Land Surveying, INC, dated 3/3/25

Coordinate System: Project Datum Washington State Planes, North Zone, US Foot.

N

0 100

Feet

Federal Way Downtown Station

Y Pay Mor Site
Federal Way, Washington

GeoEngineers

Figure 2

Parking Garage

S 317th Street

TOD Site 1

TOD Site 2

S 318th Street

S 319th Street

S 320th Street

21st Avenue S

22nd Avenue S

23rd Avenue S

Bus Loop

Light Rail Station

Stormwater Vault

FL358-MW24 423.2

FL358-MW23 423.2

FL358-MW15 421.7

FL358-MW13 421.1

FL358-MW8

FL358-MW12

FL358-MW5B

FL358-MW5A

FL358-MW16 420.6

FL358-MW6

358-B10

FL358-MW9

FL358-MW7

FL358-MW14

420.1

FL358-MW11

FL358-MW10

FL358-MW25 413.3

FL358-MW26 403.9

FL358-MW28 411.8

FL358-MW29 410.7

FL358-MW27

FL358-MW20 412.4

FL358-MW17 416.9

FL358-MW30 407.9

FL358-MW21 410.4

FL358-MW18

FL358-MW19 418.7

FL358-MW22 410.1

415.8

423

421

419

417

415

413

411

409

407

405

411

409

407

A

A'

B

B'

Legend

- Development Properties (TOD Sites)
- Former Y Pay Mor Cleaners (Space A-6)
- Former Pond Extent Below Elevation 400 feet
- Monitoring Well Location
- Decommissioned Monitoring Well
- 409 Groundwater Contour - Shallow Aquifer
- Approximate Groundwater Flow Direction of Shallow Aquifer (variable range shown)
- 409 Groundwater Contour - Combined Shallow and Deep Aquifer
- A A' Cross Section Location
- Approximate Extent of PCE in Groundwater at Concentrations Greater than the PCUL During the 2024-2025 Sampling Events
- Approximate Extent of Vinyl Chloride in Groundwater at Concentrations Greater than the PCUL During the 2024-2025 Sampling Events

Notes:

1. Features and infrastructure shown are proposed or currently under construction.
2. TOD = Transit Oriented Development
3. PCE = tetrachloroethene
4. PCUL = preliminary cleanup level

Data Sources:

- Design plans S3.15 S07-CDP536, S07-UCP336 dated October 28, 2021 completed by Kiewit/Parsons
- Wells FL358-MW-23 to FL358-MW-27 Surveyed by True North Land Surveying, INC, dated 12/20/24
- Wells FL358-MW-28 to FL358-MW-30 & Borings Surveyed by True North Land Surveying, INC, dated 3/3/25

Coordinate System: Project Datum Washington State Planes, North Zone, US Foot.

N

0 100

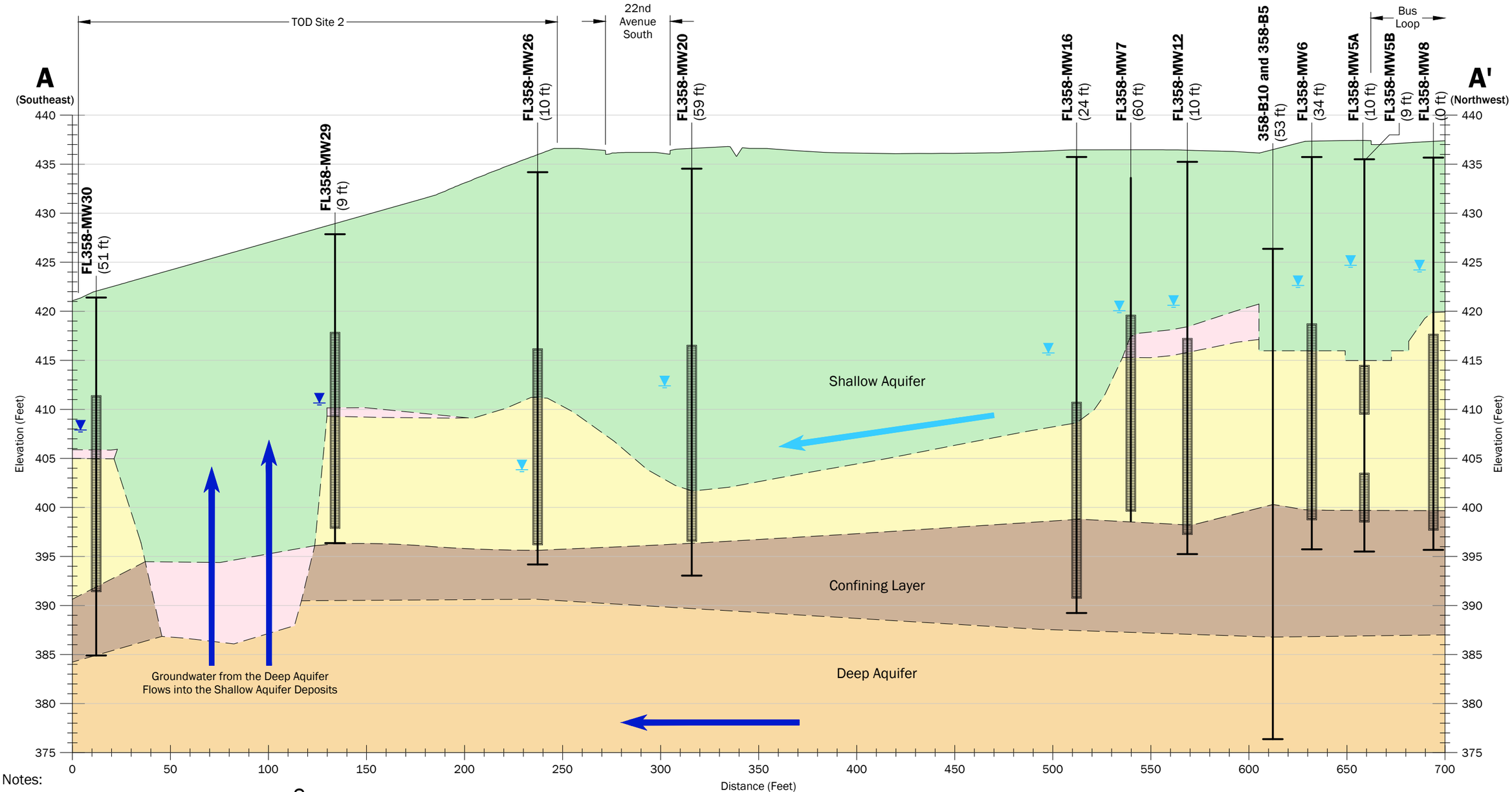
Feet

Groundwater Contours
March 2025

Y Pay Mor Site
Federal Way, Washington

GeoEngineers

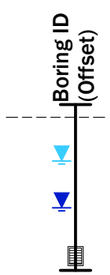
Figure 3



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. TOD = transit oriented development

Datum: NAVD88



Legend

- Boring
- Inferred Soil Contact
- Shallow Aquifer Groundwater Level (Measured)
- Combined Shallow and Deep Aquifer Groundwater Level (measured)
- Well Screen
- Shallow Aquifer Groundwater Flow
- Deep Aquifer Groundwater Flow

Lithology

- Fill
- Organic Soil
- Silty Sand and Sandy Silt, Sand and Silt with Gravel (Glacial Lacustrine, Lacrustrine, Recessional Outwash, Weathered Till)
- Hard Silt with Gravel (Dense Glacial Till)
- Sand and Silt with Gravel (Advance Outwash)

0 50 Horizontal Feet

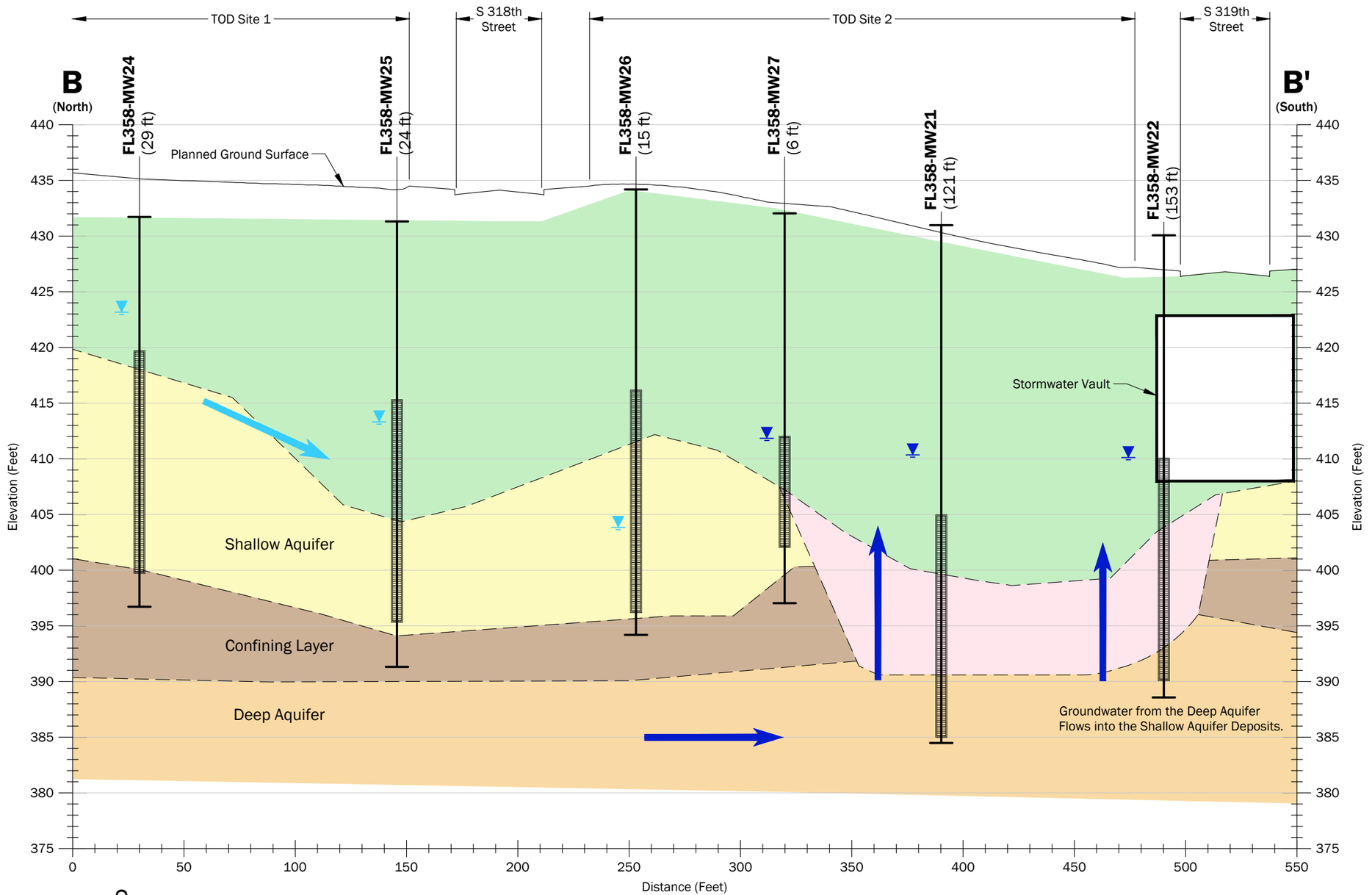
0 10 Vertical Feet
Vertical Exaggeration = 5X

Cross Section A-A'

Y Pay Mor Site
Federal Way, Washington

GeoEngineers

Figure 4



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. TOD = transit oriented development

Datum: NAVD88

Legend

- Boring ID (Offset)
- Boring
- Inferred Soil Contact
- Shallow Aquifer Groundwater Level (Measured)
- Combined Shallow and Deep Aquifer Groundwater Level (measured)
- Well Screen
- Shallow Aquifer Groundwater Flow
- Deep Aquifer Groundwater Flow

Lithology

- Fill
- Organic Soil
- Silty Sand and Sandy Silt, Sand and Silt with Gravel (Glacial Lacustrine, Lacrustrine, Recessional Outwash, Weathered Till)
- Hard Silt with Gravel (Dense Glacial Till)
- Sand and Silt with Gravel (Advance Outwash)

0 50 Horizontal Feet

0 10 Vertical Feet

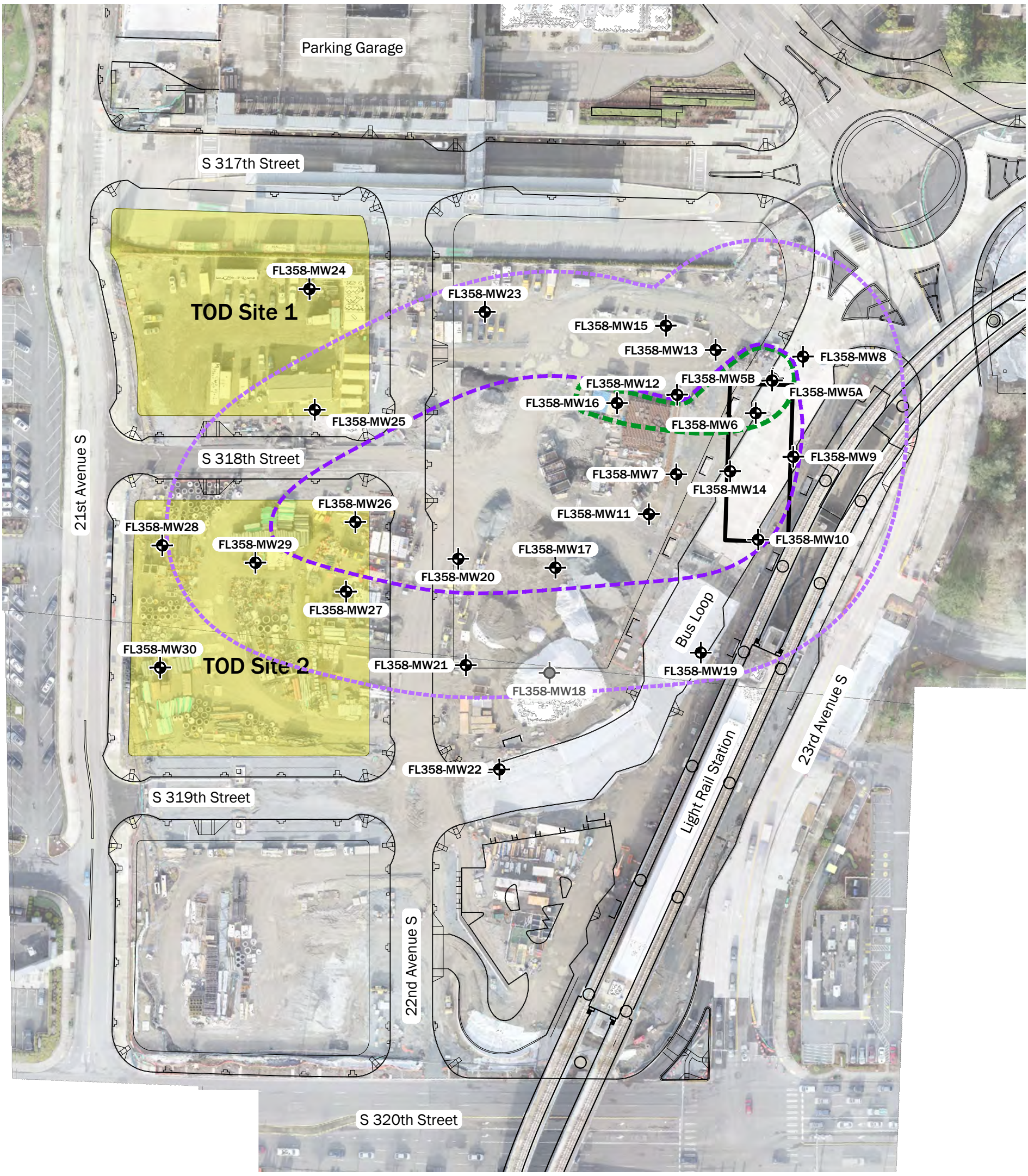
Vertical Exaggeration = 5X

Cross Section B-B'

Y Pay Mor Site
Federal Way, Washington

GeoEngineers

Figure 5



Legend

- Development Properties (TOD Sites)
- Former Y Pay Mor Cleaners (Space A-6)
- Monitoring Well Location
- Decommissioned Monitoring Well
- Approximate Extent of PCE in Groundwater at Concentrations Greater than the PCUL During the 2024-2025 Sampling Events
- Approximate Extent of Vinyl Chloride in Groundwater at Concentrations Greater than the PCUL During the 2024-2025 Sampling Events
- 100-foot Lateral Distance from Groundwater Plume - Potential for Vapor Intrusion Into Future Buildings

Notes:

1. Features and infrastructure shown are proposed or currently under construction.
2. TOD = Transit Oriented Development
3. PCE = tetrachloroethene
4. PCUL = preliminary cleanup level

Data Sources:

- Design plans S3.15 S07-CDP536, S07-UCP336 dated October 28, 2021 completed by Kiewit/Parsons
- Aerial from Furtado & Associates dated 1/20/2024
- Wells FL358-MW-23 to FL358-MW-27 Surveyed by True North Land Surveying, INC, dated 12/20/24
- Wells FL358-MW-28 to FL358-MW-30 & Borings Surveyed by True North Land Surveying, INC, dated 3/3/25

Coordinate System: Project Datum Washington State Planes, North Zone, US Foot.

N

0 100

Feet

Vapor Intrusion Evaluation

Y Pay Mor Site
Federal Way, Washington

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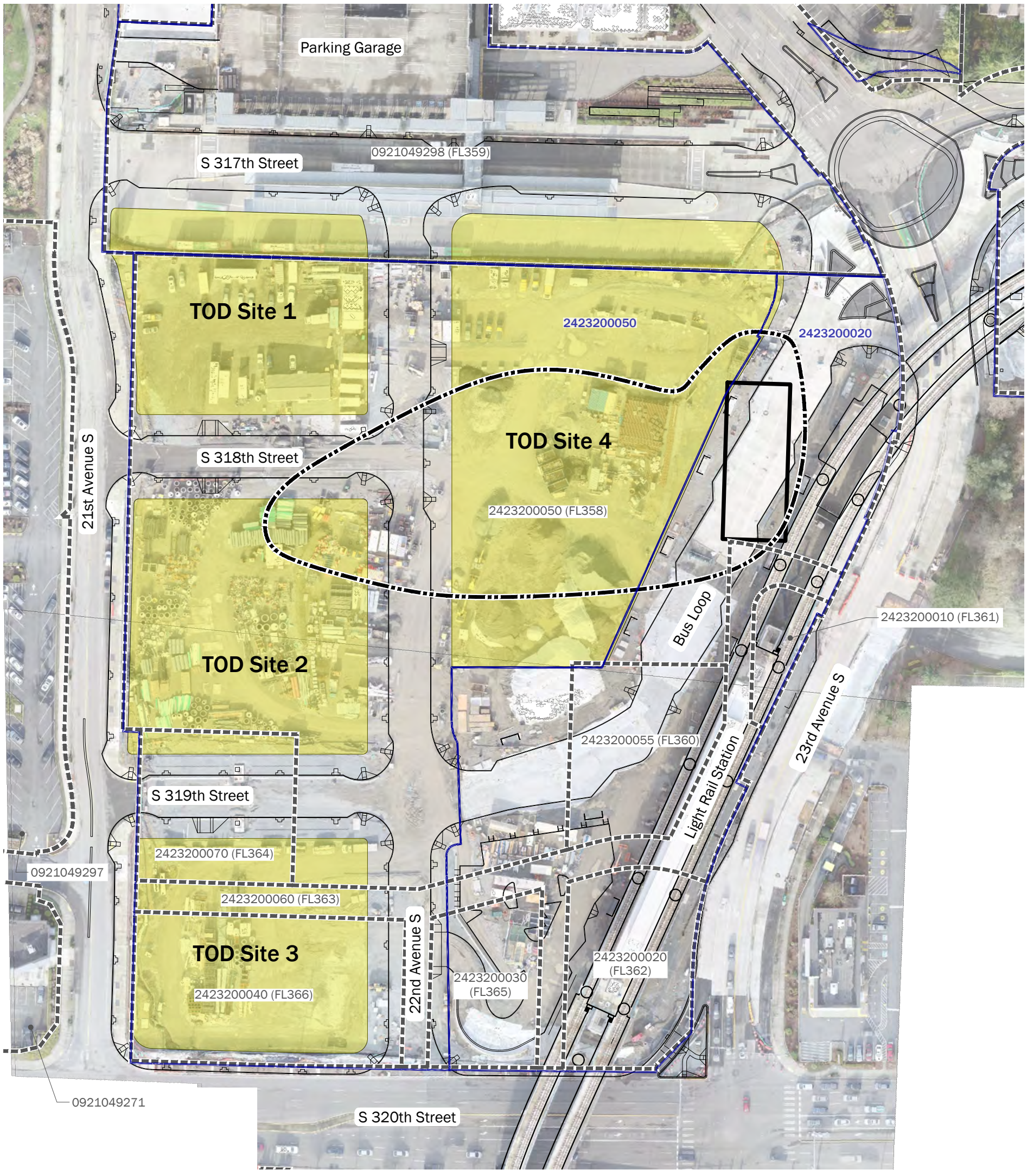
Figure 6

Appendices

Appendix A
Parcel Boundary Changes



Legend

- Development Properties (TOD Sites)
- Former Y Pay Mor Cleaners (Space A-6)
- Current Parcel Boundary with King County Assessor Number
- Historic Parcel Boundary with King County Assessor Number (Sound Transit Parcel Number)
- Approximate Extent of Y Pay Mor Site

Notes:

1. Features and infrastructure shown are proposed or currently under construction.
2. TOD = Transit Oriented Development
3. PCUL = preliminary cleanup level

Data Sources:

- Design plans S3.15 S07-CDP536, S07-UCP336 dated October 28, 2021 completed by Kiewit/Parsons
- Aerial from Furtado & Associates dated 1/20/2024
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Coordinate System: Project Datum Washington State Planes, North Zone, US Foot.

N

0 100

Feet

Parcel Boundary Changes

Y Pay Mor Site
Federal Way, Washington

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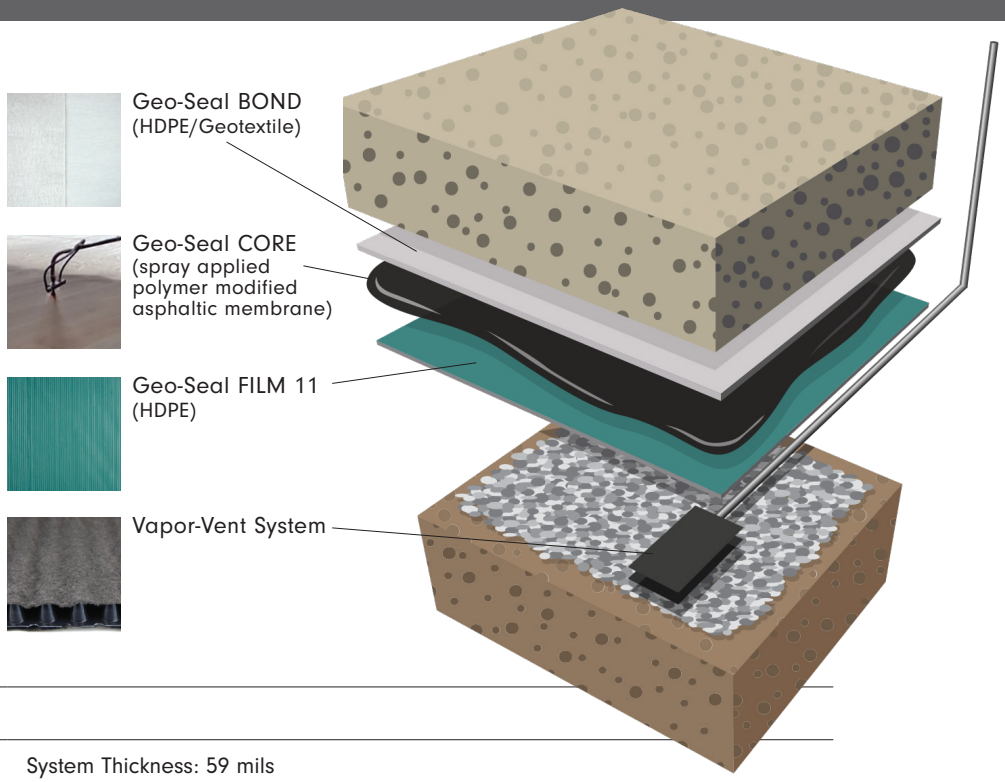
Figure A-1

Appendix B
Chemical Vapor Barrier Examples

Geo-Seal® 60



System: Geo-Seal 60 Vapor Intrusion Barrier			
Application: Underslab Contaminant Vapor Barrier		System Thickness: 59 mils	
	1st Layer	2nd Layer	3rd Layer
Product Name	Geo-Seal FILM 11	Geo-Seal CORE 30 mil	Geo-Seal BOND 18 mil

DESCRIPTION

Geo-Seal® 60 is designed to provide a cost-effective alternative for sites desiring a pre-emptive mitigation solution, but also wish to have a vapor intrusion barrier that is more robust and resistant to construction traffic than simple single sheet membranes. Geo-Seal® consists of three distinct layers, Geo-Seal® FILM 11, Geo-Seal® CORE and Geo-Seal® BOND.

While simple single sheet membranes may be able to provide robust chemical resistance, they often lack the robust seals around penetrations and termination points. They are also more prone to punctures during the construction process.

Geo-Seal® 60 makes the decision easy for those debating whether to employ a simple single sheet membrane or utilize a thicker, more robust barrier to protect human health at similar price points.

BENEFITS

- **Class A:** Class A vapor barrier that alone meets the basic water vapor barrier requirements for new construction.
- **Durable:** Three layers of complementary contaminant vapor barrier materials create a thick and redundant composite system superior to single sheet barrier systems.
- **Chemical Resistant:** Constructed with multiple highly chemical resistant sheets and a polymer-modified asphaltic membrane to form a robust composite barrier.
- **Seamless:** Spray-applied monolithic layer ensures complete sealing of building foundation without mechanical fastening.
- **Bonded:** Mechanically adheres directly to the foundation slab.
- **Single-Source Warranty:** EPRO can be a single point of contact to address building vapor intrusion and waterproofing needs.

LIMITATIONS

- Do not apply below 20°F or to damp, frozen or contaminated surfaces.
- Contact EPRO for waterproofing system recommendations.

SPECIFICATIONS, DRAWINGS, AND TECHNICAL ASSISTANCE

The most current specifications and drawings can be found on www.eproinc.com. For project specific details contact EPRO directly, or your local EPRO representative.

Site conditions, performance goals, and budget determine which system is most appropriate for a given project. For more information regarding product performance, testing, plan review, or general technical assistance, please contact EPRO.

WARRANTY

EPRO provides a wide range of warranty options for Geo-Seal systems. For a project to be eligible for any warranty option beyond a 1-year material warranty, a Geo-Seal Authorized Applicator must be used and the project must be registered and approved by EPRO prior to the commencement of any product application.

Warranty options available for this system include:

- Material warranty
- Longer warranty periods are available. Contact EPRO for more information.

Physical Property	Test Method	Value
Tensile Strength	ASTM D 412	527.7 psi
Elongation	ASTM D 412	45%
Adhesion to Concrete	ASTM D 903	8 lbf/in
Puncture Resistance	ASTM D 1709	310 lbf
Hydrostatic Head Resistance	ASTM D 5385	100 psi (231 ft)
Water Vapor Transmission	ASTM E 96	0.020 perms
PCE Diffusion Rate	Geokinetics	1.16×10^{-17} m^2/sec
Benzene Diffusion Rate	Geokinetics	2.31×10^{-18} m^2/sec
Classification	ASTM E1745	Class A, B & C

Nítra-Seal®

Nitrile-Advanced Contaminant Vapor Barrier

Technical Data Sheet

Description

Nitra-Seal® is a nitrile-advanced contaminant vapor barrier designed for use under concrete slabs to control vapor intrusion (VI) at sites considered moderate to high-risk for VI. The Nitra-Seal composite system is comprised of three layers: Nitra-Base+™, Nitra-Core™ and Land Science Bond™ to create a seamless, redundant barrier that provides more protection over existing polyethylene-based barriers.

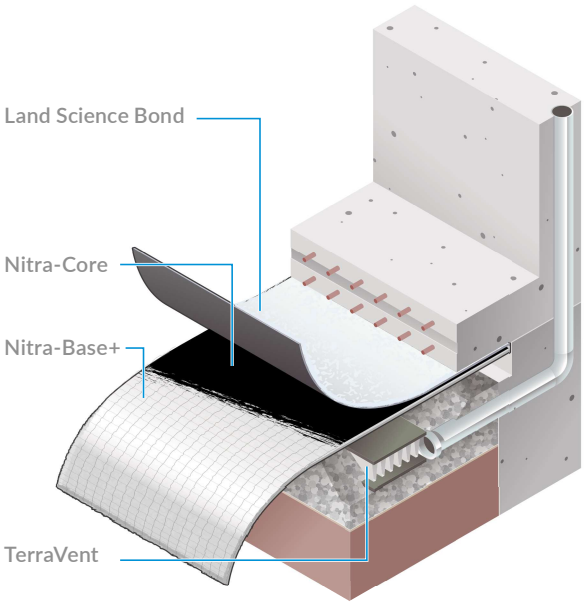
Key to Nitra-Seal's ability to minimize vapor intrusion is the inclusion of a nitrile-modified asphalt, Nitra-Core, the most chemically resistant spray-applied core available. NitraBase+, the base layer of the system is comprised of a 15 mil polyethene (PE) sheet laminated to a geotextile fabric and further strengthened with a reinforcing grid. Nitra-Base+ is sealed at the seams, penetrations, and terminations using Nitra-Core. A continuous 40-mil layer of Nitra-Core is then sprayed across the entirety of the installation for added robustness and protection. Land Science Bond, a 5 mil PE layer bonded to a geotextile, completes the Nitra-Seal system for added durability and allows the barrier system to bond to the foundation.

Nitra-Seal was developed to protect against chlorinated solvents, petroleum compounds, methane, radon and other volatile organic compounds. The installation of Nitra-Seal typically occurs after the site substrate has been prepared and the utilities placed, and prior to concrete slab placement.

Nitra-Seal System Summary

System Thickness:	80 mil			
Components:	Venting System[1]	Base Layer	Middle Layer	Top Layer
Product Name:	TerraVent	Nitra-Base+	Nitra-Core	Land Science Bond
Component Thickness:	1"	22 mil	40 mil	18 mil

1. Venting system is an optional system component



Advantages

Chemical Resistance

Nitra-Seal offers an improvement over all other PE-based composite vapor barriers due to the use of Nitra-Core, a more chemically resistant, nitrile-modified asphalt core.

Durable

The multi-layer system includes a base layer with a reinforced grid, provides a robust, highly puncture and tear resistant, vapor intrusion mitigation system.

Reliable

Nitra-Seal is installed by Land Science certified applicators who perform quality testing to ensure proper installation.

Nitra-Seal System Properties

Property	Test Method	Typical Value
Tensile Strength[1]	ASTM D751	223 lbs
	ASTM D7004	237 lbs
Elongation[1]	ASTM D751	38%
	ASTM D7004	38%
Puncture Resistance	ASTM D4833	76 lbs
Water Vapor Transmission	ASTM E96	0.031 grains/(hr·ft^2)
Water Permeance	ASTM E96	0.077 US Perms
Methane Gas Permeance	ASTM 1434	404 mL(STP)/(m^2*d*atm) [5]
Benzene Diffusion Coefficient	GeoKinetics[2]	4.9 x 10^{-18} m^2/s
PCE Diffusion Coefficient	GeoKinetics[2]	1.1 x 10^{-16} m^2/s

1. Values are an average of the machine direction and the transverse direction test results.

2. A method comparable to ISO 15105-2, performed by GeoKinetics, Inc., Irvine, CA.

Design Considerations

Nitra-Seal is an advanced composite barrier designed for use at a wide range of site types and vapor intrusion levels. Common applications include multi-family housing units, industrial locations, or sites with many penetrations.

TerraVent™ can be implemented in an active or passive mitigation capacity in conjunction with Nitra-Seal. Combining a sub-slab ventiliation network in the permeable substrate with Nitra-Seal offers the highest level of protection from contaminant vapor intrusion. Please contact Land Science to discuss whether TerraVent is recommended for your site.

Service & Support

Land Science representatives are available for site data analysis, mitigation system recommendations, barrier and venting design support, and budgetary estimates. Site conditions, project objectives, and regulatory requirements will dictate which mitigation solution is appropriate.

Weather Limitations

- Nitra-Core should be sprayed at temperatures >45°F. Contact Land Science for requirements in colder temperatures.
- Nitra-Core should not be sprayed when raining or during weather conditions that create ponding water on the membrane.
- Any ponding water on the surface of Nitra-Base+ needs to be removed prior to applying Nitra-Core.

Warranty

Land Science offers industry-leading warranty options for the full suite of vapor intrusion barrier systems. All installations come with a one-year material warranty free of charge. To qualify for extended warranty terms, the project must be reviewed and approved by the Land Science prior to any product installation by a Land Science Certified Applicator.

Nitra-Seal warranty options include Material and System warranties up to 20 years.

Contact Land Science for more information to meet your site's warranty requirements.

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