Final Engineering Design Report

Simplot Grower Solutions
1800 W. 1st Street
Warden, Washington 98857

February 2021

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Warden, WA 98857

Prepared by:
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February 2021

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Acronyms

µg/Kg	microgram per kilogram
µg/L	microgram per liter
AO	Agreed Order
bgs	below ground surface
BMP	best management practice
CAICMP	Cleanup Action Implementation Compliance Monitoring Plan
CAP	Cleanup Action Plan
CFR	Code of Federal Regulations
CUL	cleanup levels
Ecology	State of Washington, Department of Ecology
EDB	ethylene dibromide
EDR	engineering design report
EIS	environmental impact statement
GAC	granulated active carbon
HASP	health and safety plan
HDPE	high-density polyethylene
HDR	HDR Engineering, Inc.
MCL	maximum contaminant level
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
PID	photoionization detector
POC	point of compliance
PPE	personal protective equipment
QA/QC	quality assurance/quality control
RAO	remedial action objectives
RCW	Revised Code of Washington
RI/FS	remedial investigation/feasibility study
SEPA	State Environmental Policy Act
SGS	Simplot Grower Solutions
Simplot	J.R. Simplot Company
SPCC	spill prevention control and countermeasures plan
SVE	soil vapor extraction
SWPPP	stormwater pollution prevention plan
UECA	Uniform Environmental Covenants Act
USEPA	U.S. Environmental Protection Agency
WAC	Washington Administrative Code

1 Introduction

This *Engineering Design Report* (EDR) describes specific activities and engineering design requirements for implementing the remedial action at the Simplot Grower Solutions (SGS) site located at 1800 West First Street, City of Warden, Washington. The site is located in Grant County. This EDR has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA) regulations published in Washington Administrative Code (WAC) 173-340-400(4)(a) (Ecology 2007d). The site is listed on the Washington State Department of Ecology's (Ecology's) Site Information System and Hazardous Sites List as Warden City Water Supply Wells 4 & 5 (FSID 2802409, CSID 1618).

1.1 Project Description

The J.R. Simplot Company (Simplot) entered into an agreed order (AO; AO 8241) with Ecology, on May 27, 2011, to address the presence of ethylene dibromide (EDB), a fumigant, in soil and groundwater at the SGS site at 1800 W. 1st Street, Warden, Washington (**Figure 1** and **Figure 2**) (figures are presented in Appendix A and tables are presented in Appendix B). As part of AO 8241, Simplot completed a remedial investigation/feasibility study (RI/FS) (HDR 2018). The RI/FS recommended a remedial approach that included removing and treating EDB-impacted soils and compliance groundwater monitoring.

After completing the RI/FS, Ecology, in cooperation with Simplot, completed a *Cleanup Action Plan* (CAP) (Ecology 2019). The CAP is Ecology's decision document for the site and provides the rationale for selecting the cleanup alternative. In summary, Ecology concluded:

> *Ecology completed an evaluation of the alternatives and has determined that Alternative 3 is Ecology's selected remedy. The remedial action consists of excavation and treatment of EDB-contaminated soil using an applied vacuum to the soil and collection of the EDB vapors from the soil. The vapors will be captured using a filter and treated. Clean soils will be removed and stockpiled so that contaminated soils can be excavated, treated, and returned to the excavation. Treated soils with EDB concentrations less than the soil cleanup level (CUL) of 0.27 micrograms per kilogram (µg/kg) will be returned to the excavation and the ground restored to its original condition. Upon completion of the soil cleanup action compliance groundwater monitoring will take place in order to evaluate the effectiveness of the cleanup action with regards to groundwater protection.*

Simplot entered into another AO (AO DE 16890) with Ecology on May 7, 2020, to address EDB remedial actions, which requires Simplot to implement the CAP in accordance with the scope of work and schedule attached to the AO DE 16890. (AO 8241 was for activities through the completion of the RI/FS report.)

1.2 Remedial Action Contacts and Information

Site Name	Simplot Growers Solutions Warden, Washington Site (in Agreed Order Ecology refers to site as Warden City Wells site)
Ecology Facility/sites ID	2802409
Agreed Order	No. DE 16890
Cleanup Site ID (CSID)	No. 1618 (Warden City Water Supply Wells 4&5)
Address	1800 West 1st Street Warden, WA 98857
Location:	GPS: 46.97025 46° 58' 13" North and -119.060309 -119° 3' 37" West UTM: Zone 11 N; 343279.18, 5203918.33 Legal: SW T17N R30E S9 Parcel: 060697000 County: Grant Washington
Ecology Site Manager	Christer Loftenius, LG, LHG State of Washington Department of Ecology Toxics Cleanup Program, Eastern Region 4601 N Monroe Street Spokane, Washington 99205-1295 clof461@ecywa.gov 509.329.3400
Potentially Liable Person (PLP)	J.R. Simplot Company P.O. Box 27 Boise, Idaho 83707
PLP Contact	Molly Dimick, MBA Environmental Engineer J.R. Simplot Company PO Box 912 1130 W. Hwy 30 Pocatello, ID 83204 208.235.5682 molly.dimick@simplot.com
Site Owner	Same as PLP
Work Plan Preparer	HDR Engineering Michael Murray, Ph.D. 412 East Park Center Boulevard, Suite 100 Boise, Idaho 83706 mike.murray@hdrinc.com 208.387.7033

1.3 Purpose of the Engineering Design Report

The purpose of this EDR is to satisfy the requirements of WAC 173-340-400(4)(a) and those established under the 2020 AO. The EDR documents engineering concepts and criteria used during design of the cleanup action and provides sufficient information to develop and review construction plans and specifications. Specific information required by WAC 173-340-400(4)(a) and provided in this EDR includes the following:

> (i) Goals of the cleanup action including specific cleanup or performance requirements;
>
> (ii) General information on the facility including a summary of information in the remedial investigation/feasibility study updated as necessary to reflect the current conditions;

(iii) Identification of who will own, operate, and maintain the cleanup action during and following construction;

(iv) Facility maps showing existing site conditions and proposed location of the cleanup action;

(v) Characteristics, quantity, and location of materials to be treated or otherwise managed, including groundwater containing hazardous substances;

(vi) A schedule for final design and construction;

(vii) A description and conceptual plan of the actions, treatment units, facilities, and processes required to implement the cleanup action including flow diagrams;

(viii) Engineering justification for design and operation parameters, including:

> (A) Design criteria, assumptions and calculations for all components of the cleanup action;
>
> (B) Expected treatment, destruction, immobilization, or containment efficiencies and documentation on how that degree of effectiveness is determined; and
>
> (C) Demonstration that the cleanup action will achieve compliance with cleanup requirements by citing pilot or treatability test data, results from similar operations, or scientific evidence from the literature;

(ix) Design features for control of hazardous materials spills and accidental discharges;

(x) Design features to assure long-term safety of workers and local residences;

(xi) A discussion of methods for management or disposal of any treatment residual and other waste materials containing hazardous substances generated as a result of the cleanup action;

(xii) Facility specific characteristics that may affect design, construction, or operation of the selected cleanup action, including:

> (A) Relationship of the proposed cleanup action to existing facility operations;
>
> (B) Probability of flooding, probability of seismic activity, temperature extremes, local planning and development issues; and
>
> (C) Soil characteristics and groundwater system characteristics;

(xiii) A general description of construction testing that will be used to demonstrate adequate quality control;

(xiv) A general description of compliance monitoring that will be performed during and after construction to meet the requirements of WAC 173-340-410;

(xv) A general description of construction procedures proposed to assure that the safety and health requirements of WAC 173-340-810 are met;

(xvi) Any information not provided in the remedial investigation/feasibility study needed to fulfill the applicable requirements of the State Environmental Policy Act (chapter 43.21C RCW);

(xvii) Any additional information needed to address the applicable state, federal and local requirements including the substantive requirements for any exempted permits; and property access issues which need to be resolved to implement the cleanup action;

(xviii) For sites requiring financial assurance and where not already incorporated into the order or decree or other previously submitted document, preliminary cost calculations and financial information describing the basis for the amount and form of financial assurance and, a draft financial assurance document;

(xix) For sites using institutional controls as part of the cleanup action and where not already incorporated into the order or decree or other previously submitted documents, copies of draft restrictive covenants and/or other draft documents establishing these institutional controls; and

(xx) Other information as required by Ecology.

1.4 Report Organization

This report consists of 12 sections and four appendices.

- Section 1, Introduction, provides a project overview, remedial action contact information, purpose, and organization of the report.
- Section 2, Site Description and Background, summarizes site background information, including the site description, site history, and nature and extent of soil and groundwater contamination at the site.
- Section 3, Cleanup Requirements, presents remedial action objectives, cleanup levels, points of compliance, and permit requirements for the planned remedial action.
- Section 4, Engineering Design, presents the cleanup action design considerations, including a conceptual plan of the remedial actions, engineering design criteria, facility-specific design issues, and measures to manage hazardous materials, spills, and safety of site workers and residents.
- Section 5, Remedial Action, provides a detailed description of the remedial action methods.
- Section 6, Construction Quality Assurance/Quality Control Procedures, describes quality assurance/quality control (QA/QC) procedures to be followed during construction activities for the remedial action.
- Section 7, Compliance Monitoring, identifies compliance monitoring activities that will be performed to evaluate the safety of site workers, assess the effectiveness of the removal action, and monitor long-term performance.
- Section 8, Operation and Maintenance Plan, identifies long-term operation and maintenance requirements.

- Section 9, Financial Assurance, presents financial information relevant to the remedial action.
- Section 10, Institutional Controls, describes restrictive covenants or other institutional controls related to the remedial action.
- Section 11, Remedial Action Schedule, presents a preliminary schedule of final design and construction activities.
- Section 12, References, includes references cited or used to prepare this report.
- Appendix A presents project-related figures referenced in this report.
- Appendix B presents project-related tables referenced in this report.
- Appendix C presents groundwater contours associated with RI/FS sampling events.

2 Site Description and Background

2.1 Site Description

Simplot uses the SGS site to store agricultural products (e.g., packaged fertilizers) in warehouses. The property consists of two warehouse buildings, an unpaved parking area, and several storage bins. In addition, the property hosts six groundwater monitoring wells.

Figure 1 and **Figure 2** are aerial photographs of the site and surrounding area that provide an indication of current land use. The parcel and surrounding parcels are listed by Grant County as "trade-general merchandise." Land use within 1 mile of the property includes commercial and light industry, open space (undeveloped), and agricultural. Simplot anticipates continuing to use the property to store agricultural products for the near future and has not identified any long-term changes to property use.

The area immediately around the SGS property is industrial (agricultural), with irrigated agricultural areas on the north and west sides of the East Low Canal and residential areas to the southeast (**Figure 2** and **Figure 3**). The property is bordered by a railroad spur to the north and west, industrial buildings to the east, 1st Street to the south, and industrial facilities to the west. The Washington Potato Company is located to the west of the SGS site and Pure Line Seeds, Columbia Seeds, Greater Pacific Cold Storage, and ConAgra Lamb Weston (formerly Ochoa Ag Unlimited Foods and Basin Frozen Foods) are to the east of the SGS site. To the southeast, is an auto wrecking lot, to the south is Pacific Coast Canola, and to the southwest is Skone Irrigation, CHS Sun Basin Growers, and the Warden Airport. The East Low Canal is located approximately 250 feet to the north of the SGS site (**Figure 3**).

2.2 Geology and Hydrogeology

A description of site geology and hydrogeology is primarily taken from the *Preliminary Investigation of Ethylene Dibromide Contamination* (PGG 2007), *Phase II Preliminary Investigation Report* (Ecology 2009), and RI/FS activities conducted by HDR Engineering, Inc. (HDR).

The City of Warden is located within the Columbia Plateau, which is dominated by the Columbia River Basalt Group (thick sequence of basalt flows). Unconsolidated sediment overlies basalt in the Warden area and is comprised of sand and silt deposited by outburst floods from Glacial Lake Missoula and Palouse Formation loess (windblown silt and fine sand). Lithology of the monitoring wells associated with the site is described as unconsolidated soil of very silty to slightly silty to silty fine sand 17 to 64 feet thick. In addition, an on-site geologist observed layers of caliche (hardened soil cause by crystalized salts) while overseeing drilling in the upper 25 feet of boreholes. For the SGS site, caliche is interbedded with sand from 4 to 20 feet below ground surface (bgs). Beneath the unconsolidated soil, 4.5 to 14 feet of weathered basalt is encountered. Beneath the weathered basalt is competent basalt. The contact between the overburden and basalt , in the vicinity of the monitoring wells, slopes to the west-northwest. A summary of lithology for monitoring well MW-5, which was constructed at the SGS site, is as follows (PGG 2007):

Depth below ground surface	Description
0 to 4 feet	Fill material
4 to 18.5 feet	Fine sand with caliche interbeds
18.5 to 43 feet	Fine sand and silty sand
43 to 49 feet	Weathered basalt
49 to >55 feet	Hard basalt
55 feet	Boring bottom

The site and surrounding area lies in the Odessa groundwater management subarea, a segment of the Columbia Basin groundwater system, which is characterized by declining basalt aquifer water levels and high amounts of recharge to the shallow aquifer due to irrigated agricultural activities in the region. The surficial geologic deposits are outwash deposits and wind-blown aeolian deposits (loess). Below these surficial deposits, three aquifers are identified in the City of Warden area:

- Shallow aquifer - comprised of unconsolidated deposits (includes weathered basalt, gravels, sand, silt, and clay); regionally, this aquifer flows toward the west (George 2006). Monitoring wells associated with this RI/FS are constructed in the shallow aquifer.
- Wanapum aquifer – part of the Wanapum Basalt formation of the Columbia River Basalt Group; this formation extends to a depth of approximately 600 feet bgs; regionally, groundwater flows southwest (Hansen et al. 1994).
- Grande Ronde aquifer – a deeper basalt aquifer found beneath the Wanapum formation; regionally, flows toward the south and southwest (Hansen et al. 1994).

Well log information for the Wanapum and Grande Ronde aquifers indicates that the groundwater potentiometric elevations decline with depth. Based on searches through Ecology's well database (updated February 2018), there are nine extraction wells within a 1-mile radius of the site. (Per WAC 173-160-010, an extraction well includes wells that withdraw groundwater for drinking, feedlots, irrigation, dewatering and drainage, infiltration, industrial processes, washing and rinsing, heating and cooling.) For several of the identified wells, there is no information about what kind of wells they are except that they are water wells.

Table 1 lists the extraction well information and **Figure 3** shows the relative location of extraction wells in relation to the site. Well locations are approximate as some of the location information is based on quarter-quarter legal descriptions and not specific global positioning system (GPS) coordinates. The deep extraction wells are finished in the Wanapum aquifer (deep aquifer), which lies below the unconsolidated material and caliche in the Wanapum Basalt formation of the Columbia River Basalt Group.

Resource protection wells within a 1-mile radius of the site are associated with the Simplot RI/FS and CAP activities. Per WAC 173-160-410 (13), resource protection wells are defined as "a cased boring intended or used to collect subsurface information or to determine the existence or migration of pollutants within an underground formation." The resource protection wells (groundwater monitoring wells) are further described in Section 2.4.2.

Depth to water (shallow aquifer) in the project area is approximately 11 to 30 feet bgs and varies seasonally, where groundwater elevation rises during the irrigation season and declines during the

non-irrigation season. Shallow groundwater is influenced by the East Low Canal, where the canal acts as a losing stream (creates a hydraulic mound) during irrigation season. The shallow aquifer system consists of the outwash deposits, loess, and other unconsolidated materials above the basalt of the Wanapum Basalt formation of the Columbia River Basalt Group. The city wells are finished in the Wanapum aquifer (deep aquifer), which lies below the unconsolidated material and caliche in the Wanapum Basalt formation of the Columbia River Basalt Group. All monitoring wells are developed in the shallow aquifer. Monitoring wells designated with a "D" refer to wells screened at the bottom of the shallow aquifer (above the competent basalt) whereas monitoring wells with no designation or with an "S" designation are screened in the upper portion of the shallow aquifer.

The topography of the area is generally flat with a few gently sloping hills. Elevation of the site is approximately 1,252 feet above sea level. The geomorphologic setting of the area is characterized by outwash deposits and wind-blown aeolian deposits (loess). The nearest major natural surface water body is Warden Lake to the west. The nearest man-made surface water body is the East Low Canal. The nearest undeveloped natural land is approximately 3 miles west/southwest of the site, part of which is the Columbia National Wildlife Refuge. Other areas around Warden are residential or agriculturally developed land (**Figure 2** and **Figure 3**).

2.3 Site History

The site is a former SGS (previously known as Simplot Soilbuilders) facility. SGS are retail outlets for agri-chemicals (fertilizers, pesticides, soil amendments) that offer customized fertilizer blending, application services, and consulting.

Environmental Data Resources conducted a chain-of-title search and reported the following for the 1800 W. 1st Street facility (2011):

- 1940 to 1971: site owned by Burlington Northern, Inc. (formally Northern Pacific Railroad Company)
- 1971 to current: J.R. Simplot Company

Simplot actively operated the Soilbuilders facility from 1971 through 1992, where they stored, blended, and transported agri-chemicals, including EDB. Most of the Simplot workers familiar with the site are retired (many no longer living). Little information is available about the storage and use of EDB and if there were any spills.

EDB was used in the past as a pesticide for potato crops and as an additive for leaded gasoline fuel. Potato crops are grown in the Warden area, and there is potato processing in the industrial section of the city. Although the chemical was banned for use as a soil fumigant in 1984, elevated levels of EDB were found in City of Warden wells (City Wells #4 and #5), which led to multiple investigations to find the source of the EDB and to protect groundwater.

Table 2 lists the EDB investigation history, starting in 2004 with an Ecology early notice letter to the City of Warden through Simplot's RI/FS activities, which include monitoring and sampling events from 2011 to October 2013, and then a groundwater sampling event in December 2017. This list represents the actions and studies that helped guide the location and type of data collection activities undertaken, and the steps taken to prepare the RI/FS report. After completing the RI/FS, Ecology, in cooperation with Simplot, completed a CAP. Simplot entered into AO DE 16890 with

Ecology on May 7, 2020, to address EDB remedial actions, which requires Simplot to implement the CAP in accordance with the scope of work and schedule attached to AO DE 16890. As part of the AO, Simplot conducted additional soil investigations in June 2020 to further define the extent of EDB-impacted soils to support this EDR (HDR 2020a). Results of the 2020 activities are described in *Additional Soil Sampling Report* (HDR 2020b) and summarized below.

2.4 Nature and Extent of Contamination

As established in the RI/FS and CAP, the cleanup level (CUL) for EDB in soil is set at 0.27 micrograms per kilogram (µg/Kg), which is in accordance with MTCA Method B (the Washington Cleanup Levels and Risk Calculations [CLARC] is 0.27 µg/Kg for protection of groundwater). For groundwater, the CUL is set at the state drinking water maximum contaminant level (MCL) of 0.05 µg/L.

2.4.1 Soils

EDB has been quantified in soil at the SGS site (HDR 2018 and HDR 2020b). The extent of impacted soil is divided into two areas; the west area and the east area (**Figure 4**). Based on borings conducted in June 2020, caliche is first encountered between 9 and 16 feet bgs depending on the boring location. Caliche was relatively solid and consolidated for the top several feet, but appeared as 2-millimeter to several-inches-thick lenses as drilling continued. Toward the bottom of each boring, any calcium carbonate remaining occurred as vertical or diagonal veins (or none at all) within a fine silty sand. **Table 3** shows a cross section of caliche on site based on soils encountered during drilling (note this table is an update of Table 7 from the RI/FS). Also included in **Table 3** is a summary of EDB sample results.

Figure 5 and **Figure 7** show the updated proposed excavation areas based on RI/FS and June 2020 sampling activities. Boreholes where EDB was non-detect for all samples have been removed from within the excavation boundaries. **Figure 6** and **Figure 8** show cross sections through the two excavation areas to give a better view of the caliche interbeds and the soil interval with EDB levels above 0.27 µg/kg.

Based on the updated excavation extents and the depths of EDB detected above CULs, **Table 4** shows the calculated volumes of soil to be excavated and separated into clean stockpile and EDB stockpile. Volumes are based on the current proposed extents of excavation and EDB detections in the 2020 borings. Volumes calculated include the volume of soil with EDB above 0.27 µg/kg, total volume of caliche, and total volume of all soils within the excavation areas. The new excavation extents have been determined based on the 2020 soil sampling activities, with some inference from past data on where to draw new boundaries where needed. The data presented in **Table 4** is used to support this EDR and proposed excavation activities.

2.4.2 Groundwater Conditions

Figure 9 illustrates the current groundwater monitoring well network for the site. The wells were constructed to provide information on groundwater flow direction, seasonal variations in flow and gradient, and an indication of groundwater quality upgradient and downgradient of the SGS site. **Table 5** summarizes monitoring well construction and survey information. Shallow wells (MW-5S, MW-6S, MW-7S, MW- 8S, MW-9S, and MW-10S) were screened in the upper portion of the shallow aquifer to monitor water at the groundwater/vadose zone interface. Well MW-7D and Ecology wells

MW-1, MW-2, MW-3, MW-4, and MW-5D were screened in the unconsolidated to weathered basalt interface (ranging from 55 to 75 feet bgs). The “shallow” and “deep” wells provide information as to potential groundwater gradient differences between the shallow and deep zones, as well as any differences in EDB levels. Both shallow and deep wells are within the shallow unconfined aquifer. In general, the deep well depths range from 75 feet bgs in MW-2 to 52 feet bgs in MW-7D. Well MW-6D was planned but not drilled, because basalt was encountered at a depth of approximately 26 feet, so only MW-6S was installed. MW-9S, drilled off site to the south of the facility, encountered basalt at 16 feet bgs. Furthermore, the borehole was dry at the time of drilling in July 2013 and the well was dry in October 2013 and December 2017. The well was screened from 7 to 17 feet bgs.

A summary of groundwater monitoring well sampling results follows. Refer to the RI/FS for more details on groundwater conditions (HDR 2018).

- Groundwater contours from the sampling events, including December 2017, are presented in Appendix C. Groundwater gradient based on the shallow wells shows a southerly/southwesterly flow direction. Groundwater flow for the deeper wells is split where groundwater north of the canal flows northerly, and groundwater south of the canal flows in a southerly direction. This split is a result of groundwater mounding caused by the canal (losing stream).

- EDB has been found in groundwater beneath the site associated with shallow well MW-5S, which is screened through the vadose zone/groundwater interface; this well was decommissioned in 2020 to support proposed excavation in the area. Shallow well MW-6S has also had some EDB detections, but was non-detect in October 2013 and 0.35 µg/L in December 2017. Monitoring well MW-5D (paired well to MW-5S and also recently decommissioned), which is screened at the unconsolidated groundwater/basalt interface, was non-detect (or at trace amounts of EDB) during the RI monitoring period. EDB has not been detected in off-site monitoring wells, including wells that are downgradient (at least part of the year) from the SGS site. Groundwater samples collected and analyzed in December 2017 (3 years from the previous monitoring) were consistent with previous findings. Monitoring well MW-5S is screened in the caliche zone, and based on soil sampling from this well, it is postulated that the detection of EDB in this well is from the slow dissolution of EDB held in this confining layer. The fact that EDB has not been detected in downgradient monitoring wells (e.g., MW-8S, MW-10S, MW-4, MW-3), suggests that the presence is localized and there is no established plume. While EDB has not been detected in off-site monitoring wells, it had been detected in Warden City water supply wells No. 4 and 5, including at levels in excess of the Washington groundwater quality standard (see RI/FS for more details).

3 Cleanup Requirements

The MTCA cleanup regulations provide that a cleanup action must comply with the site-specific cleanup standards described in WAC 173-340-700, which include CULs for chemicals of concern, points of compliance (POC) where the CULs must be met, and applicable or relevant and appropriate requirements (ARARs) based on federal and state laws.

The chemical of concern is EDB, a volatile organic compound. **Table 6** lists select chemical and physical properties. EDB volatilizes or evaporates upon exposure to the air and dissolves in groundwater to some extent. It is moderately persistent in the soil environment, with a representative half-life of 100 days. Generally, EDB degrades readily near the surface and becomes more persistent with depth. In the atmosphere, EDB will degrade by reaction with photo-chemically produced hydroxyl radicals (half-life 32 days).

3.1 Remedial Action Objectives and Cleanup Levels

The objective of the cleanup action is to reduce potential EDB risks to human health and the environment. The remedial action objectives (RAOs) are developed to prevent unacceptable risk to current and future receptors.

To support the CAP, the RAO for soil is as follows:

- For protection of human health, reduce EDB concentrations in soil to protect groundwater, where the soil CUL for protection of groundwater is 0.27 µg/Kg EDB.

The RAO for groundwater is as follows:

- For protection of human health, prevent ingestion of groundwater, both on site and off site, with EDB in excess of the federal and state MCL of 0.05 µg/L.

Refer to the RI/FS (HDR 2018) for full discussion of RAO.

3.2 Points of Compliance

MTCA defines the POC as the point or points where CULs shall be attained. Once CULs are met at the POC, the site is no longer considered a threat to human health or the environment.

3.2.1 Point of Compliance for Soils

For soil CULs based on protection of groundwater, the POC shall be established in the soils throughout the site under WAC 173-340-740(6). Because groundwater has been found to be impacted by EDB, the entire soil profile from surface to groundwater is considered the point of compliance. For soil CULs based on human exposure via direct contact, the POC is within in the soils throughout the site from the ground surface to depth of excavation (assumed to be depth to groundwater).

3.2.2 Point of Compliance for Groundwater

The standard groundwater POC is established throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the site.

At the site, a standard groundwater POC will apply throughout the extent of the plume. All groundwater monitoring well samples will serve as POC as they are representative of groundwater conditions.

3.3 Permits and Regulatory Requirements

Actions carried out as part of the CAP must be performed in accordance with applicable federal, state, and local requirements, including requirements to obtain necessary permits. However, the exception is that Revised Code of Washington (RCW) 70.105D.090 allows an exemption from the procedural requirements of state and local permits. The permits or other federal, state, or local requirements that Ecology has determined are applicable, and that are known at this time, include the following.

Federal Requirements

- Clean Water Act (CWA) (Section 401 and Section 404)
- Resource Conservation and Recovery Act (RCRA)
- Occupational Safety and Health Act (29 Code of Federal Regulations [CFR\ 1910)
- Safe Drinking Water Act
- National Pollutant Discharge Elimination System (NPDES)
- Endangered Species Act (ESA)
- Protection of Historical Properties (36 CFR 800)
- National Historical Preservation Act of 1966 (Section 106)

State Requirements

- Model Toxics Control Act (WAC 173-340)
- Dangerous Waste Regulations (WAC 173-303)
- State Environmental Policy Act (RCW-43.21C)
- Environmental Checklist (WAC 197-11-960)
- Minimum Standards for Construction and Maintenance of Wells (WAC 173-160)
- State Clean Air Act (RCW 70.94)
- Washington Industrial Safety and Health Act Regulations (WAC 296-62)
- Water Pollution Control Act (RCW 90.48)
- Water Quality Standards for Groundwater of the State of Washington (WAC 173-200)
- Maximum Environmental Noise Levels (WAC 173-60)
- Archaeological Sites and Resources (RCW 27.53)
- Indian Graves and Records (RCW 27.44)
- Washington State Regulations for Handling Human Remains (RCWs 68.50.645, 27.44.055, and 68.60.055).

Local Requirements

- Grant County Municipal Code, Title 14 Buildings and Construction; Title 21 Coordinating Government Regulations; Title 24 Environment.
- City of Warden, Municipal Code

Under RCW 70.105D.090(1), Ecology and the responsible party that is conducting a remedial action at a facility under a consent decree, order, or AO are exempt from the procedural requirements of Chapters 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 RCW, and of any laws requiring or

authorizing local government permits or approvals. However, the responsible party and Ecology shall comply with the substantive requirements of such permits or approvals. During remedial action, the responsible party and Ecology will continue to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under the AO. Ecology will be responsible for contacting the appropriate state and/or local agencies and working with those agencies to determine the substantive requirements those agencies believe are applicable to the remedial action.

Pursuant to RCW 70.105D.090(2), if Ecology determines that the exemption from complying with procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption will not apply and Ecology and the responsible party will comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits.

The State Environmental Policy Act (SEPA) requires governmental agencies to evaluate environmental impacts for the proposed remedial action before finalizing the planning decisions. As part of the SEPA process, Ecology completed an environmental checklist. The purpose of the environmental checklist is to help determine whether significant environmental impacts will occur during the project, which will lead to the decision of whether or not an environmental impact statement (EIS) is required. Ecology, as the lead agency for this proposal, determined that the project does not have a probable significant adverse impact on the environment; therefore, an EIS is not required.

The contractor will be responsible for ensuring local requirements (city and county) are met. To date, the only identified local requirements are related to water use, where if the contractor is to obtain permission from the City of Warden for fire hydrant use as a water supply, a water meter and backflow prevention device must be used.

4 Engineering Design

4.1 Conceptual Plan of the Remedial Action

Alternative 3a in the RI/FS and CAP has been selected for remedial action. The remedial action involves the following:

- Institutional controls;
- Targeted soil excavation, treatment, and return; and
- Compliance monitoring.

Each of these bulleted items is described below (Sections 5 and 6 provide greater details):

4.1.1 Institutional Controls

The following institutional controls will be implemented.

- Restrictive covenant. Under soil excavation and monitored natural attenuation for groundwater, the CUL for groundwater would take time to be achieved even with source removal. The POC for groundwater is the property boundary, which meets the CUL for EDB. A restrictive covenant would include the following:
    - A restriction on installing drinking water wells in the shallow aquifer on site until the CUL is met for groundwater throughout the site.
    - After soil excavation, it is assumed the remaining soil would meet the CUL for soil (0.27 µg/Kg) and no restriction on construction or relocation of buildings would be required.
    - The covenant would follow the Washington Uniform Environmental Covenants Act (UECA).
- Monitoring well maintenance. The preliminary excavation design resulted in the removal of wells MW-5S and MW-5D, which will be replaced following excavation backfill. In addition, two new monitoring wells will be constructed, MW-11S and MW-12S, to be located along the western edge of the Simplot property downgradient of the excavation areas (**Figure 9**).

4.1.2 Targeted Soil Excavation, Treatment, and Return

The following soil and soil/groundwater interface excavation activities will occur.

- Wells MW-5S and MW-5D were decommissioned in June 2020 in preparation of excavation in the area. Once excavation is completed and backfilled, these wells will be replaced at approximately the same locations (MW-5SR and MW-5DR, where “R” is for replacement).
- **Table 4** presents the updated excavation volume estimates for the west and east excavation areas (**Figure 4**, **Figure 5**, and **Figure 7**). Using the updated information from the new borings (HDR 2020b) along with the information presented in the RI/FS, soils in the two areas will be excavated down through the caliche zone to the groundwater.
- Excavation activities will occur during the winter months to take advantage of a lower water table, which allows greater access to soil at the soil/groundwater interface and less risk of EDB volatilization (refer to Section 5.3.1for excavation details). It is the soil/groundwater interface that serves as the secondary source of EDB in groundwater. For the two excavation

areas, overburden (defined here as the soil above the caliche) will be excavated and stockpiled separately from the caliche material. The caliche zone will be penetrated using equipment designed to infiltrate this hard layer (e.g., hydraulic hammer equipped on a trackhoe). The actions of breaking up the caliche using a hydraulic hammer (or something equivalent) and placing the material into a pile, are expected to result in the breakup of material suitable to soil vapor extraction (SVE). Based on drilling results and observations, much of the EDB is expected to in the sand/caliche interface and not within the caliche, and the mechanics of excavation should result in sufficient exposure of surface area for ex-situ SVE. The contractor will remove impacted caliche (material previously identified as exceeding the CUL for EDB, and illustrated as the red hatch area in **Figure 6** and **Figure 8**).This impacted material will be separately stockpiled and will be treated on site using ex-situ SVE (Section 5.3.1 provided greater detail on excavation activities).

- Excavated soils will be placed on high-density polyethylene (HDPE) plastic (20-mil or greater) and also covered in plastic (6-mil or greater) to minimize vapor emissions and wind and water erosion. A health and safety plan (HASP) will be in place that includes atmospheric monitoring to ensure worker safety from breathing EDB vapors above health based Occupational Safety and Health Administration (OSHA) standards. Dust control measures will be in place such as water spraying during excavation to minimize dust generation during field activities. At the discretion of the contractor, and depending upon equipment, the excavation pit may be laid back (sloped) to ensure safe entry of equipment, including an access ramp. In addition, stormwater measures will be implemented to ensure stormwater runoff remains on site and stockpiled soil is protected. Excavation will continue until the zones of EDB are reached and excavated to the extent practicable. Excavation will not penetrate into the saturated zone. The contractor will be responsible for following state and federal requirements, including OSHA Standards for Construction and General Industry (29 CFR 1926 Subpart P), for excavation pit sloping and shoring to ensure safe working conditions.
- The soil remaining in the ground after excavation will be tested for EDB. If soil remains above the CUL, additional excavation will occur to the extent practicable. Once the CUL for soil is met, the excavation pit will be backfilled and compacted (refer to Section 3.3.4 and 5.3.3 for detailed descriptions of backfilling and compaction procedures).
- The excavated soil identified as having in-situ concentration of EDB in excess of 0.27 µg/Kg (includes previously identified impacted soils [red hatched material illustrated in **Figure 6** and **Figure 8**], as well as an additional excavated materials based on pit sampling results) will be stockpiled (placed on and covered in plastic) and stored during the winter months. To support the SVE system design, stockpiled soil samples will be collected to assess EDB concentrations and potential air emissions so that proper vapor capture can be determined. The soil will be treated by ex-situ SVE during the warmer months (late spring or early summer), where the soil will be placed over a network of aboveground piping to which a vacuum will be applied to enhance and capture the EDB vapor (see **Figure 11** and **Figure 12** for details). The piles will be on top of plastic (HDPE, 20 mil or greater thickness) and also covered with plastic (6-mill or greater thickness). The goal will be to treat soils by ex-situ SVE until EDB vapor levels drop to near or below detection limits and then soils tested. Captured vapor treatment will be treated by passing through activated carbon. The treatment of vapors and its emissions will follow Washington air quality standards. Treated soils will be analyzed

for EDB and treatment will be continued until soil EDB levels are less than 0.27 µg/Kg, based on discrete sampling. Once soil reaches the CUL, the soil will either be placed back into the excavation pit (an area will be kept open for additional fill), or the soil will be used for fill material elsewhere. If the fill were to be moved off site, permission will be sought from Ecology for approval of final use.

- The site is currently fenced (chain link fence surrounds the site; additional temporary fencing may be warranted to control site access and for additional protection of excavation areas) and access to the site is limited to controlled access gates that are locked after work hours.

4.1.3 Compliance Monitoring

Compliance monitoring includes protection monitoring, performance monitoring, and confirmation monitoring (see Section 7 for details). Soil cleanup action compliance activities include performance monitoring, as described above, where soil samples will be collected from pit soils (soils not excavated), excavated stockpiled soils, and treated soils.

Confirmation monitoring is focused on collecting groundwater samples from the monitoring well network on a semi-annual basis (twice per year, in August and January). Sampling will take place until EDB in groundwater monitoring wells is below 0.05 micrograms per liter (µg/L). As described previously, new monitoring wells, MW-11S and MW-12S (**Figure 9**), will be included, and MW-5S and MW-5D will be replaced once excavation is complete. A total of 13 wells (MW-1, MW-2, MW-3, MW-5DR, MW-5SR, MW-6S, MW-7D, MW-7S, MW-8S, MW-9S, MW-10S, MW-11S, and MW-12S) will be monitored as part of the groundwater monitoring program. The *Groundwater Monitoring Well Construction and Monitoring Plan* (HDR 2021b) describes field sampling and analytical procedures to be used to support groundwater monitoring.

4.2 Design Criteria

The following sections describe the design elements of the remedial action and present design criteria and rationale.

4.2.1 Excavation Activities

See Section 4.1.2 for description of excavation procedures.

4.2.1.1 UTILITY REPLACEMENT

No underground utilities have been identified within the identified excavation areas; however, there are underground utilities adjacent to the pit, including a natural gas line along W 1st Street. As required by Washington regulations, the contractor will contact the Utility Notification Center for utility locate request prior to any excavation activities. A private utility locator will also locate underground utilities within the excavation areas on site.

4.2.1.2 EXCAVATION EXTENT

Figures 4 through **8** illustrate the excavation extent for the west and east excavation areas. **Table 4** summarizes potential excavation volumes. The extent of excavation will depend upon soil sample analytical results for EDB. Soil excavation depth is limited to the depth of groundwater.

4.2.1.3 EXCAVATION STABILIZATION

Excavation will occur using a trackhoe or backhoe equipment. Excavations will be supported to meet applicable requirements of WAC 296-155-650 and 29 CFR 1910.120. Worker protection from cave-in is required for any excavation more than 4 feet deep. Excavation will be stabilized by either being sloped 1.5H:1V (horizontal to vertical) or by benching, as needed, to be determined by the contractor. The contractor will be responsible for following state and federal requirements, including OSHA Standards for Construction and General Industry (29 CFR 1926 Subpart P), for excavation pit sloping and shoring to ensure safe working conditions. The excavation extent may be limited to the north due to rail tracks and to the south due to the public road and buried gas line. If EDB is encountered near these two areas, and excavation is not deemed feasible, then it is possible that EDB would be left in the ground. Samples would be collected, and Simplot would discuss with Ecology the feasibility of additional excavation or leaving in place.

4.2.1.4 EXCAVATION DEWATERING, TREATMENT, AND DISCHARGE

No dewatering will occur for the excavation activities.

4.2.1.5 EXCAVATION BACKFILL

The goal is to backfill the excavation pits with on-site clean fill (overburden removed from above the caliche, as described in Section 4.1.2, and caliche stockpiled material with EDB concentrations below the CUL), and with remediated EDB-impacted soils (soils treated by ex-situ SVE). To complete backfilling operations, import fill may also be needed.

Imported backfill, if needed, will be pit run material from a local borrow source and have the following characteristics:

- Non-expansive soil with a liquid limit <40 percent and a plasticity index <15 percent.
- No clods or rocks larger than 2 inches in greatest dimension.
- No organic material such as peat, bark, wood chips, or soil containing visible amounts of organic material are to be used as backfill.
- Documentation or clean fill certification (free of inorganic and organic contaminants).

To support future use of the site, backfill material will be placed in 8-inch lifts and compacted to 95 percent of maximum density. The contractor may augment materials with clean granular material in order to reach compaction requirements. See Section 5.3.4 for more detail on backfilling and compaction.

4.2.2 Ex-Situ Soil Vapor Extraction

Ex-situ SVE is a remediation technology in which soil is excavated and placed over a network of aboveground piping to which a vacuum is applied to encourage volatilization of organics (in this case EDB). Soils that exceed EDB CUL (soils previously identified as exceeding the CUL, as illustrated in Figures 6 and 8, and then any additional excavated soils based on sampling of pit walls and bottoms) will be placed on top of and covered with a geomembrane to prevent volatile emissions and to prevent the soil from becoming saturated by precipitation. The process includes a system for handling off-gases, in this case, granulated active carbon (GAC) is proposed.

The general process includes:

- The system will be underlined and covered with an impermeable liner (typically 20-mill or greater HDPE).
- The shape of the pile and size will depend upon the final quantity of EDB-impacted soils excavated (with some over excavation expected). The quantity of soil requiring remediation is estimated at approximately 1,000 to 1500 cubic yards. A range is provided because the amount could vary depending upon in-site pit sampling and also the amount of over-excavation by the contractor.
- Slotted schedule 2-inch 40-PVC piping is wrapped in geotextile (fine pore fabric type material) and placed within the soil mound and spaced to allow for adequate capture of vapors.
- A vacuum is applied to pull air through the impacted soil. The vacuum is created by a power vacuum blower.
- The vapor in the air is then passed through a GAC system for removing EDB vapors and then the clean air is emitted to the atmosphere.
- The vacuum system will have pressure gauges and flow meter to measure vapor pressure and flow rates in the system. The system will include an alarm system with pre-set low and maximum pressure. In addition, the system will be inspected periodically during operations (Simplot personnel are anticipated to be on-site daily and can notify the contractor if an alarm sounds or if there are other observable issues).

4.2.3 Facility-Specific Design Issues

Simplot uses the SGS site to store agricultural products (e.g., packaged fertilizers) in warehouses. The property consists of two warehouse buildings, an unpaved parking area, and several storage bins (**Figure 4**). The west and east excavation areas are open areas and excavation activities are not expected to encroach upon buildings or other structures. If excavation extent goes beyond those illustrated in **Figure 4**, the contractor will need to coordinate with Simplot and Ecology to assess potential excavation restrictions such as building foundations, rail tracks, and public roads. Stockpiled soils are anticipated to be placed in the middle of the site (open area) and the ex-situ SVE system is anticipated to be located along the north portion of the site as illustrated in **Figure 10**. Actual locations will be determined by the contractor, but all stockpile soils will be on site and within the fenced area (**Figure 10**).

4.3 Spill Control during Construction

Spill potential during the remedial action is primarily limited to fuel and lubrication oil from construction equipment. Spill potential will be addressed as follows:

- The contractor will prepare a spill prevention control and countermeasures (SPCC) Plan (regardless of oil storage volume on site), which will include procedures for spill control, including containment and regular inspections during construction. The SPCC Plan will be attached to the remediation action completion report.
- The contractor will maintain a spill control kit for equipment-related spills and will clean up any spills immediately.

4.4 Contaminated Soil Management

Excavation of EDB-containing soil could produce organic vapors that may be harmful to construction workers. Construction workers also might contact EDB-containing soil during cleanup activities. In addition, vehicles could transport EDB containing soil via tracking.

The following measures will be implemented to mitigate risks related to contaminated soil.

- All personnel working with EDB-containing soil will be Hazardous Waste Operations and Emergency Response (HAZWOPER)-certified.
- Site workers shall use appropriate personal protective equipment (PPE) to prevent exposure to contaminants.
- Water spraying will be performed as needed during excavation and soil stockpiling to minimize fugitive dust.
- Air monitoring for EDB using a photoionization detector (PID) with an appropriate lamp to ensure an adequate ionization potential to detect of EDB (further addressed in the HASP).
- Best management practices (BMPs) will be implemented to prevent off-site tracking of contaminants via vehicles and equipment (e.g., quarry spalls lined construction entrance, dry brushing of tires, etc.).

4.5 Protection of Human Health and the Environment

Short-term protection of human health and the environment pertains to implementing the remedial action, including ex-situ SVE. Long-term protection involves the period beginning at the completion of excavation backfill and site restoration. Based on site conditions, the most likely exposure routes of concern are the potential inadvertent ingestion or inhalation of soil or dust, inhalation of EDB vapors, and dermal absorption of site surface materials.

4.5.1 Short-Term Protection

Short-term protection of human health and the environment involves risks associated with the hazardous constituents (EDB in this case) in site material and risks typically related to construction activities. Materials at the surface and slightly below the surface of the site may present potential risks to human health or the environment during construction. Excavating EDB-containing soil, handling excavated soils, and setting up an ex-situ SVE system may expose workers to EDB. Remediation workers will use PPE to reduce the risks involved with handling EDB soils on site. If site construction activities produce visible dust, the contractor will apply water to surface materials to control fugitive dust emissions. Air monitoring will be conducted using a PID.

The contractor will set up an exclusion zone, where only qualified personnel, with appropriate PPE, will be allowed to enter (primarily the excavation areas). The contractor will decontaminate all equipment that may be exposed to contaminated site materials and describe such decontamination procedures as part of the construction submittals. The contractor will dispose of all waste materials in accordance with applicable federal, state, and local laws and regulations.

This remedial action also involves activities typically associated with construction sites that could pose risks to human health. These activities include working near moving heavy equipment, tripping and falling hazards, and lifting heavy objects and will be addressed in the contractor's HASP.

A security fence is in place at the site to prevent unauthorized personnel from entering the construction areas. Additional may be added near the excavation sites. The contractor's HASP will address construction-related safety hazards to site workers and general public accessing the site during construction.

BMPs (e.g., silt fence) will be implemented around the construction area to prevent stormwater runoff from leaving the facility. The contractor's stormwater pollution prevention plan (SWPPP) will address stormwater management and protection from off-site discharges.

4.5.2 Long-Term Protection

Long-term protection is achieved by remediating EDB-impacted soils on site through the SVE treatment system. Removing the impacted soils will reduce impacts to groundwater. The treatment of soils to levels below the CUL provides for long-term protection of groundwater. A groundwater monitoring network, including installation of four additional wells, will provide compliance monitoring after excavation activities are completed.

5 Remedial Action

Engineering plans and specifications have been developed to provide details of the remedial design and to serve as a basis for contractor bidding. The engineering drawings and specifications will be submitted separately from the EDR. The following section summarizes the remedial action work elements that are set forth in the engineering plans and specifications.

5.1 Sequencing of Work

Work phases are summarized as follows:

- Phase 1 – Mobilization and Site Preparation
- Phase 2 – Excavation and Stockpiling
- Phase 3 – Ex-situ SVE Treatment
- Phase 4 –Groundwater Compliance Monitoring
- Phase 5 – Site Closure

5.2 Mobilization and Site Preparation

Contractor mobilization and site preparation includes preparing construction plans; mobilizing equipment, materials and staff; and preparing the site for construction activities.

- Prepare construction plans, including a HASP, a SPCC Plan, and construction SWPPP. Note a SWPPP is required but as long as ground disturbance is less than 1 acre, a Washington Construction Stormwater General Permit is not required.
- Install additional temporary chain-link fence as needed. The site has a chain-link fence with gates, but contractor may need to add additional fencing.
- Provide temporary utilities to support construction, including power, water, phone, and sanitation.
- Place signs announcing the construction activities, safety warnings, and traffic control.
- Construct clean soil and contaminated soil holding (stockpile) areas with berms and impermeable liners to prevent the release of potential contaminants during storage.
- Construct a decontamination facility for site equipment and construction personnel.
- Mobilize equipment and materials to the site.
- Construct temporary erosion and sedimentation control BMPs, including the following:
    - Quarry spalls or equivalent stabilized construction entrances.
    - Filter fabric silt fence or straw waddles for stormwater controls.
    - Synthetic liner and cover for the soil stockpile areas.
    - Complete a pre-construction survey of the excavation area and photograph preconstruction conditions.
    - Complete an underground utility locate.

- Decommission groundwater monitoring wells located within the excavation footprint in accordance with WAC 173-160 (completed June 2020) (HDR 2020b).

5.3 Soil Excavation and Stockpiling

5.3.1 Excavation

Standard earth moving equipment, which may include a trackhoe, backhoe, dozer, and dump trucks, will be used to excavate overburden (surface material to caliche) and EDB-containing soil. Excavated material will be placed in stockpile areas (**Figure 10** shows general layout). Equipment such as a hydraulic hammer may be needed to break apart and aid in excavating caliche material. The action of using a hydraulic hammer, removing the material using a track hoe bucket, and placing the material in a stockpile, is expected to break up the caliche material to some extent. No additional pulverization of the material is proposed prior to SVE, otherwise the material would likely be lost to the atmosphere prior to SVE and capture of EDB on granular activated carbon (part of the ex-situ SVE system).

As a first step, excavation will be advanced to the lateral extent shown on **Figures 5** and **7** and to a depth to first encountered caliche. **Table 3** and **Figures 6** and **8** show estimates of depth to caliche, which is variable across the site. A geologist will be on site during excavation activities to assess soil lithology and to aid the contractor in determining when caliche is encountered. In addition, the contractor will use survey equipment to determine locations (x, y, and z coordinates). For example, the contractor would remove overburden to an elevation of 1,236 feet in the north end of the pit and taper this to 1,230 feet in the southern end of the pit (see **Figures 5** and **6**). This overburden material above the caliche will be separately stockpiled for sampling, and, if EDB is below the CUL, will be used for backfilling.

The caliche material illustrated in the red hatch in **Figures 6** and **8** would be excavated, with the aid of survey, and stockpiled separately as EDB impacted soils for treatment. This material is approximately 1,000 cubic yards, with an estimated range of 1,000 to 1,500 cubic yards. For example, for the west pit, the excavation of impacted soils would go to an elevation of 1,222 feet and the pit bottom then sampled to determine if additional soil removal is necessary (remaining soil exceeding the CUL).

The final excavation depth and extent will be determined based on analytical results from soil samples collected from the sidewalls and floor of the excavation and analyzed for EDB (refer to Section 5.3.3). If soil sample results exceed CUL, the excavation will be expanded to remove the affected soil. The extent of excavation could be limited due to safety concerns or obstructions such as underground utilities, public road, and rail tracks. If the extent of excavation is limited due to physical constraints, Ecology will be consulted.

5.3.2 Soil Stockpiling

A series of lined stockpiled areas will be established:

- Overburden stockpile area (this is surface soil to just above the caliche).
- Caliche material above the impacted soil zone (caliche material area above the red hatch zone illustrated in **Figures 6** and **8**).

- EDB impacted soils, materials excavated within the red hatch area (**Figures 6** and **8**), and any additional soils excavated based on in-situ pit bottom and wall confirmation samples.

Details regarding soil stockpile sampling protocols are provided in the *Cleanup Action Implementation Compliance Monitoring Plan* (CAICMP) (HDR 2021a). The EDB impacted soils described above, will be remediated on site using ex-situ SVE. Stockpiles with EDB below the CUL will be reused as excavation backfill. Soil may require some moisture conditioning prior to placement to meet compaction requirements. Soil may also be amended with granular material to achieve target compaction criteria, as needed.

Soil stockpiles will be on plastic (20-mil or greater) and then covered with plastic (6-mil or greater) and secured from the wind and rain to prevent dust and stormwater runoff.

5.3.3 Confirmation Soil Sampling

Soil samples from excavation bottoms and sidewalls will be collected and analyzed to verify that the CUL has been met. Sampling of the excavation pit will generally follow Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Pub. No. 10-09-057):

- One sample every 20 feet horizontally along the side walls.
- One sample every 400 square feet of exposed bottom.
- Multiple samples may need to be taken vertically along the side walls for deeper excavations. If the vertical profile exceeds 20 feet, then two samples along the wall (upper and lower sample to be determined in the field), every 20 feet horizontally.

Samples will be collected from a backhoe bucket. Considerations for sample collection include:

- Use the track hoe bucket to expose new sidewall and bottom soils just prior to sampling to ensure representative samples (i.e. EDB not volatilized) are obtained.
- Collect soil samples directly from the middle of the track hoe bucket, from soils that have not contacted the sides of the bucket.
- When sampling the sides of an excavation, make sure soils from higher up in the excavation do not fall into the bucket.

Samples will be submitted for EDB analysis per U.S. Environmental Protection Agency (USEPA) Method 8011. Laboratory analysis will be performed on an accelerated turnaround basis as needed to minimize delays. Sampling procedures will follow the CAICMP.

If a confirmation sample exceeds the EDB CUL, further excavation will be performed to remove the affected soil and additional confirmation samples will be collected. If additional excavation cannot be performed (e.g., at soil/groundwater interface or excavation limited due to safety), then Ecology will be notified for discussion and approval.

5.3.4 Sampling of Soil Stockpiles

The overburden stockpile soil will be sampled. Sampling procedures will generally follow Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Pub. No. 10-09-057):

- Discrete grab samples will be collected (no compositing of soils).

- Samples collected by hand tools 6 to 12 inches beneath the surface of the pile.
- Piles will be divided into sections and each section sampled.
- Number of samples will be based on the volume of soil (see Table 6.9 in the above referenced guidance) and is summarized as follows:
    - 100 to 500 cubic yards = 5 discrete samples
    - 501 to 1000 cubic yards = 7 discrete samples
    - 1001 to 2000 cubic yards = 10 discrete samples
    - > 2000 cubic yards = 10 +1 for every 500 cubic yards
- As an example, if the stockpile is estimated at 1500 cubic yards, then the pile would be evenly divided into 10 sections, and one sample collected from each section for a total of 10 samples. If a sample result exceeds the CUL for EDB, then that section of the pile is considered contaminated and appropriate remediation required. Simplot may also choose to sample that section in greater detail to further separate clean versus contaminated soil.

5.3.5 Excavation Backfill

Completed excavations will be backfilled with clean excavated overburden, clean stockpiled caliche zone material, and SVE remediated soils (all soil types must be below the EDB CUL). In addition, imported fill may be necessary to complete the backfilling.

As discussed above, samples will be collected from the stockpiles to confirm that EDB concentrations do not exceed site CULs. Representative soil samples will also be collected from the clean imported fill and analyzed for EDB to confirm that the fill meets site CUL. Sampling of imported fill is not required if the borrow pit operator can provide a written and signed statement that the import fill originated for a virgin unaltered source that has not been contaminated. Any such correspondence must be documented in the cleanup action completion report. Fill will be placed in the excavation in 8-inch lifts, as measured before compaction. Each lift will be compacted to 95 percent of maximum density using appropriate equipment prior to placing the subsequent lift to the extent practicable. The contractor will be required to conduct compaction testing at a frequency of one test for each 2 feet of fill (see Section 6.1.3 for testing requirements). Compaction testing of the lower lifts (bottom of the pit) may not be feasible due to safety concerns. The contractor is to document compaction activities and use best judgement for when it is safe for personnel to test compaction lifts. Compaction testing documentation will be provided to Ecology as part of the construction record.

5.3.6 Site Restoration

The proposed excavation areas are unpaved and contain no structures or known utilities. Thus, site restoration will be comprised of filling the excavation areas up to near grade and compacting a 6-inch layer of crushed surfacing top course gravel paving to meet the final site grades.

Remedial equipment and any temporary fencing will be removed from the site once backfilling is completed. Groundwater monitoring wells will remain in place for monitoring (see Section 5.5).

5.4 Ex-situ SVE Treatment

The goal is to excavate soils during the winter months, stockpile soils exceeding the CUL, and then treat these soils in late spring and summer using ex-situ SVE. The purpose of waiting until spring and summer is to take advantage of warmer temperatures, which will enhance volatilization into the SVE system.

A detailed design of the treatment system will be developed after excavation has occurred, and the soil volume and EDB concentrations levels are known. The design elements include the following:

- Layout of pad – size and shape and include incorporation of gravel bed material, HDPE liner, pipe layout, soil thickness, blower size and power supply, and GAC quantity specifications.
- System startup and operating protocol
- Monitoring requirements
- System maintenance
- System shutdown

A typical cross-section ex-situ system is illustrated in **Figure 11**. A process diagram is presented in **Figure 12**.

5.4.1 Air Treatment

GAC will be used for reducing EDB emission from the ex-situ SVE system (note that the need for vapor treatment is being further assessed). Canister systems with off-site regeneration is proposed for treatment. The GAC will be sized based on the following parameters:

- Volumetric flow rate of EDB-laden gas stream
- Concentration of EDB (mass load)
- Adsorption capacity of GAC
- Desired GAC regeneration frequency

No air permit is anticipated given the estimated quantity of EDB emissions but need for a permit will be verified once final volume and EDB quantity estimate is known.

5.5 Groundwater Compliance Monitoring

A total of 13 wells (MW-1, MW-2, MW-3, MW-5DR, MW-5SR, MW-6S, MW-7D, MW-7S, MW-8S, MW-9S, MW-10S, MW-11S, and MW-12S) will be monitored as part of the groundwater monitoring program. A *Groundwater Monitoring Well Construction and Monitoring Plan* (HDR 2021b) has been developed and describes field sampling and analytical procedures to be used to support groundwater monitoring.

Compliance monitoring involves collecting groundwater samples from the monitoring well network semi-annually. Criteria for site closure is four consecutive groundwater monitoring events (2 years), or using statistical methods as outlined in WAC 173-340-720(9) for more than four consecutive sampling events, to demonstrate that EDB is below the groundwater CUL.

Sampling will take place in August and January to coincide with maximum and minimum groundwater recharge from the East Low Canal. City of Warden is monitoring City Well #5 for EDB. The City of Warden will provide Ecology with the EDB data from City Well #5 when it is available. The results from the monitoring of City Well #5 will be included into the cleanup action report and future periodic review reports to help assess the effectiveness of the selected cleanup action.

As part of the remedial action implementation,

- Monitoring wells MW-5S and MW-5D were decommissioned in June 2020 (HDR 2020b).
- New wells to be constructed as part of this remedial action:
    - MW-5SR and MW-5DR – replacement wells in the approximate location as the original wells.
    - MW-11S and MW-12S – these are new downgradient wells from the excavation area.

Monitoring wells MW-11S and MW-12S will be constructed prior to excavation activities. Wells MW-5SR and MW-5DR will be constructed after soil excavation, soil treatment, and backfilling activities have been completed. The *Groundwater Monitoring Well Construction and Monitoring Plan* will be followed (HDR 2021b) for well construction.

5.6 Site Closure

Site closure is achieved when the soil EDB CUL is met (via confirmation sampling), groundwater EDB CUL is met for two consecutive monitoring events for all monitoring wells, and institutional controls have been implemented. With closure approval, the groundwater monitoring wells will be decommissioned in accordance with Ecology regulations (WAC 173-160-381).

6 Construction Quality Assurance/Quality Control Procedures

6.1 Soil Excavation

The engineer will monitor and enforce compliance with the following construction quality assurance activities during the remedial action:

- The contractor will be responsible for providing a SWPPP that documents measures to identify, prevent, and control the contamination of stormwater. The SWPPP will follow the Washington State NPDES stormwater baseline general permit for construction and will include procedures for containing site runoff and controlling erosion. Because disturbance is expected to be less than 1 acre, no stormwater construction permit is required.
- The contractor will prepare and implement a SPCC Plan (regardless if bulk oil storage exceeds 1,320 gallons). The plan goal is to identify, prevent, and control potential spills of hazardous materials. The contractor will maintain a spill control kit for equipment-related spills and will clean up any spills immediately.

6.1.1 Materials

Materials used in construction of the remedial action will be tested for compliance with the following specifications:

- Imported backfill (pit run): Imported backfill will be non-expansive soil with a liquid limit <40 percent and a plasticity index <15 percent, contain no clods or rocks greater than 2 inches in greatest dimension, contain <10 percent passing the #200 sieve, and contain no organic material. Clean fill documentation will be required.

6.1.2 Excavating

The site has a chain link fence and temporary fencing may be required around the excavation pits at the discretion of the contractor. All excavation limits (west and east areas, as shown in **Figure 4**, **Figure 5**, and **Figure 7**) will be laid out in the field and marked with stakes and flagging. Quarry spalls or equivalent material will be placed at the construction entrances in accordance with the SWPPP to minimize equipment mud from tracking outside the site boundary. A filter fabric fence and/or straw wattles will be installed as dictated by the SWPPP. The contractor will inspect all BMPs daily to ensure their integrity.

6.1.3 Backfilling

Material will be placed to bring the excavation pits to finished site grade and all materials will meet 95 percent compaction as specified by ASTM International (ASTM) Method D1557 Modified. The contractor will perform compaction testing at a frequency of one test for every 1,000 square feet for every 2 feet of fill. Compaction testing of the lower lifts (bottom of the pit) may not be feasible due to safety concerns. The contractor is to use best judgement for when it is safe for personnel to test compaction lifts. Compaction testing documentation will be provided to Ecology as part of the construction record.

6.1.4 Storing Materials

All excavated stockpiled materials will be lined and covered when not in use to prevent those materials from being dispersed via wind or rainfall. When materials are loaded on site, proper measures shall be in place in order to prevent dispersion of materials in areas other than original or final locations.

6.2 Ex-Situ Soil Vapor Extraction

Detailed design of the ex-situ SVE will be completed following excavation activities when the extent of soil requiring treatment is quantified. General layout and cross-sections of design are provided in **Figure 11** and **Figure 12**.

6.3 Groundwater Monitoring Well Construction

Four groundwater monitoring wells will be constructed (MW-5SR, MW-5DR, MW-11, and MW-12) in accordance with the *Groundwater Monitoring Well Construction and Monitoring Plan* (HDR 2020b). Monitoring well construction will follow Chapter 173-160 WAC - Minimum Standards for Construction and Maintenance of Wells. Wells will be commissioned and decommissioned in accordance with Ecology procedures. The cleanup action report must document permits obtained for both well abandonment and well reinstallations.

6.4 Documentation

After completing the soil remedial action, a cleanup action report will be developed in accordance with WAC 173-340-400(6)(b) and (c). The report will provide the following information:

- Laboratory data, including data validation report.
- Air monitoring records.
- Well installation/abandonment permits.
- Operations and maintenance (O&M) protocols and corrective action records.
- As-built drawings showing area and volumes of soils removed, treated, and backfilled.
- Compliance monitoring results and sample locations.
- Description of site activities, photo documentation, and summary of results.
- Maps showing site layout, location of stockpiles, and types of stockpiles.
- Conclusions and recommendations regarding meeting site cleanup goals.

6.4.1 Inadvertent Discovery of Archeological or Historical Remains and Artifacts

If archeological or historical remains or artifacts are encountered during excavations or during other site work, all work must stop and the Ecology project manager immediately informed about such remains or artifacts. The contractor will be made aware of requirements.

7 Compliance Monitoring

This section describes the objectives, locations, and methods for compliance monitoring activities that will be performed at the site as part of the remedial action. Three types of compliance monitoring are described in this section.

- Protection monitoring - designed to protect human health and the environment during the construction and operation & maintenance phases of the cleanup action.
- Performance monitoring - confirms that the cleanup action has met cleanup and/or Compliance standards.
- Confirmation monitoring - confirms the long-term effectiveness of the cleanup action once cleanup standards have been met initially or other performance standards have been attained.

Compliance monitoring activities fulfill requirements for ongoing monitoring of this remedial action in accordance with MTCA (WAC 173-340-410). A CAICMP, meeting the requirements of WAC 173-340-820, has been prepared to support compliance monitoring.

7.1 Protection Monitoring

Health and safety measures are required for those individuals working at and visiting the site. The contractor will prepare a site HASP, which will describe health and safety measures, including any protection monitoring necessary during construction activities.

7.2 Performance Monitoring

Performance monitoring to be completed during excavation activities will include sampling. Three types of soil sampling will occur.

- Stockpile soils - excavated soils placed in stockpiles:
  - Overburden – materials above the caliche layer that is assumed to be clean of EDB. This stockpiled material will be sampled to verify it is below the CUL.
  - Caliche zone above EDB impacted soils – soils above the designated EDB impacted area (see **Figures 6** and **8** for illustration of this zone).
- Excavation Pit soils – soils remaining in the pit sidewalls and bottoms. This is for confirmation sampling that excavation meet cleanup goals
- Ex-situ SVE soils and vapor – sampling of soils in the SVE system to determine when cleanup goals are met.

Sampling activities are described in the remedial action CAICMP (HDR 2021a). A summary of sampling approach is presented below.

7.2.1 Stockpile Soil Sampling

Soil samples will be collected at a frequency outlined in Section 5.3.4. While composite samples are desirable for assessing stockpile soils (representing an average concentration, which is consistent with risk-based assessment), because EDB is volatile, discrete samples will be collected.

7.2.2 Excavation Pit Soils

Discrete soil samples will be collected at a frequency outlined in Section 5.3.3 . Samples will be submitted for analysis of the site EDB per USEPA Method 8011. Laboratory analysis will be performed on an accelerated turnaround basis as needed to minimize delays. Sampling procedures will follow the CAICMP.

7.2.3 Ex-situ SVE soils and Vapor

For soils placed in the lined ex-situ SVE pile, discrete soil samples will be collected at a frequency of one sample per 900 square feet of stockpiled soil. Sampling frequency will be at SVE startup, and then monthly during remediation. Soils results will be used to assess SVE effectiveness and determination when CUL are met. Samples will be submitted for EDB per USEPA Method 8011. Sampling procedures will follow the CAICMP.

In addition to soil sampling, soil vapors will be measured before and after the vapors enter the GAC treatment system. Vapors will be monitored at startup, weekly for the first month, and then monthly, at a minimum, until the soil CUL is met. Sampling procedures will follow the CAICMP. The soil vapor data will be used to assess system performance and also to determine compliance with air quality rules.

7.2.4 Quality Assurance/Quality Control

QA/QC samples to be collected during each field sampling activity. Data quality objectives (DQOs) will be provided in the CAICMP and will be consistent with those previously submitted.

7.2.5 Groundwater Monitoring

Groundwater monitoring, described in Section 7.3, is both performance monitoring (until groundwater EDB concentrations are below the CUL), and confirmation monitoring (time period EDB concentrations in wells are below the CUL).

7.3 Confirmation Monitoring

A total of 13 wells (MW-1, MW-2, MW-3, MW-5DR, MW-5SR, MW-6S, MW-7D, MW-7S, MW-8S, MW-9S, MW-10S, MW-11S, and MW-12S) will be monitored as part of the groundwater monitoring program (both for performance monitoring and confirmation monitoring). The *Groundwater Monitoring Well Construction and Monitoring Plan* (HDR 2021b) has been developed and describes field sampling and analytical procedures to be used to support groundwater monitoring.

8 Operations and Maintenance Plan

Soil excavation, stockpiling, and backfilling do not require an O&M plan. The ex-situ SVE system is temporary and anticipated to run for less than 6 months. While design details are presented in this EDR, the final design will depend upon the volume of soil and condition of soil (primarily texture). O&M considerations will be provided in the final design report. See Section 6.4 for requirements on record keeping including documenting and reporting incidents and correction actions.

Site monitoring wells will be maintained as part of the twice-per-year confirmation groundwater monitoring events and are described in the *Groundwater Monitoring Well Construction and Monitoring Plan n* (HDR 2021b).

9 Financial Assurance

WAC 173-340-440 states that financial assurance mechanisms shall be required at sites where the selected cleanup action includes engineered and/or institutional controls. Financial assurances are not required at this site at this time, because institutional controls such as on-site groundwater use restrictions are not part of the overall site cleanup action after the EDB CUL has been achieved.

10 Institutional Controls

Institutional controls are long term measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at the site. Such measures are required to assure both the continued protection of human health and the environment, and the integrity of the cleanup action whenever hazardous substances remain at the site at concentrations exceeding applicable CULs. Institutional controls can include both physical measures and legal and administrative mechanisms. WAC 173-340-440 provides information on institutional controls, and the conditions under which they may be removed.

Institutional controls include

- An environmental covenant prohibiting the extraction of groundwater and addressing vapor intrusion. The environmental covenant shall be consistent with the State of Washington UECA (Chapter 64.70 RCW). The environmental covenant can be removed once groundwater has met CULs.

Environmental covenants must be recorded in order to provide adjoining property owners, future purchasers, and tenants, as well as the general public, notice of the restrictions on use of the property. Property owners are also required to notify Ecology prior to any lease or sale of the restricted property. The environmental covenant for the site will be executed following Ecology approval of the final cleanup action reports. The environmental covenant will be prepared pursuant to the MTCA, chapter 70.105D RCW; UECA, chapter 64.70 RCW; and Solid Waste Management – Reduction and Recycling, chapter 70.95 RCW. A proposed draft environmental covenant for the site is provided under separate cover.

11 Remedial Action Schedule

Table 7 shows proposed remedial action schedule.

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A

Figures

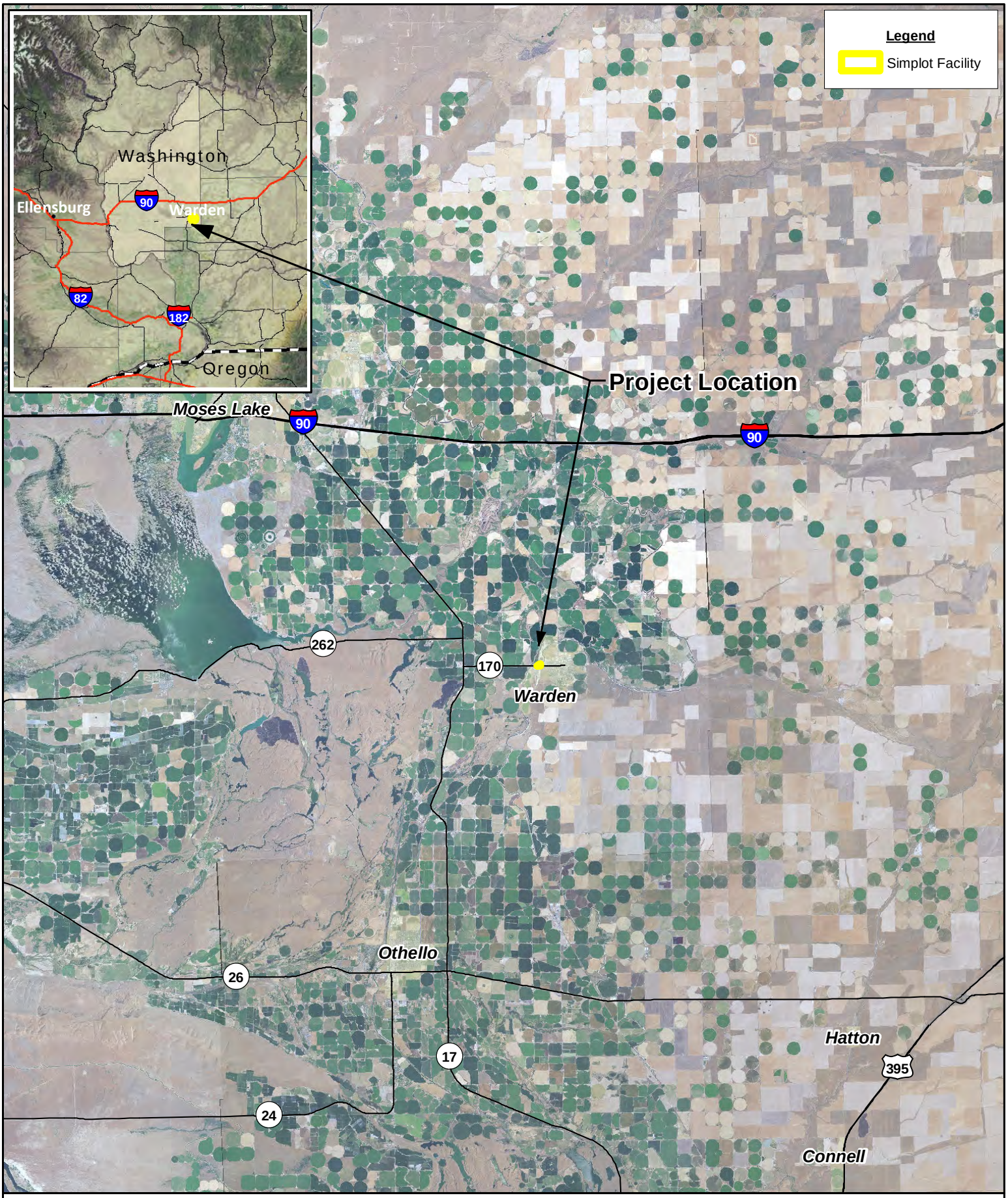

Figure 1. Vicinity Map
Simplot Grower Solutions,
1800 W 1st St., Warden, WA 98857

Imagery: 2017 NAIP 1 meter resoltion
Source: NRCS/USDA Digital Gateway
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue

Map Date: 3/14/2018
Document: Q:\Simplot\CityofWarden\map_docs\Vicinity2017.mxd

HDR

Imagery: 2016 ESRI World Imagery
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,
CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Other Data Sources: US Census Bureau; Washington Department of Transporation;
Washington Department of Revenue; Washington Department of Ecology (WDOE)

Figure 2. Project Site

Simplot Grower Solutions,
1800 W 1st St., Warden, WA 98857

0 200 400
Feet

Map Date: 3/14/2018
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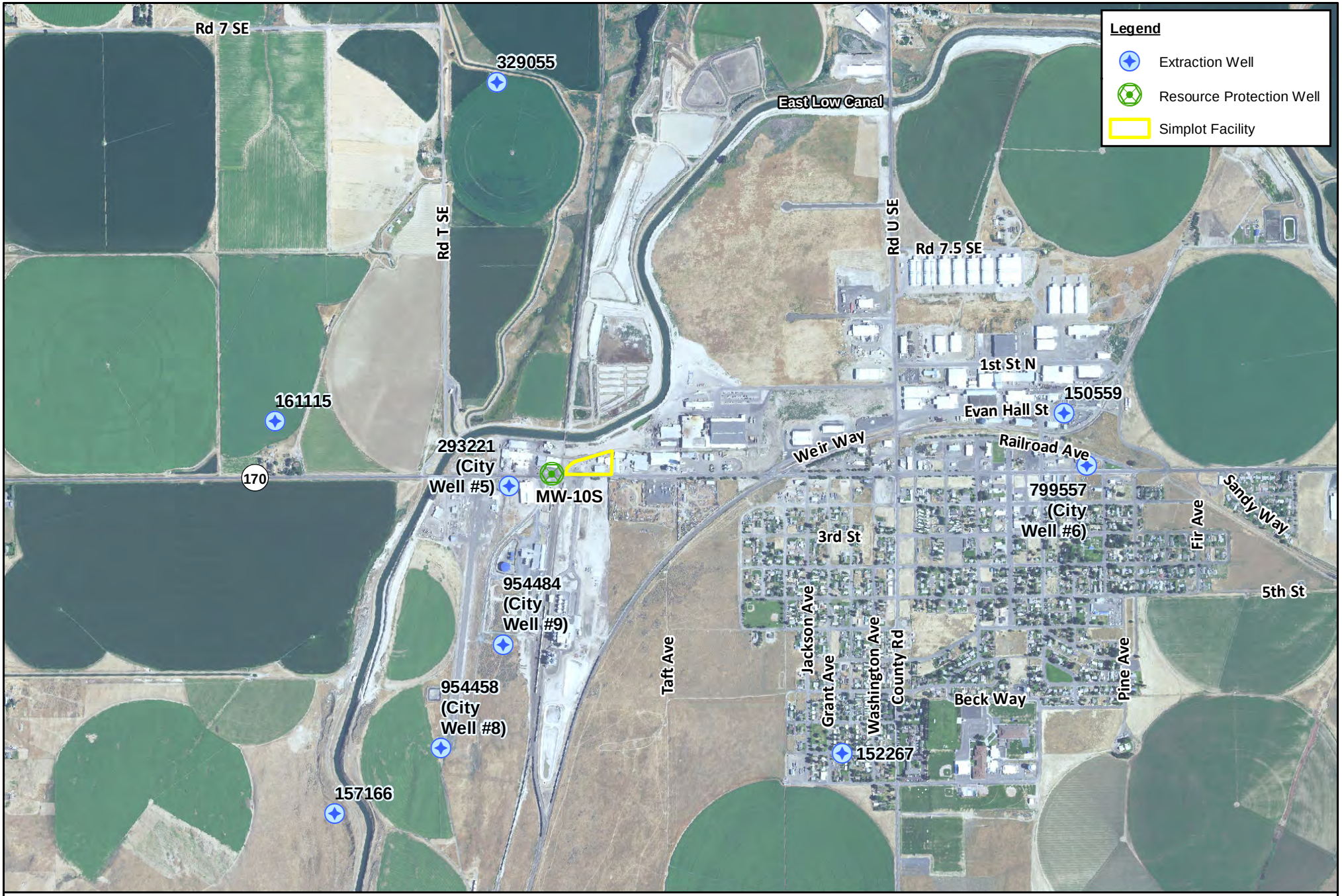

Figure 3. Extraction Wells Within 1-Mile

Simplot Grower Solutions, City of Warden, WA

Imagery: 2016 ESRI World Imagery
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,
CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Other Data Sources: US Census Bureau; Washington Department of Transporation;
Washington Department of Revenue; Washington Department of Ecology (WDOE)

0 1,500 3,000
Feet

Map Date: 5/16/2018
Document: Q:\Simplot\CityofWarden\map_docs\Site_2017.mxd

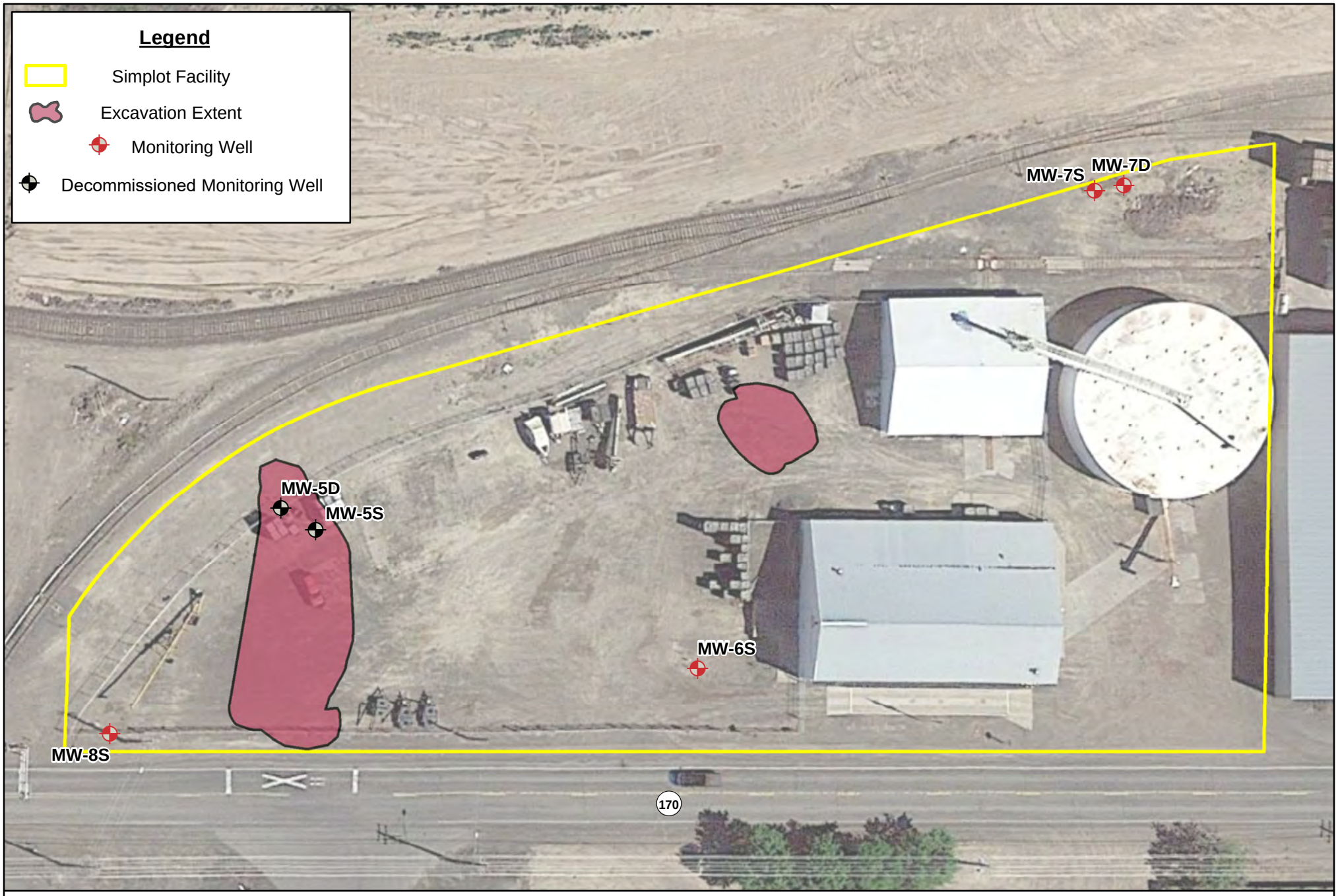

Figure 4. Excavation Areas

Simplot Grower Solutions, City of Warden, WA

Imagery: August 2018 Google Earth
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

0 50 100
Feet

Map Date: 9/18/2020
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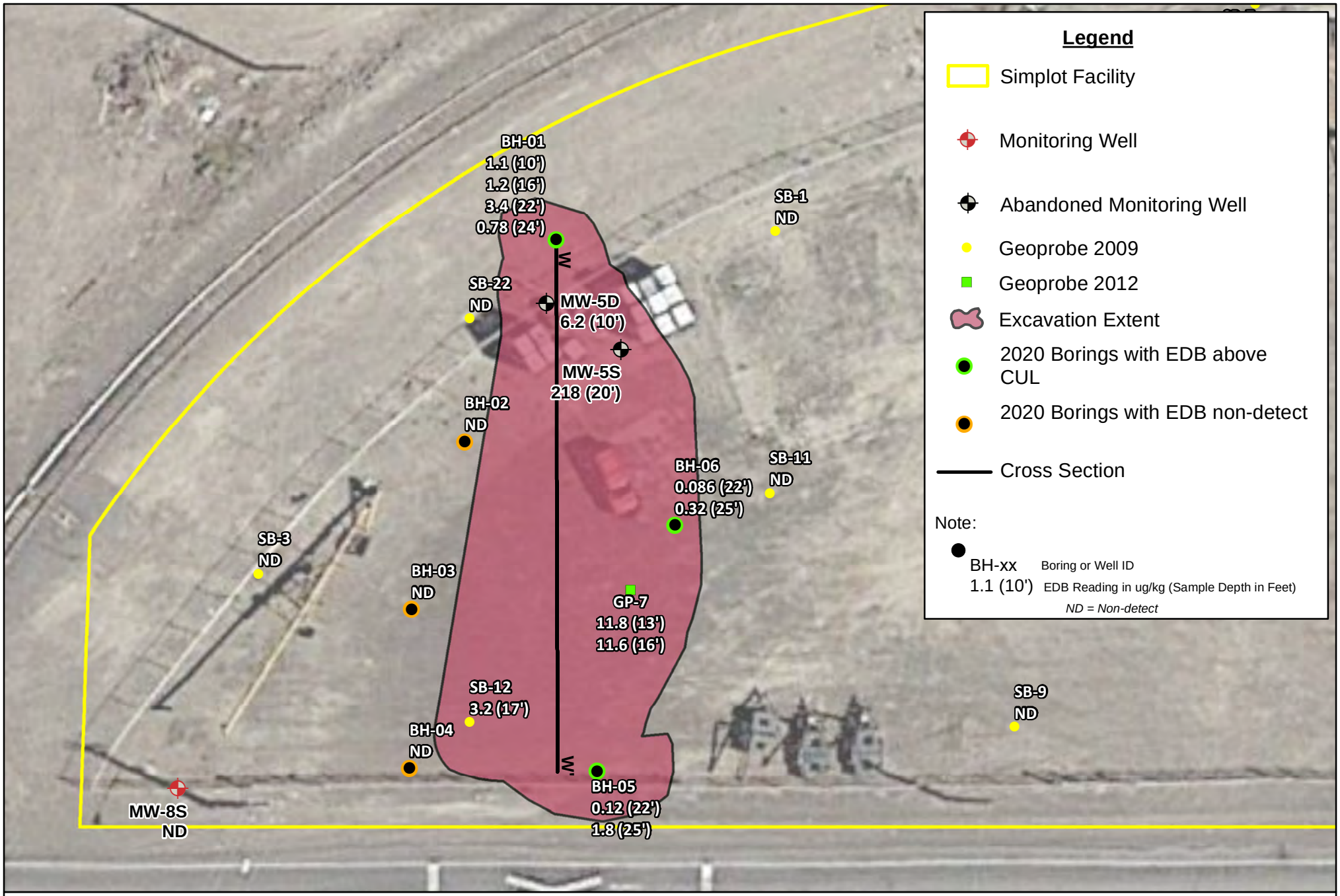

Figure 5. West Excavation Area

Simplot Grower Solutions, City of Warden, WA

Imagery: August 2018 Google Earth
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

Map Date: 8/27/2020
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0 20 40
Feet

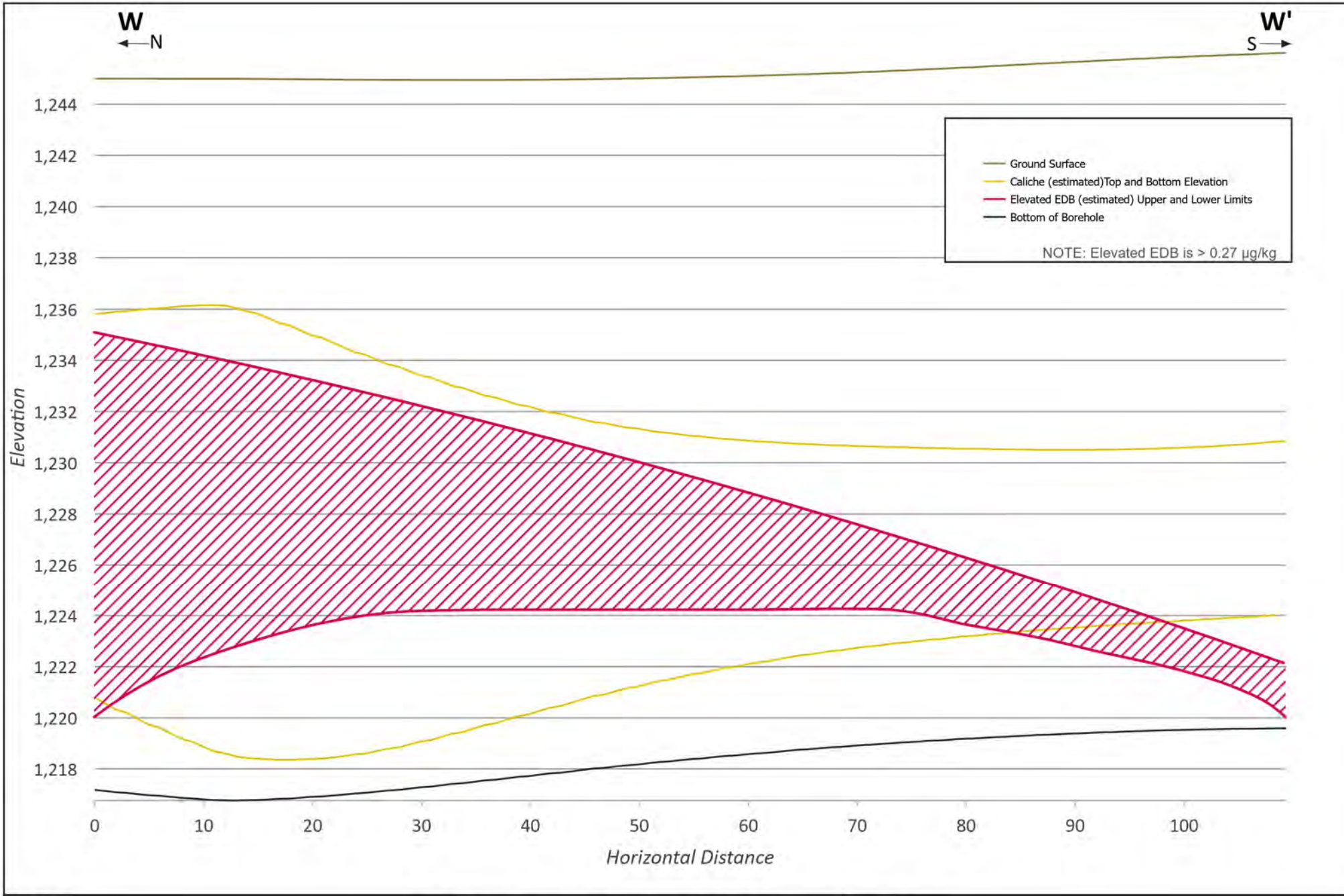

Figure 6. West Excavation Area Cross Section
Simplot Grower Solutions, City of Warden, WA

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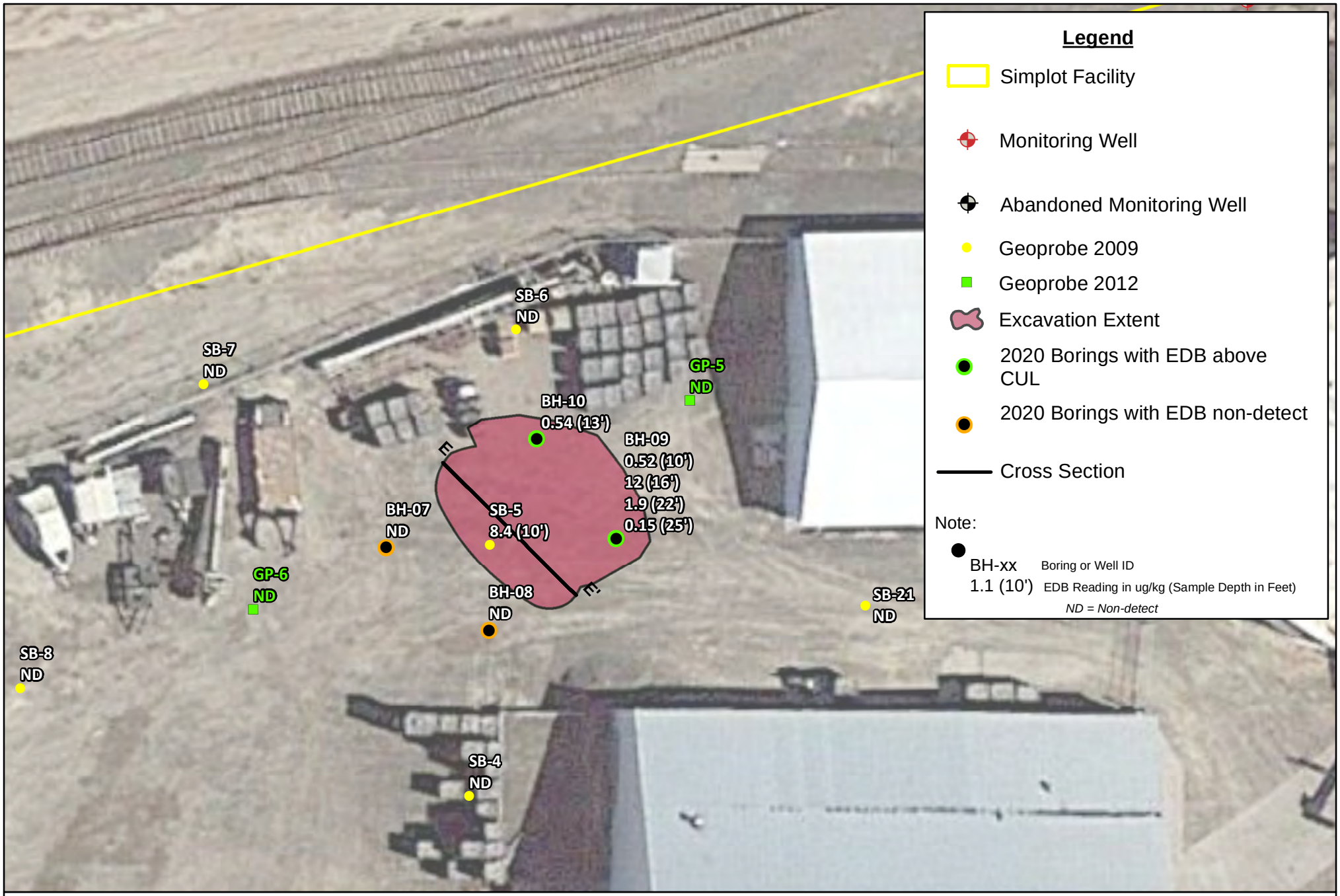

Figure 7. East Excavation Area
Simplot Grower Solutions, City of Warden, WA

Imagery: August 2018 Google Earth
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

Map Date: 8/27/2020
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0 20 40
Feet

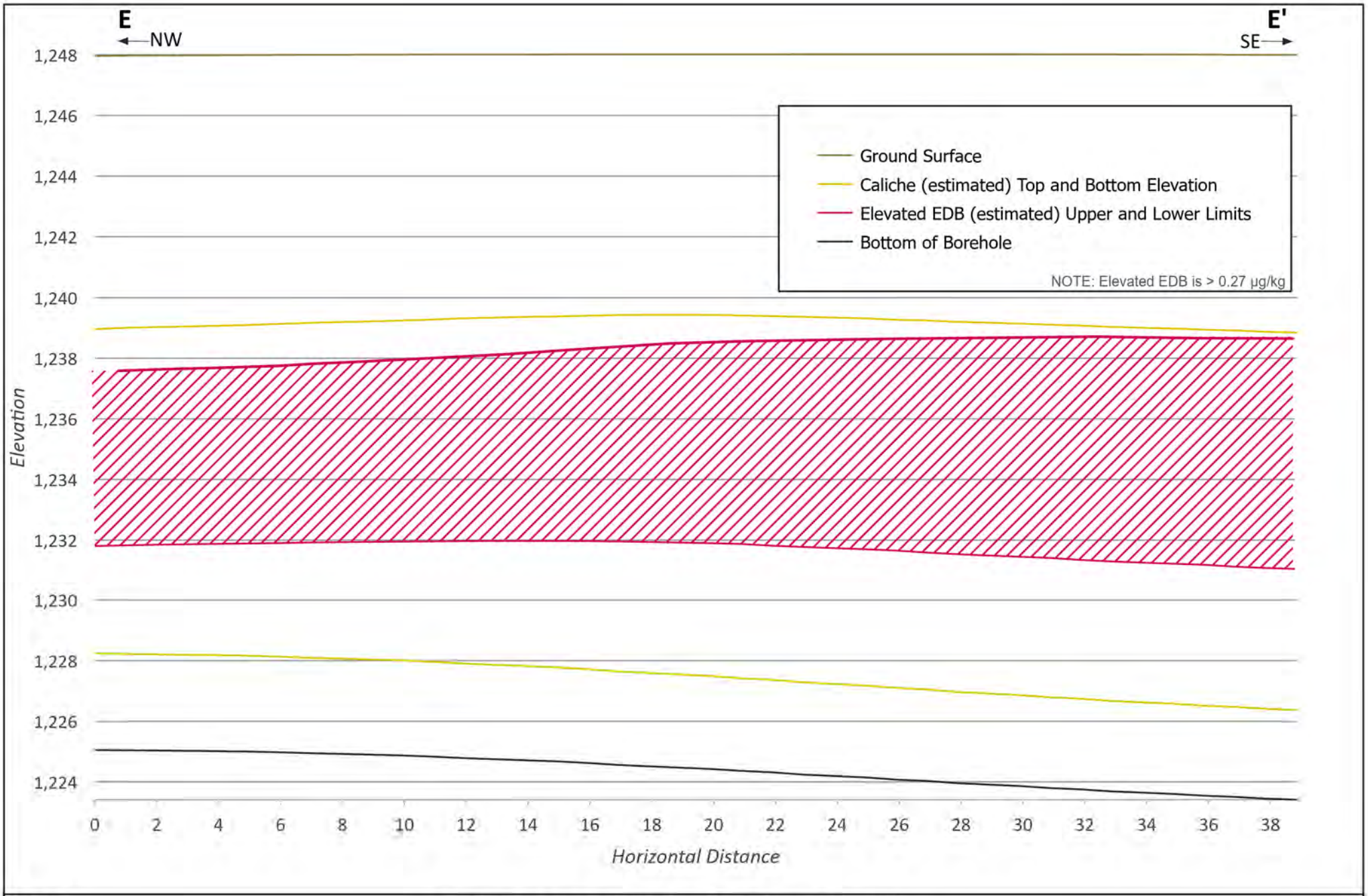

Figure 8. East Excavation Area Cross Section
Simplot Grower Solutions, City of Warden, WA

Figure Date: 1/20/2021
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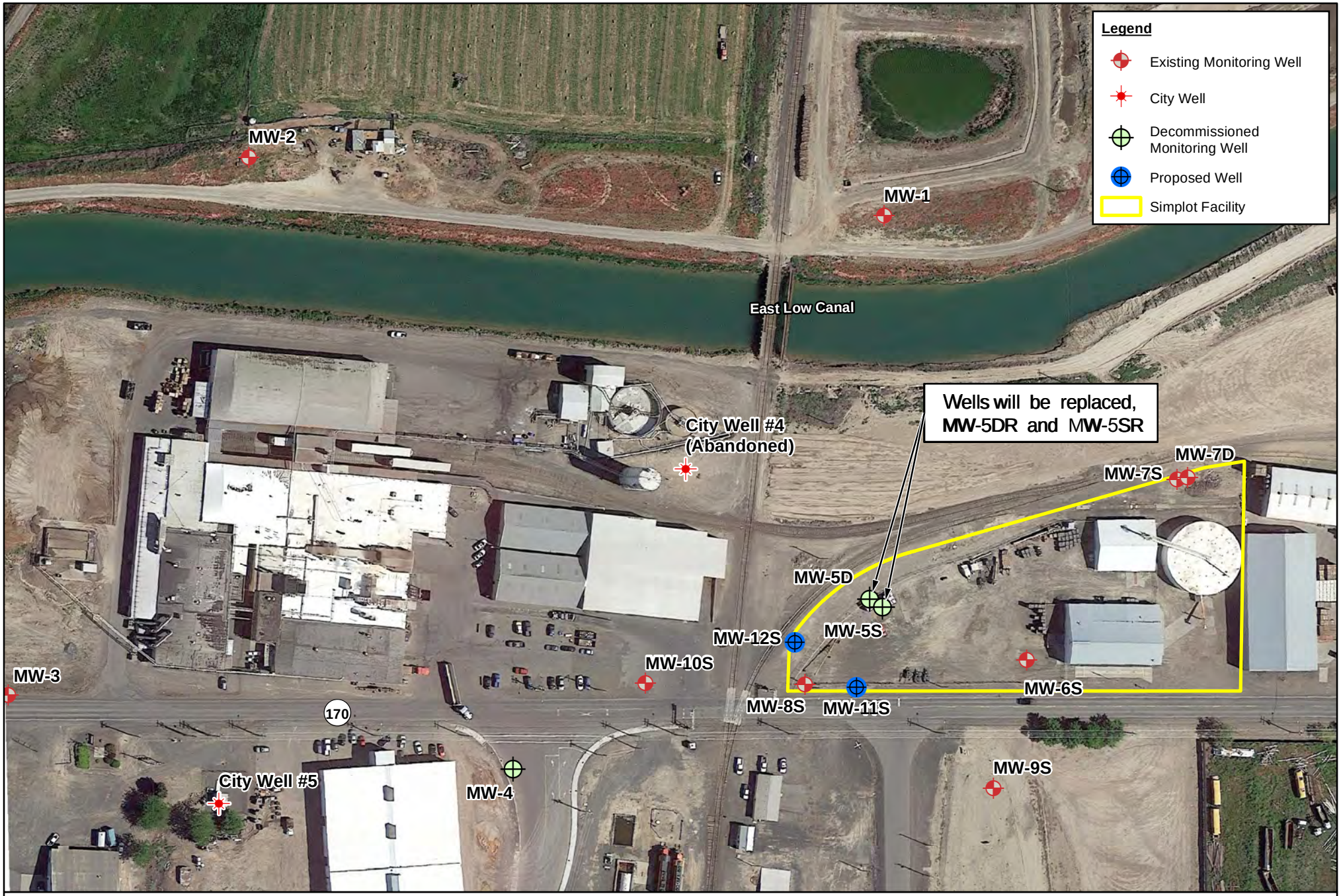

Figure 9. Compliance Monitoring Well Network

Simplot Grower Solutions,
1800 W 1st St., Warden, WA 98857

Imagery: Google Earth, Date 5/27/2017; Source: ©2019 Google
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

0 150 300
Feet

Map Date: 9/21/2020
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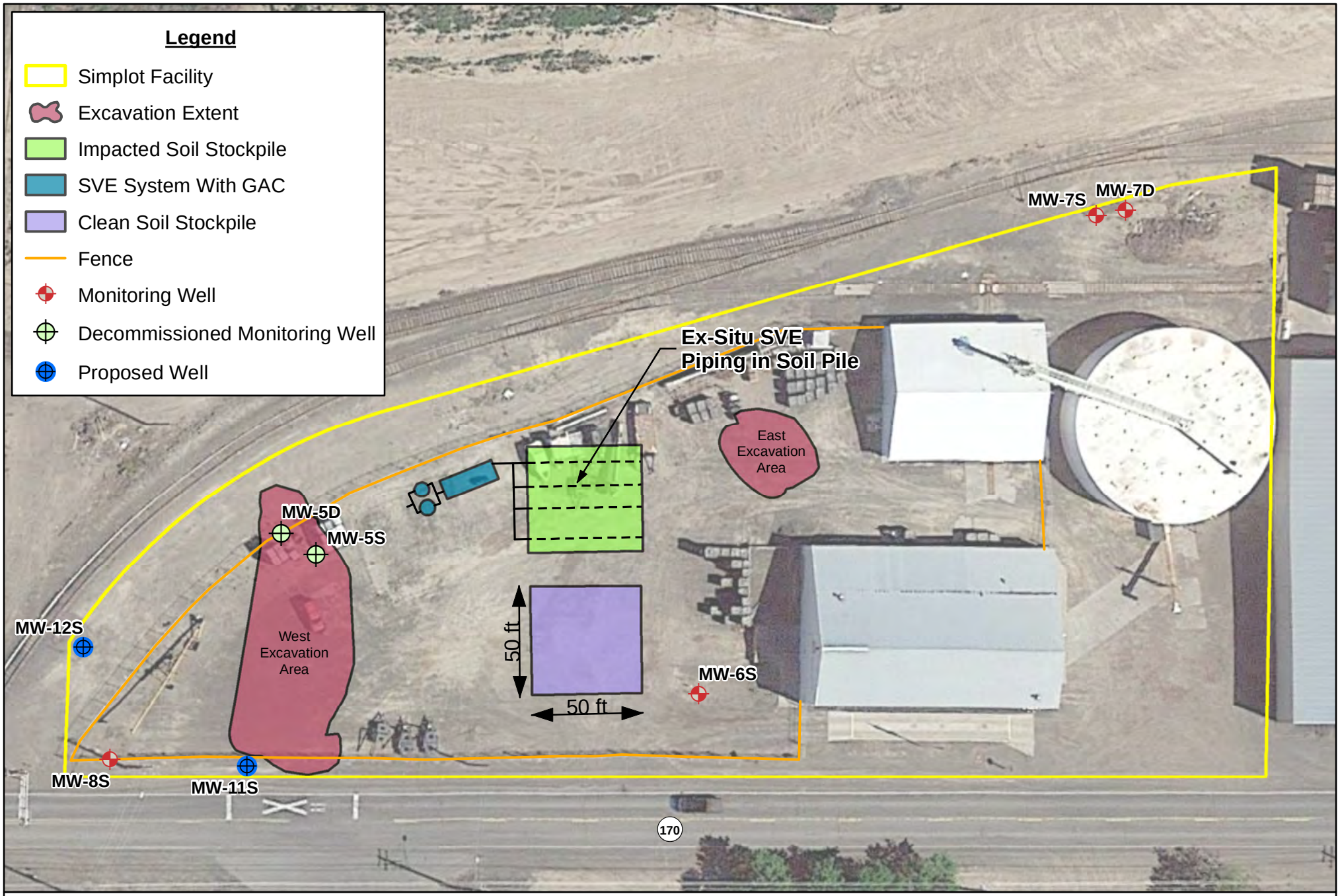

HDR

Figure 10. Remedial Layout
Simplot Grower Solutions, City of Warden, WA

Imagery: August 2018 Google Earth
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

Map Date: 10/15/2020
Document: Q:\Simplot\CityofWarden\map_docs\RemedialLayout.mxd

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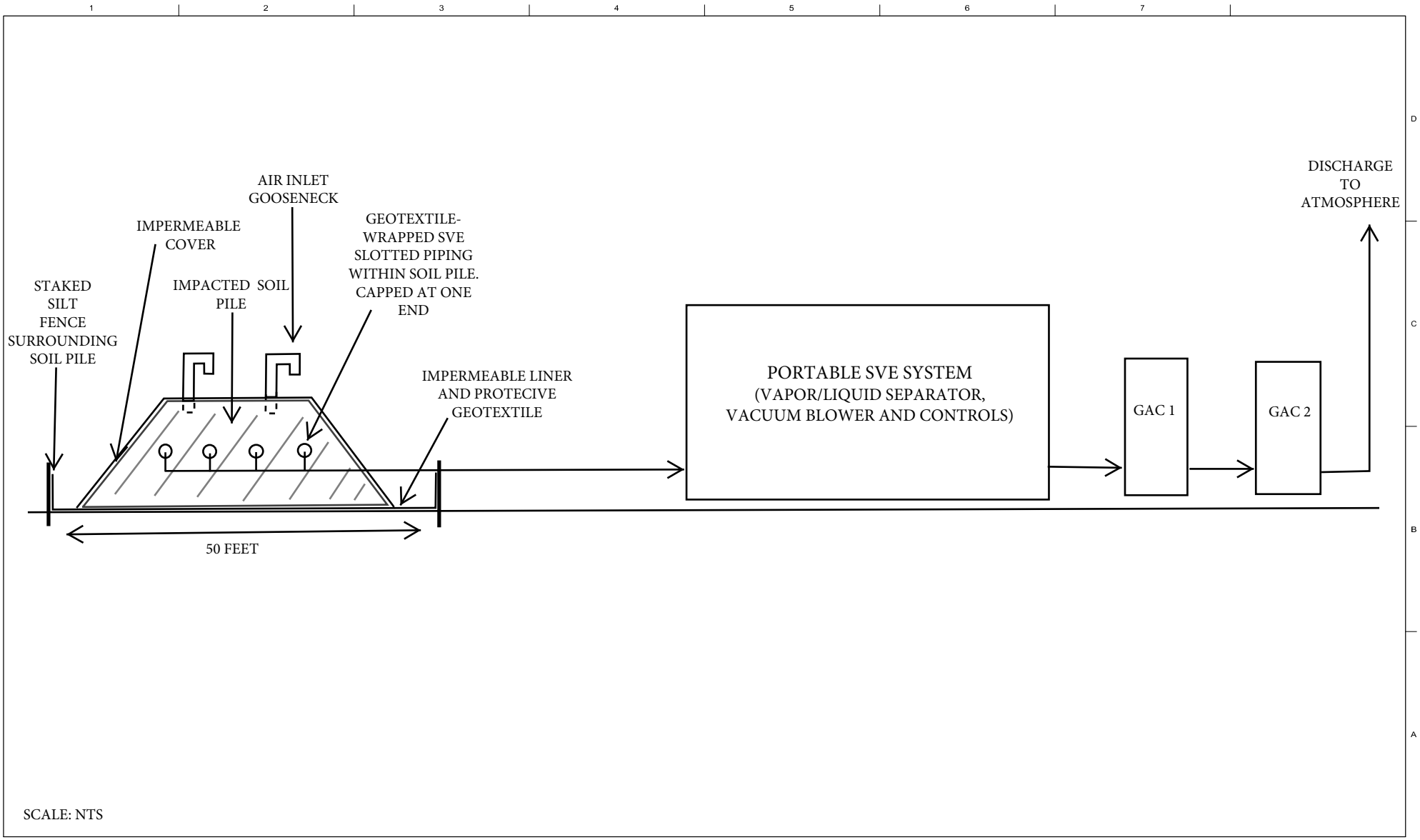
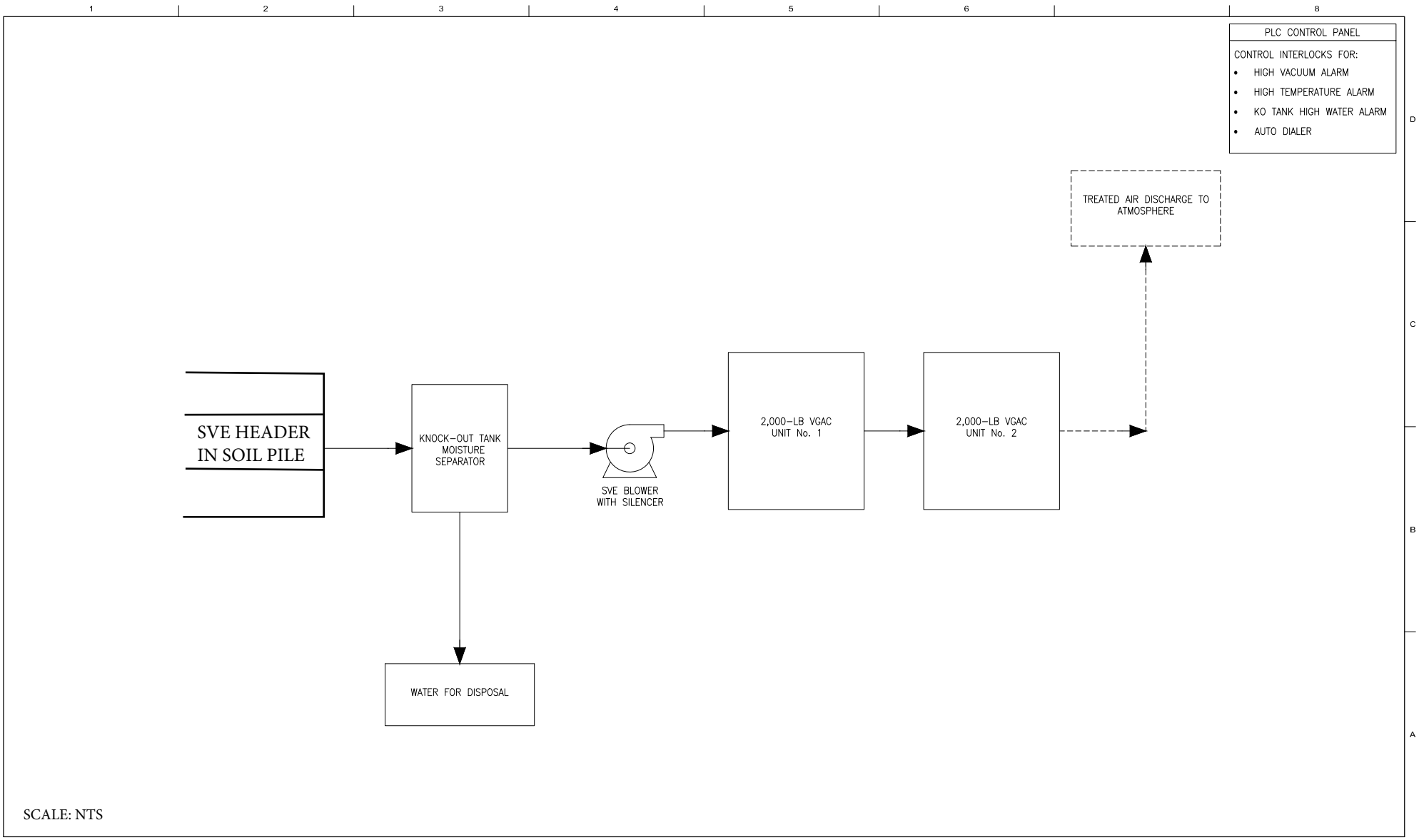
Feet



SCALE: NTS

SIMPLOT GROWER SOLUTIONS
WARDEN, WA

FIGURE 11
SVE CROSS-SECTIONAL
VIEW



SIMPLOT GROWER SOLUTIONS
WARDEN, WA

FIGURE 12
SVE PROCESS SCHEMATIC

B

Tables

Table 1. Extraction Wells within 1-mile of the Site

Ecology ID number	Owner	City Well	Date Completed	Well Type	Well Diameter (in)	Well Depth (ft bgs)	SWL (ft bgs)	Distance and Direction from Site (ft)	Notes
Extraction wells									
0150559	Chicago, Milwaukee, S. P. Pac. R.R	N/A[3]	1912	Water supply	10	448	250	5,400 ENE	--
0152267	Edward Jeske	N/A	12/31/1909	Water supply	6	415	NA	4,500 SE	--
0157166	Odessa Pump Irr.	N/A	unknown (1978?)	Water supply	8	525	NA	5,100 SW	--
0161115	Ron Zirker	N/A	2/24/1994	Domestic	6	105	60	3,600 WNW	--
0293221	City of Warden	Well #5	5/21/1968	Municipal	16	368	42	1,500 SW	--
0329055	Steve Connors	N/A	3/11/2002	Domestic	6	220	100	4,500 NNW	--
799557	City of Warden	Well #6	4/4/1979	Municipal	15	830	278	6,000 E	reconditioned on 4/17/2012; original Ecology ID 0159741;
954458	City of Warden	Well #8	10/16/2014	Municipal/ irrigation	20	507	82	3,000 SSW	Reconditioned
954484	City of Warden	Well #9	10/16/2014	Municipal	20	505	52.7	2,100 SSW	--

[1]No Ecology ID number was found

[2]No owner was found, however, it was assumed that it belongs to Simplot

[3]N/A=not applicable;

in = inches; ft bgs = feet below ground surface; SWL = static water level; ENE = east northeast; SE = southeast; SW = southwest; WNW = west northwest; NNW = north northwest; E = east; SSW = south southwest

Table 2. EDB Investigation History

Date	Type	Description/Trigger
March 1989	Water Quality Report.	EDB in City Wells #4 and #5.
May 18, 2004	DOE Early Notice Letter to Warden.	Informing city of EDB contamination in wells #4 and #5 and City of Warden's obligation to investigate.
August 2004	EDB Mitigation Project Report, Gray and Osborne, Inc. for Warden.	Options for dealing with EDB in City of Warden water supply. Project funding needed: $2.3M.
September 2005	Site Hazard Assessment, Department of Health.	Ranking of 3.
July 1, 2005	Remedial Action Grant Agreement Ecology and City of Warden	Drill city well 7 and reconstruct well #5 and well 6: $2M grant.
September 19, 2005	WA Dept. of Health – Public Health Evaluation.	
January 24, 2006	Dave George to John Roland, Ethylene Dibromide Groundwater contamination site Investigation and Data Collection Summary.	Ecology memo summarizing groundwater conditions.
April 20, 2007	Preliminary Investigation of Ethylene Dibromide Contamination.	Pacific Groundwater Group (PGG), prepared for Ecology. Installed Monitoring Wells #1 through #5, and numerous soil borings.
April 2009	Phase II Preliminary Investigation, Ecology.	Additional groundwater sampling and soil borings were drilled on Simplot site.
April 6, 2010	Notice of Potential Liability under MTCA for Release of Hazardous Substances. Ecology to Simplot.	Letter of finding of liability. Request Simplot enter into an Agreed Order.
May 27, 2011	Final Agreed Order 8421	Between Ecology and Simplot.
October 2011	Final RI/FS Project Plan submitted to Ecology.	HDR prepared for Simplot.
2011, 2012, and 2013	RI/FS activities - additional monitoring well installation on site, geophysical survey, soil sampling, City Well #5 pump test, and site investigation reports and groundwater sampling results.	As part of the R/IFS Work Plan.
June 2014	Revised draft RI/FS submitted to Ecology	HDR prepared for Simplot
May 2015	Well MW-4 decommissioned at request of site owner (off-site well)	HDR prepared well closure memo and submitted to Ecology May 27,2 015
December 2017	Groundwater Sampling	Update to groundwater quality to support RI/FS
May 2018	Final RI/FS	
November 2019	Agreed Order 16890 for Remedial Action	Agreed Order 8421 for RI/FS completed.
November 2019	Corrective Action Plan	
May 2020	Work Plan for Additional Soil Sampling and Well Decommissioning	Approved by Ecology in May 2020. Field work implemented June 2020
August 2020	Additional Soil Sampling Report	

Table 3. Combined Results Showing Caliche Layer and EDB Soil Samples

Well	MW-4	MW-10S	MW-8S	SB-3	BH-04	BH-03	SB-12	BH-02	SB-22	MW-5	BH-01	BH-05	MW-5S	GP-7	BH-06	SB-11	SB-1	SB-2	SB-9	SB-8	SB-7	GP-6	MW-9S	BH-07	MW-6S	SB-10	SB-4	BH-08	SB-5	SB-6	BH-10	BH-09	GP-5	SB-21	GP-4	MW-7	MW-7S	GP-3	GP-2	GP-1
@ Grade Elevation (ft)	1244.22	1242.8	1244.5	1247	(1246)	(1246)	1246	(1245)	1245.5	1245.05	(1245)	(1246)	1245	1245	(1245)	1245	1245	1245	1246.5	1246	1246.5	1247	1244.8	(1248)	1245.4	1247	1248	(1248)	1248	1248	(1248)	(1248)	1249	1249.5	1250	1248.5	1248.4	1251	1253	1253
1250																																								
1250																																								
1240																																								
1230																																								
1220																																								

Caliche Interbeds

Silt/Sand

Basalt

Refusal - Total Thickness Unknown

Soil Sample - Non-Detect

EDB Detected in Soil Sample (micrograms per kilogram)

Table 4. Updated Volume Estimates

Potential Excavation Volumes	Volume of Soils (Cubic Yards)		
	West Area	East Area	Total
Overburden Soils, cubic yards	2,083	648	2,731
Soils with EDB above 0.27 ug/Kg, cubic yards	786	192	978
Soils excavated for treatment, low estimate, cubic yards	865	211	1,076
Soils excavated for treatment, high estimate, cubic yards	1,179	288	1,467
Surface area of the excavation area, square feet	5,073	832	5,905

Notes: EDB interval is based on soil borings that had EDB above 0.27 µg/kg. Soil estimates for treatment, assumes over-excavation as well as the need for additional excavation based on sampling pit soils.

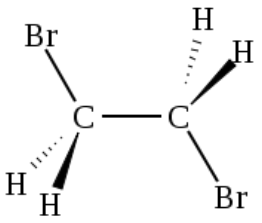
Table 5. Monitoring Well Construction Summary

	MW-1	MW-2	MW-3	MW-4[2]	MW-5D	MW-5S	MW-6S	MW-7D	MW-7S	MW-8S	MW-9S	MW-10S
Ecology Unique ID	APK 353	APK 354	APK 355	APK 356	APK 357	BCE 296	BCE 297	BCE 298	BCE 299	BHP-139	BHP-507	BHP-508
Installation Dates	8/14/06	8/15/06	8/15/06	8/16/06	8/16/06	12/5/11	12/5/11	12/7/11	12/6/11	1/16/13	7/8/13	7/8/13
Measuring Point Coordinates[1]												
Northing	600643.42	600712.43	600077.54	599989.55	600190.13	600180.56	600118.69	600334.17	600331.8	600089.61	599967.53	600091.31
Easting	1999635.94	1998885.78	1998600.99	1999197.52	1999618.84	1999634.23	1999804.74	1999994.82	1999981.87	1999542.40	1999765.18	1999354.01
Elevations[1]												
Ground Surface Elevation, feet	1243.22	1244.49	1240.88	1244.72	1245.14	1245.06	1245.36	1248.51	1248.36	1244.52	1244.77	1242.82
Measuring Point (PVC) Elevation, feet	1245.62	1247.09	1240.88	1244.72	1247.54	1247.66	1247.86	1251.01	1250.86	1248.84	1247.27	1245.32
Top of Screen Elevation, feet	1197.22	1179.99	1191.38	1195.22	1201.14	1228.56	1235.36	1206.51	1231.36	1230.52	1237.77	1227.82
Bottom of Screen Elevation, feet	1187.22	1169.99	1181.38	1185.22	1191.14	1208.56	1215.36	1196.51	1211.36	1210.52	1227.77	1207.82
Depths (bgs)												
Top of Screen, feet bgs	46	64.5	49.5	49.5	44	16.5	10	42	17	16	7	15
Bottom of Screen, feet bgs	56	74.5	59.5	59.5	54	36.5	30	52	37	36	17	35
Bottom of Well Casing, feet bgs	N/A	N/A	N/A	N/A	N/A	37	30.4	52.4	37.4	36.5	17.5	35.5
Depth of Borehole, feet bgs	60	75	60	60	55	39.5	37	52.5	38.5	36.5	17.5	35.5

[1] Survey conducted by Permit Surveying, Inc.

[2] MW-4 decommissioned April 2015 at land owners request; MW-5S and MW-5D decommissioned June 2020 per the CAP and in preparation of excavation in the area.

Table 6. Selected Properties of Ethylene Dibromide

	**Solubility in Water**	4,300 mg/L
	Vapor Pressure	11 mm Hg
	Specific Gravity	2.17
	Log Kow	1.6-2.0
Trade names	Bromofume; Dowfume W85; Dowfume EDB; Dowfume 40, W-10, W-40; Dowfume MC-2; Iscobrome D; ENT 15; 349; Netis; Pestmaster EDB-85; Santryum;unifume; EDB-85; Fumogas; Icopfume soilbrom-85; soilfume	
Synonyms	Ethylene dibromide; 1,2- dibromoethane; dibromoethane; ethylene bromide; ethane,1,2-dibromo; α-, β-dibromoethane; sym-dibromoethane	

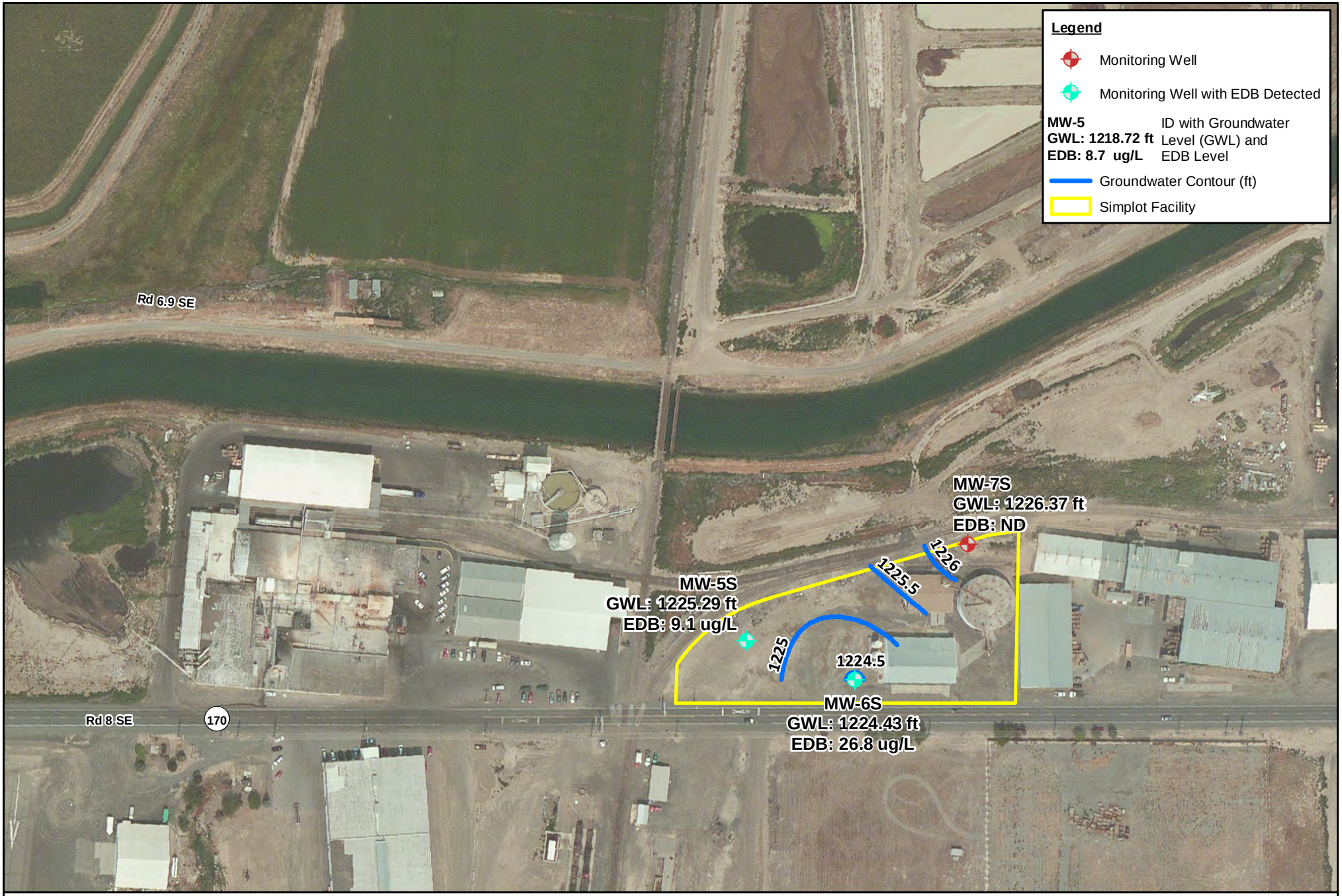
ASTM 2006, Standard Guide for Soil Gas Monitoring In The Vadose Zone: ASTM D5314-92, 36 P.
mg/L = milligrams per liter; mm Hg = millimeters of mercury

Table 7. Remedial Action Schedule

Remedial Activity	Dates
Excavation, sampling, stockpiling, and backfilling	January 2021 to March 2021
Groundwater Monitoring Well Construction	March 2021
Ex-situ SVE construction and startup	March/April 2021
Ex-situ SVE operation	April 2021 to September 2021
Completion of remedial action, site closure (except for confirmation groundwater monitoring)	October 2021
Confirmation Monitoring - Groundwater Sampling	April 2021 – Twice yearly (August and January)

C

Groundwater Contour Maps



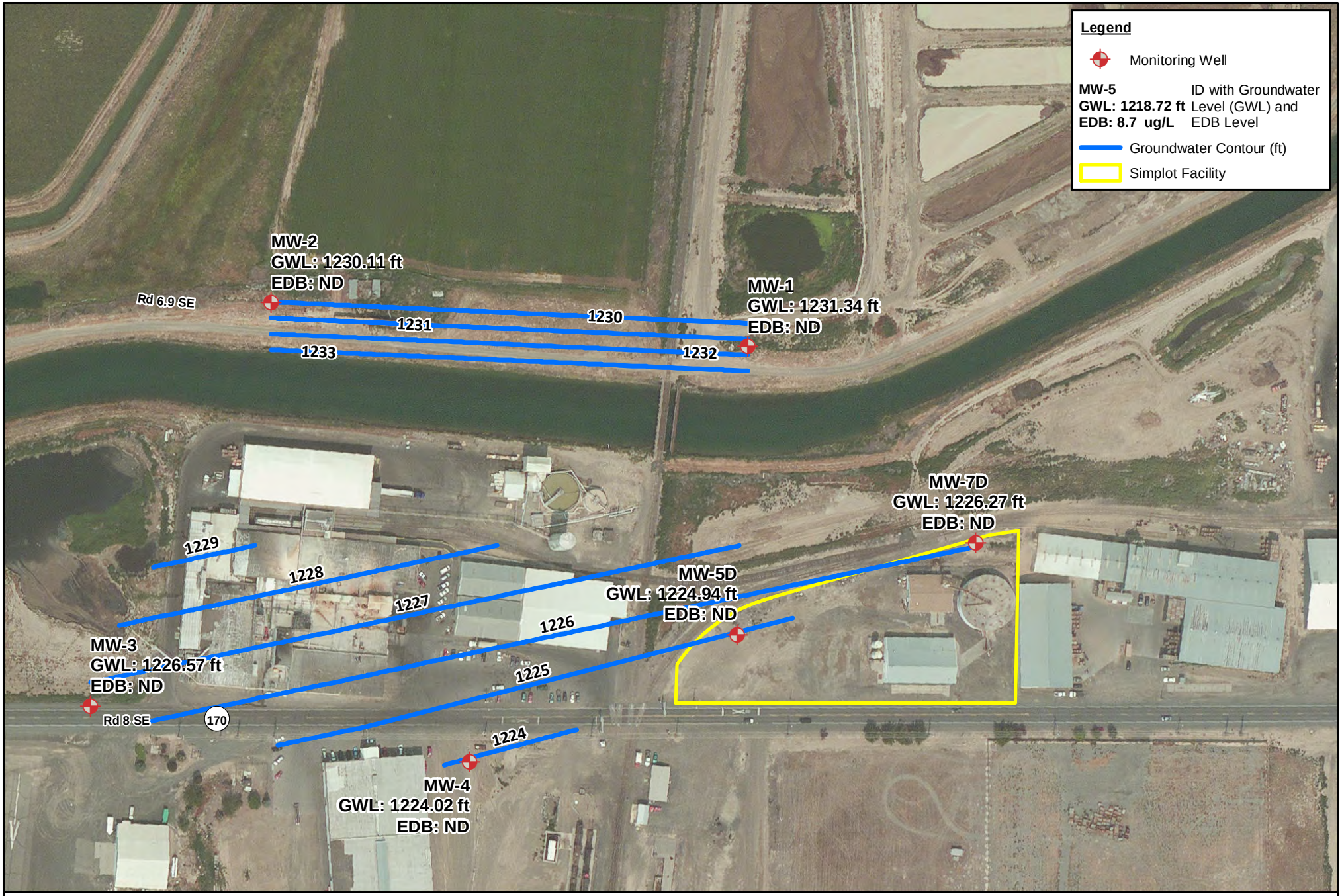
July 2012 Groundwater Contour Map, Shallow Wells and EDB Levels

Simplot Grower Solutions, City of Warden, WA

Imagery: Bing Aerial Imagery (DigitalGlobe)
Source: (c) 2012 Microsoft Corporation and its data suppliers
Other Data Sources: US Census Bureau; Washington Department of Transporation; Washington Department of Revenue; Washington Department of Ecology (WDOE)

0 200 400
Feet

Map Date: 5/16/2018
Document: Q:\Simplot\CityofWarden\map_docs\Site_2013.mxd



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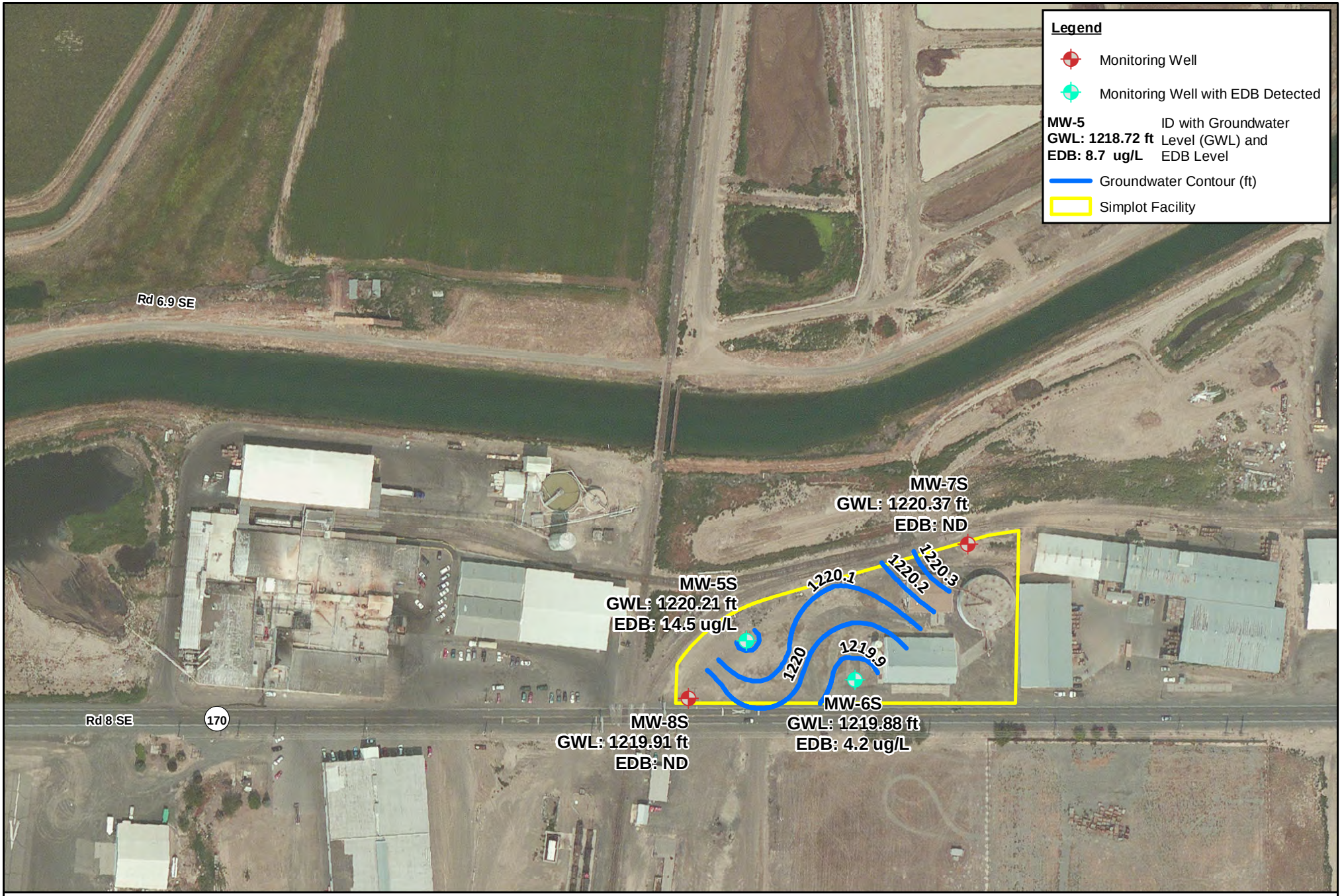
0 200 400
Feet

Map Date: 5/16/2018
Document: Q:\Simplot\CityofWarden\map_docs\Site_2013.mxd



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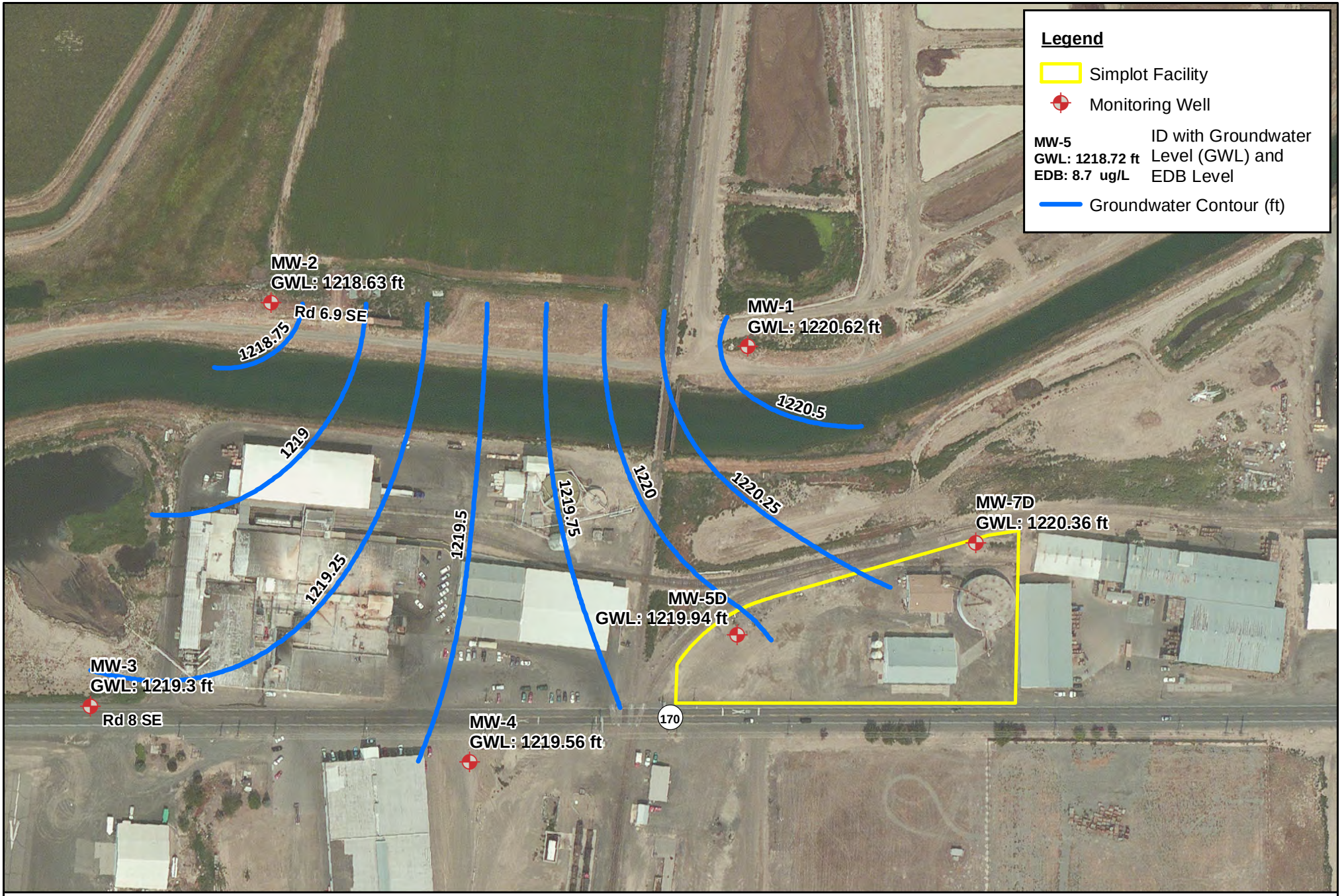

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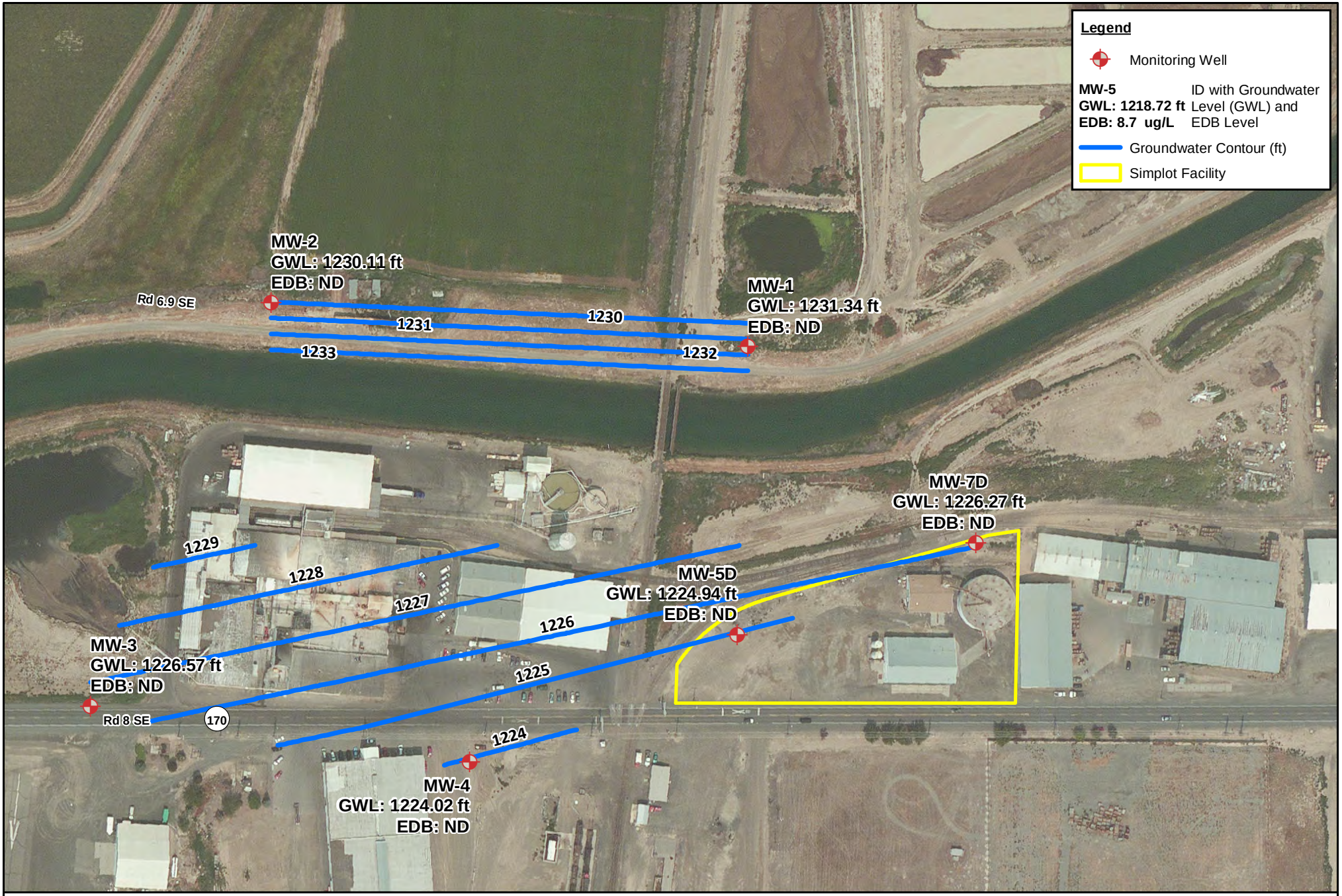
Note: No EDB levels were detected for these wells for this period

0 200 400
Feet

Map Date: 5/21/2014
Document: Q:\Simplot\CityofWarden\map_docs\Site_2013.mxd



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0 200 400
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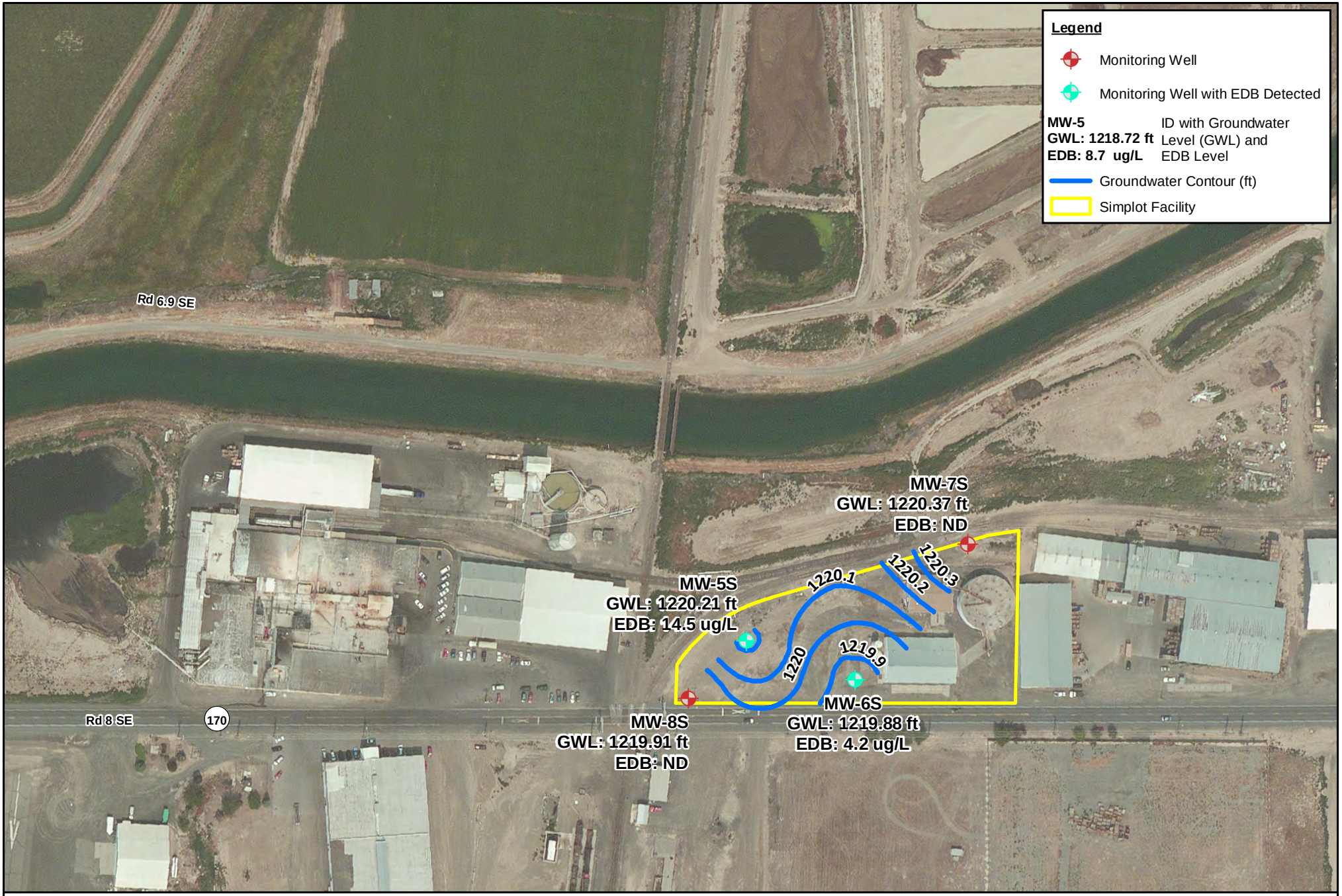

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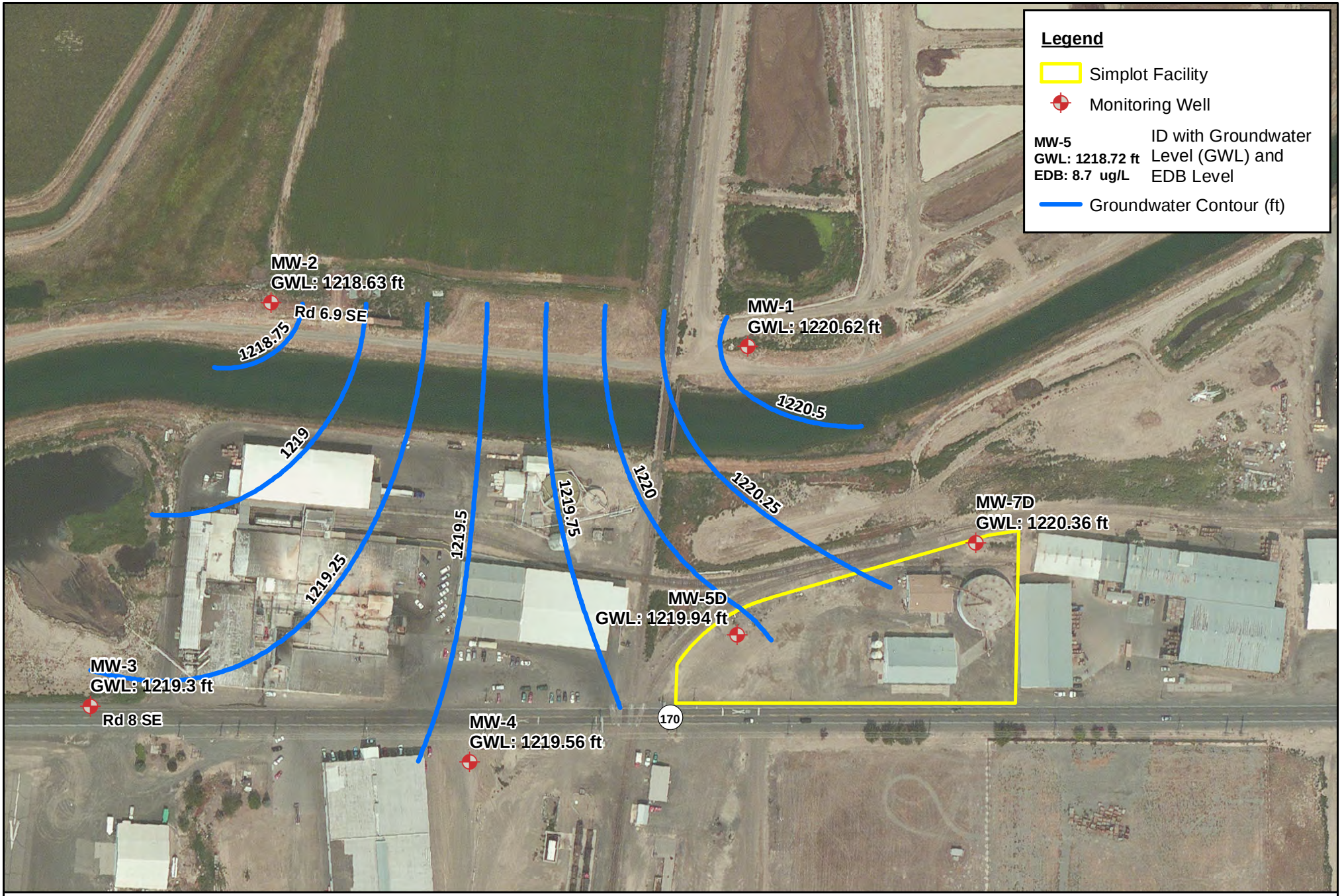

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