Play Area Interim Action Construction Completion Report

Gas Works Park Site
Seattle, Washington

for
Puget Sound Energy

January 13, 2022

GeoEngineers

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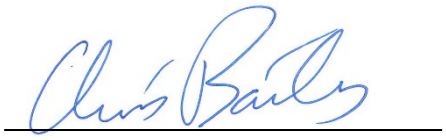

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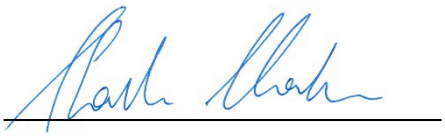

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APPENDICES

1.0 INTRODUCTION

The Play Area Groundwater Treatment Interim Action (Interim Action) summarized in this Construction Completion Report (CCR) was completed at the Play Area portion of the Gas Works Park Site (GWPS). The Interim Action was implemented under Agreed Order No. DE 2008 (AO DE 2008) between Puget Sound Energy (PSE), the City of Seattle (City), and the Washington State Department of Ecology (Ecology).

1.1. Background

Gas Works Park is a twenty-acre park within the GWPS, located at 1801 North Northlake Way (Figure 1) and is owned and operated by Seattle Parks and Recreation (SPR). The park is bounded by Lake Union to the south and east, Seattle Harbor Patrol to the west, and North Northlake Way to the north. The Play Area is located in the eastern portion of the Park, along the shoreline of Lake Union (Figure 2).

A manufactured gas plant historically operated on the park property, more specifically hydrogen sulfide was removed from the manufactured gas stream using a Thylox process in the Play Area. The former facilities, including the Kelly Filter, are shown on Figure 2. The Thylox process used a sodium thioarsenate solution to remove hydrogen sulfide from the manufactured gas. The detection of elevated arsenic in soil and groundwater in this area reflects the past surface releases of sodium thioarsenate, which migrated downward through soil and groundwater because it was denser than water. Local geology and geochemistry controlled how and where the thioarsenate moved in the ground.

The primary objective of the Interim Action was to install and operate an in-situ treatment system, in coordination with the renovation of the Play Area, to reduce dissolved arsenic concentrations in groundwater from the historical thioarsenate releases.

1.2. Regulatory Framework for the Interim Action

The Interim Action was authorized under the Second and Third Amendments to the 2005 Agreed Order (No. DE 2008) between PSE, the City, and Ecology for the GWPS. The April 2017 Second Amendment authorized installation of the groundwater treatment infrastructure and associated groundwater monitoring wells (Ecology 2017a). The August 2016 memorandum titled "Supplemental Play Area Investigation and Treatment Infrastructure Construction" (GeoEngineers 2016a) documented the design of the treatment infrastructure, and the December 2016 memorandum titled "Play Area Injection Infrastructure Groundwater Monitoring Well Network" (GeoEngineers 2016b) provided the basis for the Interim Action monitoring well layout. The Ecology-approved August and December 2016 memoranda were prepared to support the Second Amendment and are included as Appendices A and B, respectively. Following the completion of treatment and monitoring infrastructure installation, the Play Area Groundwater Treatment Interim Action Work Plan (Work Plan) (GeoEngineers 2017) was prepared to support the August 2017 Third Amendment (Ecology 2017b) and is included as Appendix C. The Third Amendment authorized the in-situ treatment and monitoring described in the Work Plan.

Injection wells are part of the groundwater treatment infrastructure that was installed at the Play Area and are regulated by Ecology under the requirements of Washington Administrative Code (WAC) 173-218 (Underground Injection Control [UIC] Program). The Interim Action injection wells are considered Class V injection wells per WAC 173-218-040(5)(a)(x) and were registered with the Ecology UIC program prior to being used to meet the regulatory requirements for Model Toxics Control Act (MTCA) cleanup actions completed under Ecology supervision.

1.3. Report Organization

This CCR is organized into six sections. Section 1 provides a background discussion and summary of the completion report. Section 2 presents a project overview and identifies project participants. Section 3 describes the groundwater infrastructure installation work activities. Section 4 summarizes the Interim Action preparation activities. Section 5 describes the activities related to the well installation and groundwater infrastructure construction. Summary and conclusions are presented in Section 6.

Appendices supporting this CCR include the following:

- **Appendix A.** Supplemental Play Area Investigation and Treatment Infrastructure Construction Memorandum
- **Appendix B.** Play Area Injection Infrastructure Groundwater Monitoring Well Network Memorandum
- **Appendix C.** Play Area Groundwater Treatment Work Plan
- **Appendix D.** Play Area Groundwater Infrastructure Installation As-Built Drawings
- **Appendix E.** Monitoring Well Installation Logs
- **Appendix F.** Injection Piping Cut Sheet
- **Appendix G.** Injection Piping Testing Documentation
- **Appendix H.** Import Fill Material Documentation
- **Appendix I.** Vault and Fixtures Cut Sheet
- **Appendix J.** Non-hazardous Soil Export Documentation
- **Appendix K.** Non-hazardous Water Export Documentation
- **Appendix L.** Hazardous Water Export Documentation
- **Appendix M.** Photographs
- **Appendix N.** Field Report
- **Appendix O.** Air Monitoring Report
- **Appendix P.** Play Area Interim Action Monitoring Report
- **Appendix Q**. Asphalt Export Documentation

2.0 PROJECT OVERVIEW AND PARTICIPANTS

2.1. Overview of Groundwater Infrastructure Installation Work

The activities associated with the groundwater infrastructure installation work comprised the following:

- Demolition of asphalt pathways and wooden deck;
- Installation of injection and monitoring wells;
- Development of injection and monitoring wells;
- Installation of injection system piping;

- Installation of underground vault and associated plumbing;
- Restoration of asphalt pathway; and
- Off-site disposal of non-hazardous impacted material (soil and water) and hazardous impacted material (water) resulting from trenching, well drilling, well development and decontamination activities.

Approximately 1,500 gallons of water from decontamination activities were collected during construction and characterized as non-hazardous water. The non-hazardous water was transferred from drums to a vacuum truck and transported to the Marine Vacuum Service permitted facility located in Seattle, Washington for treatment and disposal. Approximately 2,500 gallons of purged well water were collected during construction and characterized as hazardous water. The hazardous water was transported by Waste Management to the Subtitle C Chemical Waste Management facility in Arlington, Oregon. Approximately 169 tons of non-hazardous impacted material was excavated from the project area and transported off-site for disposal. Approximately 30 cubic yards of controlled density fill was utilized to backfill shallow trenches or trenches under asphalt. An injection system was installed. As part of asphalt pathway restoration, a 3-inch thick lift of Class B hot mix asphalt was placed over an area of approximately 450 square feet.

All non-hazardous impacted materials were transported off-site by truck to the Waste Management Transfer Facility located in Seattle, Washington. From the transfer station, the material was shipped by rail to the Columbia Ridge Landfill facility located in Arlington, Oregon (a Subtitle D permitted facility) for final disposal.

The work activities were initiated in January 2017 and completed in June 2017.

2.2. Interim Action Construction Participants

Several parties participated in the process of completing the Interim Action. Ecology provided regulatory oversight for the project. The owner of the property is SPR. The work was completed for PSE and the City.

A brief summary of each contractor's role is described below.

As project engineer, GeoEngineers was responsible for overall project management: coordination for securing all necessary permits and approvals; coordinating with Ecology; preparing the design documents; performing construction oversight; and coordinating with contractor during construction. GeoEngineers also conducted all monitoring required during construction, as well as during treatment activities. GeoEngineers retained two subcontractors to perform the work identified below:

- Wyser Construction (Wyser) of Snohomish, Washington was retained as the contractor to perform groundwater infrastructure installation work.
- Cascade Drilling (Cascade) located in Woodinville, Washington was retained to perform injection and monitoring well installation work.

Site activities performed by Wyser included demolition, earthwork (excavation, trenching and backfilling), erosion control, injection piping installation, vault installation and associated plumbing, waste management (soil and water), and asphalt pathway restoration. In this capacity as the infrastructure installation contractor, Wyser retained five subcontractors, to perform the work identified below:

- Waste Management transported and disposed impacted soil (non-hazardous) at their Subtitle D Columbia Ridge Landfill facility in Arlington, Oregon.
- Waste Management transported and disposed impacted water (hazardous) at their Subtitle C Chemical Waste Management facility in Arlington, Oregon.
- Marine Vacuum Service Inc. located in Seattle, Washington, transported and disposed impacted water (non-hazardous) at their permitted treatment and disposal facility in Seattle, Washington.
- Northwest Asphalt located in Renton, Washington performed asphalt paving work.
- True North Land Surveying Inc. located in Seattle, Washington performed site surveying activities.

3.0 DESCRIPTION OF GROUNDWATER TREATMENT INFRASTRUCTURE INSTALLATION WORK

Field activities for groundwater treatment infrastructure installation were performed in general accordance with the construction documents (GeoEngineers, 2017) prepared by GeoEngineers. GeoEngineers provided on-site construction oversight on behalf of PSE and the City. A description of the field activities is provided in the subsequent sections. Appendix D includes the as-built drawings for the completed infrastructure installation work.

3.1. Site Preparation

Site preparation activities performed prior to initiating earthwork activities included:

- A pre-construction meeting;
- Installation of temporary facilities and controls; and
- Installation of temporary erosion and sedimentation controls (TESC).

These activities are discussed below.

3.1.1. Pre-Construction Meeting

The pre-construction meeting was held on January 31, 2017, prior to site mobilization to discuss project scope items, project communications, permits, schedule and miscellaneous coordination items. Attendees included representatives from PSE, the City, GeoEngineers, Wyser and Cascade.

3.1.2. Temporary Facilities and Controls

Temporary facilities and controls provided by Wyser included:

- First aid kit and fire extinguisher within the support zone;
- Temporary fence along all sides of project area;
- A decontamination trailer with decontamination and collection system located within the contamination reduction zone;
- Warning signs for the general public at the construction entrance/exit to the project area;
- Safety candles and caution tape along the perimeter of active excavations and other work areas; and
- Covers for material stockpiles, secured at the end of each workday.

3.1.3. Temporary Erosion and Sedimentation Controls

Straw wattles were installed along the southern boundary of the project area to prevent silt from entering Lake Union. The straw wattles were installed in accordance with the City of Seattle Stormwater Manual (Seattle, 2016). Stormwater controls and Best Management Practices (BMPs) were implemented by Wyser during construction. BMPs included lining and covering stockpiles and providing run-on and runoff controls for the stockpiles. Wyser and GeoEngineers performed inspection of the BMPs on a regular basis. Wyser performed repairs to the straw wattles as needed. Figure 3 shows the approximate location of straw wattle installed at the project area.

3.2. Site Demolition

Demolition activities included removal of asphalt pathways, removal of brick pavers for reuse, and wood deck demolition as shown on Figure 3. Demolition materials (wood deck, asphalt and broken pavers) were temporarily stockpiled and transported off-site for disposal or recycling. Brick pavers removed for reuse and in good condition were stored on a pallet and staged within the project area.

3.3. Well Installation

3.3.1. Injection Wells

Cascade Drilling installed 35 injection wells (A-1 through A-5, B-1 through B-8, C-1 through C-12, and D-1 through D-10) shown on Figure 3. Of the 35 injection wells installed, 25 were screened in the fill unit and 10 were screened in the outwash unit. Injection wells were completed between March 21 and April 11, 2017. Cascade Drilling used a track-mounted CME 55 auger drill rig with an 8¼-inch outside diameter (OD) hollow-stem auger and star bit for installation. Drill cuttings were collected in 55-gallon drums and transferred to soil roll-off bins for management per Section 3.7. Each injection well was installed with 2-inch Schedule 40 polyvinyl chloride (PVC) well casing and 2-inch 304 stainless steel screen. Screen slot sizes of 20, (0.020-inch), 50 (0.050-inch), or 90 (0.090-inch) were used based on the geologic unit and location in which it was installed. Injection wells were completed using silica sand or gravel filter pack (size based on screen slot size) surrounding the screen and sealed using bentonite chips and concrete. Neat cement was used to seal some injection wells when concrete could not be installed to the required depth. Well construction details are shown on Figure 4. Injection system elevations are shown on Figure 5.

3.3.2. Monitoring Wells

Cascade Drilling installed 15 monitoring wells (MW-41S, MW-41D, MW-42S, MW-43S, MW-44S, MW-45S, MW-45D, MW-46S, MW-46D, MW-47S, MW-48D, MW-49D, MW-50D, MW-51S, and MW-52D) shown on Figure 3. Monitoring well installations were completed between March 27 and April 18, 2017. Cascade Drilling used a track-mounted CME 55 auger drill rig with an 8¼-inch OD hollow-stem auger for installation. Soil samples were collected using a 2¼-inch inside diameter (ID) split barrel sampler driven 30 inches with a 140-pound hammer. Soil samples were logged by a GeoEngineers field representative. Drill cuttings were collected in 55-gallon drums and transferred to soil roll-off bins for management per Section 3.7. Each monitoring wells was installed with 2-inch Schedule 40 PVC well casing, 2-inch Schedule 40 PVC screen with 0.010-inch slot widths, and 2-inch Schedule 40 PVC end cap. Monitoring wells were completed using 10/20 silica sand filter pack around the well screen and sealed using either bentonite chips or both bentonite chips and bentonite grout. Cascade Drilling installed temporary well protection per construction documents (GeoEngineers, 2017) for monitoring wells. The final surfaces of monitoring wells within the Play Area footprint were completed in 2018 during SPR renovations at the Play Area. Monitoring wells

outside the Play Area footprint were installed with an 8-inch diameter steel well monument set in concrete. Well construction details are shown on Figure 4. Monitoring well elevations are shown on Figure 5. Monitoring well installation logs are provided in Appendix E. All monitoring well installation work was completed in accordance with Ecology regulations and construction documents.

3.3.3. Well Development

GeoEngineers developed 35 injection wells and 15 monitoring wells listed in Sections 3.3.1 and 3.3.2 and shown on Figure 3. Wells were developed between March 22 and April 28, 2017, by alternately pumping and surging to remove water and fine soil particles from the wells to improve yield and flow characteristics. Equipment used during the well development process included 3/8-inch high-density polyethylene (HDPE) and low-density polyethylene (LDPE) disposable tubing, foot valves, surge blocks, and peristaltic pumps. Water from well development was managed per Section 3.8. Reusable equipment was decontaminated between wells. Well development was completed before the injection wells were connected to injection system piping. Well development work was completed in accordance with the construction documents.

3.4. Trenching and Injection System Piping

3.4.1. Trench Construction

A utility locate was completed by a private utility locating firm and SPR prior to starting earthwork activities. Initial survey and staking was completed to assist with the trenching and other construction activities. Excavation of the trenches were completed by Wyser utilizing a track hoe. Existing brick pavers over the trenching footprint were removed for reuse, to the extent practicable. For trenching over asphalt pavement, trench limits were saw cut and the existing asphalt within the trench footprint was removed and disposed of by Wyser at United Recycling in Snohomish, Washington. See Appendix Q for asphalt management documentation.

Trenches for installation of the injection system piping were excavated to a minimum of 18 inches below finish grade. Trenching depths vary in areas impacted by grade constraints and utilities or structures encountered during trenching. Trenching depth and alignment have been noted on the as-built drawings, included as Appendix D. Refer to Figure 3 for as-built trenching layout and Figure 6 for as-built trenching details.

Excavated material from trenching operations was removed and temporarily stockpiled adjacent to the trenches and used for backfill. Unsuitable material including debris, rock and soil clumps/clods larger than 2-inches were removed from the material prior to backfilling. Excess trench soil and unsuitable materials from excavation were placed in roll-off bins with non-hazardous soil for transport and disposal as described in Section 3.7.

3.4.2. Injection System Piping Installation

The injection system piping, well-point connections, valves, and fittings were installed as presented on Figures 3 through 6, which show as built conditions for the injection system. All materials installed were approved by GeoEngineers (see Appendix F for material cut sheets). Wyser completed hydrostatic pressure testing of the injection system piping (per pipe manufacturer's recommendations and American water works association standard C605) with GeoEngineers performing the observations. Documentation of the injection system piping pressure testing was completed by GeoEngineers. The pressure tests for the installed injection system piping met the required specifications per the construction documents. Refer to Appendix G for pressure testing results.

The injection system piping was installed to minimum depths of approximately 16 inches to 52 inches below finish grade and vary in areas impacted by grade constraints, utilities or structures encountered. The final surveyed elevations of injection piping are recorded on the as-built drawings, specifically Figure 5 and sheet 4.1 of Appendix D. Pipe bedding material (minimum 12 inches) was placed around the piping in the trench as shown on Figure 6. Pipe bedding material consisted of Washington State Department of Transportation (WSDOT) Class 2 Sand in accordance with the City of Seattle 2014 Standard Specifications (Section 9-03.12(2)). Approximately 64 tons of sand was imported from a commercial gravel pit. Sieve analysis and weight tickets for the Class 2 import sand material are provided in Appendix H.

3.4.3. Trench Backfilling

3.4.3.1. Sand and Brick Area

Native backfill from trench spoils was placed in 12-inch loose lifts over the pipe bedding material up to the existing sand surface subgrade elevation (approximately 12 inches below finish grade). Wyser placed 12 inches of sand at the surface to match existing conditions within the sand area footprint. For backfilling in brick areas, native backfill from trench spoils was placed in 12-inch loose lifts over the pipe bedding material up to approximately 3 inches below finish grade. Wyser placed 3 inches of sand at the surface to match elevations with surrounding bricks. The contractor moisture conditioned the material to facilitate compaction. The contractor compacted the soil utilizing a vibratory plate compactor to a firm non-yielding condition. The backfill was evaluated and observed by the on-site GeoEngineers representative prior to placing the next lift to ensure the backfill was compacted properly and was free of pumping soil conditions and observed to be a firm non-yielding condition. Wyser installed detection tape within the backfill at the vertical limits shown on the construction documents. Survey stakes installed within the project area identified fill depths and final elevations for the import backfill sand.

The as-built trench cross-sections are shown on Figure 6.

3.4.3.2. Asphalt Area

Wyser installed approximately 30 cubic yards of CDF above the pipe bedding material between wells A-4, A-5, and vault; B-7, B-8, and vault; C-8, C-9, and vault; and C-10, C-11, C-12, and vault. CDF was placed up to 3-inches below finish grade. Figures 3 and 5 show the areas where CDF was used to backfill trenches and Figure 6 shows the various as-built injection system backfill details. The as-built drawings are also presented as Appendix D. CDF was placed at these locations in lieu of native material backfill to provide additional protection to the injection system piping from lateral movements and vehicular traffic on the asphalt pathway. Wyser installed detection tape within the backfill at the vertical limits shown on the construction documents. CDF documentation from the commercial borrow source is provided in Appendix H.

3.5. Injection System Vaults

3.5.1. Vault Installation

Wyser installed two concrete vaults upon completion of trenching activities. Vault locations are shown on Figures 3 and 5. Vault excavations were slightly larger than the vault dimensions to provide room for installation. Excavated soil from the vault excavations was placed in roll-off bins and managed as described in Section 3.6. The vault subgrade was prepared and compacted per the construction documents.

Oldcastle Precast Model 444-LA was used at the western vault location with inside dimensions measuring 3-feet 6-inch x 3-feet 6-inch x 3-feet 3-inch. Wyser installed a larger vault (Oldcastle Precast Model 504-LA) at the eastern vault location, with inside dimensions measuring 4-feet 2-inch x 4-feet 2-inch x 3-feet 2-inch. See Appendix I for vault and access hatch details.

3.5.2. Vault Plumbing

Valves, fittings, and connections within the concrete vaults were completed in accordance with the construction documents. Material cut sheets for the plumbing fixtures and valves are provided in Appendix I. The western vault contains valves for 13 wells. The eastern vault contains valves for 22 wells. Metal stamped well identification tags were affixed to each injection well pipe inside the vaults. See Figure 6 for vault plumbing details.

3.6. Asphalt Pathway Restoration

3.6.1. Asphalt Pathway

The asphalt pathway located south of the Play Area is utilized by pedestrians and maintenance vehicles. Asphalt path restoration at the surface was completed by constructing a single 3-inch thick lift of WSDOT Class B hot mix asphaltic concrete (HMA). The asphalt layer was compacted using a vibratory plate compactor to a firm non-yielding condition as observed by the on-site GeoEngineers representative. Asphalt was placed over an area measuring approximately 450 square feet. Hot mix asphalt product information for the pathway construction is provided in Appendix H. Figure 3 shows the portions of the existing asphalt pathways that were restored after being demolished to construct piping and vaults. .

3.7. Loading, Transport, and Disposal of Non-hazardous Impacted Soil

Non-hazardous material from drilling operations and soil from trenching that was in excess of the quantity that could be utilized for backfill were disposed of in roll-off bins for transport to a permitted off-site disposal facility. Roll-off bins were staged in the western portion of the site within the temporary construction fence. Drilling cuttings and excess trench spoils were tested for mercury, total metals, and volatile organic compounds (VOCs) and was determined to be within the threshold for disposal at a Subtitle D permitted facility (see Appendix J for chemical analytical results).

The non-hazardous impacted material was transported to the Waste Management Transfer Facility located in Seattle, Washington. From the transfer station, the material was shipped by rail to the Columbia Ridge Landfill facility located in Arlington, Oregon (a Subtitle D permitted facility). All trucks that contained waste materials were weighed at the Waste Management Transfer Station. The number of truck loads transported off-site each workday was documented by Wyser and bills of lading were completed for each truck exiting the project area. Based on the weight tickets, approximately 167 tons of non-hazardous impacted soil were transported off-site. Documentation from Waste Management for non-hazardous impacted soil is provided in Appendix J.

3.8. Water Management

3.8.1. Non-hazardous Water

Equipment/personnel decontamination water was collected in 55-gallon drums and stored on-site for characterization and off-site disposal. Water collected in the drums was sampled by GeoEngineers for waste characterization and disposal at the appropriate facility. Samples collected from the drums were tested for mercury, total metals, and VOCs. Based on the analytical results, water was determined to be within the threshold for management at a non-hazardous waste facility. A total of thirty-six 55-gallon drums (approximately 1,500 gallons) of decontamination water was transferred from the drums to a vacuum truck and transported to the Marine Vacuum Service permitted facility located in Seattle, Washington for treatment and disposal. See Appendix K for non-hazardous water management documentation.

3.8.2. Hazardous Water

Well purge water was collected in 55-gallon drums for off-site disposal. Water in the 55-gallon drums was sampled by GeoEngineers for waste characterization and disposal at the appropriate facility. The water in the drums were tested for mercury, total metals, and VOCs. Based on the analytical results, water exceeded threshold for management at a non-hazardous facility and required disposal at a hazardous waste facility. A total of forty-seven 55-gallon drums (approximately 2,500 gallons) of purge water was transported by Waste Management to the Subtitle C Chemical Waste Management facility in Arlington, Oregon. SPR signed manifests for transportation and disposal of the hazardous water drums per construction documents. Documentation from Waste Management regarding management of the hazardous water is provided in Appendix L.

3.9. Site Restoration

As part of site restoration, Wyser repaired portions of the asphalt pathway that appeared to show signs of deterioration at the surface. This work included resurfacing an area of asphalt (measuring approximately 20 feet by 10 feet) adjacent to the western vault, as shown on Figure 3. The asphalt in this area was repaired by removing the damaged portion and overlaying a 3-inch asphalt section of the same mix listed in Section 3.6.1. Other parts of site restoration included placement of sand to match pre-construction conditions within the sand play area. Wyser repaired a damaged irrigation line (located in the brick area) and damaged storm drain lines in the sand area in accordance with SPR requirements. Upon completing construction activities, Wyser demobilized equipment, materials, supplies, debris, and temporary facilities on June 16, 2017. All construction debris was transported off-site and disposed of by Wyser.

3.10. As-Built Survey

Wyser and True North completed progress surveys as needed during the project. A final survey was completed after all project activities were completed. The final as-built survey from True North and as-built drawing set from GEI showing as-built conditions are provided in Appendix D.

3.11. Field Construction Documentation

Photographs from the construction activities at the project area are provided in Appendix M. Environmental field activity logs for the project are provided in Appendix N.

Air monitoring and noise monitoring was performed during drilling activities by GeoEngineers in accordance with the site-specific project Health and Safety Plan (HASP) prepared by GeoEngineers. As specified in the HASP, air and noise monitoring was performed as necessary during drilling activities along the perimeter of the project area exclusion zone. The air and noise monitoring results were below action levels. Refer to Appendix O for a summary of air and noise monitoring results.

3.12. Final Site Inspection

The final site inspection was completed on June 15, 2017. In attendance were representatives from GeoEngineers, Wyser, and SPR. GeoEngineers submitted a request to Wyser to complete punch list items discussed during the final site inspection. Wyser addressed all punch list items and other items identified by SPR during the final site inspection.

4.0 INTERIM ACTION TREATMENT

Treatability testing showed that elevated arsenic concentrations in Play Area groundwater can be reduced by applying iron-containing amendments that act to decrease the soluble arsenic fraction in groundwater. The treatability testing results are summarized in the Arsenic Treatability Study Report (Anchor QEA 2016), which is Appendix A of the Work Plan, which is included in this CCR as Appendix C.

The general treatment approach for the Interim Action neutralizes high pH and increases iron concentrations to sequester dissolved arsenic by precipitation as well as creating conditions favorable for adsorption. The ferrous sulfate reagent was selected to form iron oxyhydroxides and sulfide phases over time, which will remove arsenic from groundwater by precipitation and enhance the long-term arsenic adsorption capacity of the aquifer solids. Further discussion of the treatment process used for the Interim Action is presented in the Work Plan (Appendix C).

A total of approximately 100,000 gallons of ferrous sulfate reagent at 5 percent concentration (21 tons of solid ferrous sulfate) were injected into the 22 fill unit and 13 outwash unit injection wells over three injection events. Reagent was handled and mixed in accordance with the Work Plan (Appendix C) utilizing a mobile injection system positioned outside the Play Area footprint. The first two rounds of injections, conducted in 2017 and 2018 respectively, included all 35 injection wells. The third round conducted in 2019, focused on the downgradient areas, injecting 20 wells within the C and D lines. The total volume of reagent injected in each set of injection wells is listed below:

UNIT TOTAL VOLUME OF REAGENT

Unit	Wells	Gallons
A line Fill	A1, A2, A3, A4, and A5	4,500
B line Fill	B1, B2, B4, B6, B7, and B8	7,600
B line Outwash	B4 and B5	3,200
C line Fill	C1, C2, C4, C6, C8, and C9	22,200
C line Outwash	C3, C5, C7, C10, C11, and C12	21,500
D line Fill	D1, D3, D5, D7, and D10	18,800
D line Outwash	D2, D4, D6, D8, and D9	21,600

GeoEngineers conducted groundwater monitoring to evaluate the effectiveness of the treatment at reducing dissolved arsenic concentrations within the Play Area, as well as to evaluate the downgradient effects of the treatment beyond the anticipated treatment area. The monitoring well network for the Interim Action, in relation to the injection well locations, is shown on Figure 3. Generally, the Interim Action groundwater monitoring consisted of baseline monitoring to evaluate pre-treatment conditions, short-term monitoring to collect groundwater data during and immediately following the reagent injection to evaluate the short-term influence of reagent injection, and performance monitoring to collect post-injection samples to evaluate treatment performance following treatment. Confirmation monitoring was also conducted to evaluate longer-term performance and stability of the arsenic treatment and to characterize final conditions to be considered during completion of the feasibility study for the GWPS. The results of the Interim Action, including further information on injection performance, geochemical influence associated with injected reagent, and reduction of dissolved arsenic concentrations, are presented in the Play Area Interim Action Monitoring Report, which is included in this CCR as Appendix P.

5.0 SUMMARY

Field activities were completed at the Play Area portion of the GWPS between January 2017 and June 2019 as part of the Play Area Interim Action. Activities performed included monitoring well installation, injection well installation, well development, injection piping and vault installation, soil and water management, and site restoration. Treatment work was completed in accordance with the Work Plan and is summarized in the Play Area Interim Action Monitoring Report included as Appendix P.

6.0 REFERENCES

GeoEngineers, Inc. 2017. Play Area Groundwater Treatment Interim Action Work Plan, Gas Works Park Site, Seattle, Washington. August 1, 2017.

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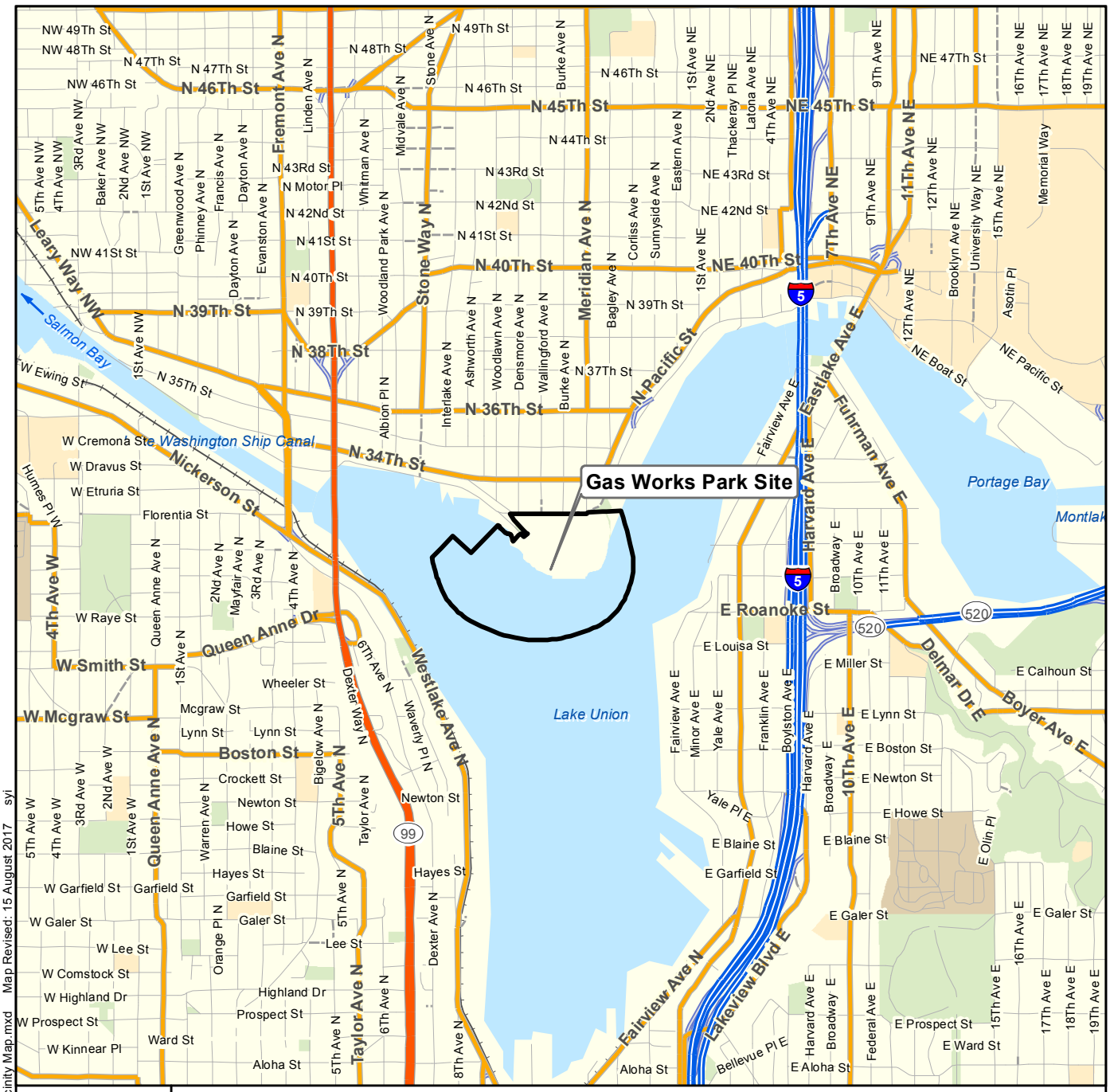
FIGURES

GeoEngineers



Notes:
1. Gas Works Park Site boundary is equivalent to the Gas Works Park Sediment Site boundary documented in the 2013 Amendment of Agreed Order DE2008.
2. Reference: basemap provided by Esri.
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

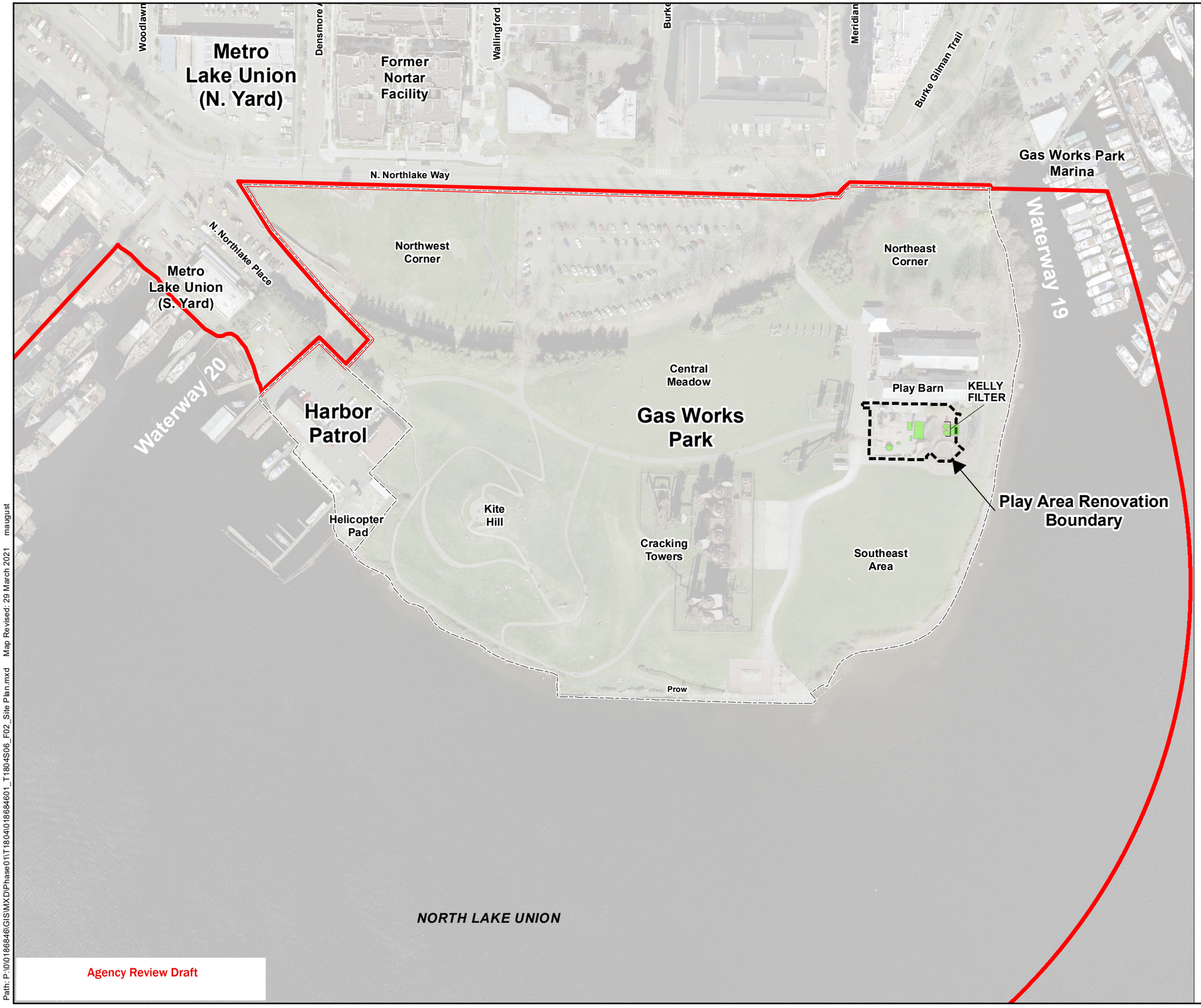
Vicinity Map

Gas Works Park Site
Seattle, Washington

GeoEngineers

Figure 1

Path: P:\01\018684601\GIS\MXD\Phase01\T1804\018684601_T1804S06_F01_Vicinity Map.mxd Map Revised: 15 August 2017 syi



Legend

- Area of Investigation (AOI) (Ecology 2013)
- Consent Decree Boundary (Ecology 1999)
- Play Area Renovation Boundary
- Thylox Process Facility

Notes:

1. The AOI is equivalent to the Gas Works Park Sediment Site boundary documented in the 2013 Amendment of Agreed Order DE 2008 (Ecology 2013).
2. The Uplands Consent Decree boundary is equivalent to the Site boundary documented in Exhibit A of the Final Consent Decree 99-2-52532-9SEA (Ecology 1999).
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

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Feet

Site Plan

Gas Works Park Site
Seattle, Washington

GeoEngineers

Figure 2

Path: P:\0018684\6\GIS\MXD\Phase01\T1804\0186846\01_T1804S06_F02_Site Plan.mxd Map Revised: 29 March 2021 maugust

INJECTION WELLS

WELL ID	NORTHING	EASTING	GROUND SURFACE AT TIME OF INSTALLATION (MARCH - APRIL 2017)	TOP OF 90° ELBOW[A]
	WA STATE PLANE, NORTH ZONE, NAD83, US FT		ELEVATION FT (NAVD88)	
A1	239171.14	1270661.05	26.75	25.04
A2	239154.91	1270651.15	26.87	24.92
A3	239134.46	1270648.11	26.99	25.50
A4	239115.96	1270637.76	27.44	25.58
A5	239088.96	1270634.15	29.38	26.86
B1	239170.51	1270686.12	26.83	24.19
B2	239156.70	1270679.68	26.64	24.40
B3	239148.72	1270679.61	26.61	24.18
B4	239136.33	1270678.98	26.76	24.38
B5	239131.24	1270677.21	26.76	24.31
B6	239116.94	1270674.15	27.00	24.50
B7	239103.60	1270658.44	27.33	24.69
B8	239085.68	1270661.88	29.44	26.44
C1	239171.07	1270717.40	31.11	25.87
C2	239163.52	1270711.53	30.81	25.92
C3	239153.65	1270710.85	30.80	26.03
C4	239143.04	1270710.36	30.69	26.37
C5	239135.08	1270708.63	30.73	26.14
C6	239119.81	1270702.75	30.90	26.30
C7	239116.76	1270698.62	30.87	26.30
C8	239110.16	1270688.96	30.88	26.39
C9	239080.68	1270689.61	28.96	26.50
C10	239072.82	1270717.81	28.30	25.67
C11	239080.59	1270743.78	27.45	24.73
C12	239095.06	1270758.65	27.43	24.51
D1	239170.34	1270735.83	30.77	25.97
D2	239166.43	1270735.63	30.56	25.82
D3	239152.19	1270736.47	30.33	25.80
D4	239149.00	1270736.02	30.44	25.95
D5	239131.33	1270735.09	30.41	26.01
D6	239127.76	1270735.17	30.56	25.94
D7	239113.05	1270730.11	27.99	25.63
D8	239109.15	1270729.73	28.03	25.48
D9	239098.48	1270727.69	27.82	25.19
D10	239095.41	1270726.05	27.88	25.29

A. TOP OF 90° ELBOW IS THE HIGHEST POINT ON THE INJECTION WELLS. SEE FIGURE 2 FOR WELL SCHEMATIC.

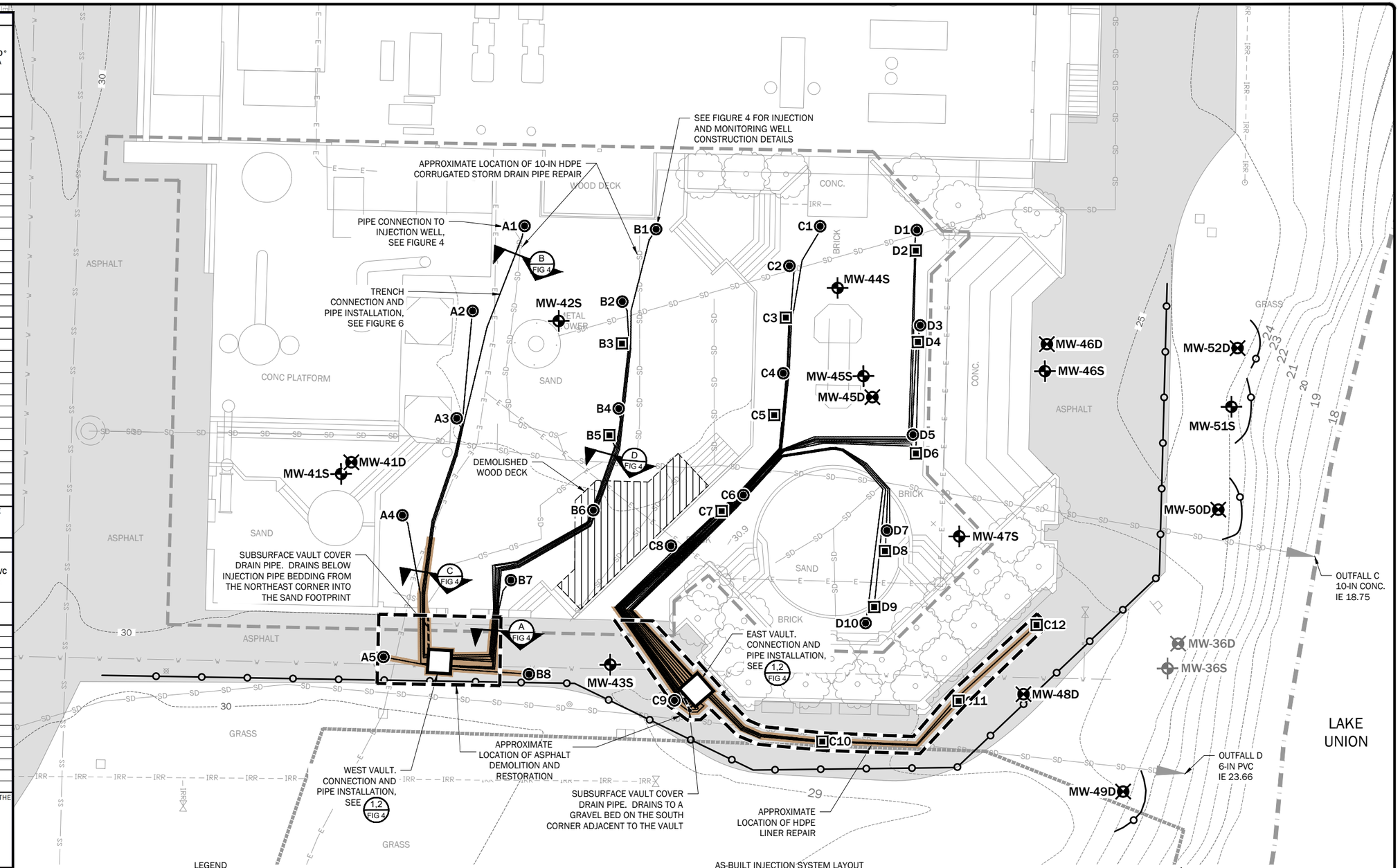
MONITORING WELLS

WELL ID	NORTHING	EASTING	TOP OF MONUMENT[A]	TOP OF PVC CASING
	WA STATE PLANE, NORTH ZONE, NAD83, US FT		ELEVATION FT (NAVD88)	
MW-41S	239123.85	1270626.07	B	29.02
MW-41D	239126.07	1270628.03	B	29.19
MW-42S	239153.02	1270667.56	B	27.82
MW-43S	239087.49	1270677.38	29.37	29.03
MW-44S	239159.31	1270720.72	B	30.29
MW-45S	239142.50	1270725.64	B	30.74
MW-45D	239138.49	1270727.34	B	30.00
MW-46S	239143.44	1270760.23	25.41	24.84
MW-46D	239148.59	1270760.61	25.40	24.92
MW-47S	239111.94	1270743.90	B	29.80
MW-48D	239081.86	1270756.15	27.27	26.80
MW-49D	239063.29	1270775.15	26.75	26.15
MW-50D	239117.04	1270793.29	25.52	25.06
MW-51S	239136.65	1270795.79	25.74	25.37
MW-52D	239147.84	1270796.96	25.76	25.31

A. TOP OF MONUMENT IS THE HIGHEST POINT ON THE MONITORING WELLS. THE WELL MONUMENTS ARE FLUSH WITH GROUND SURFACE. SEE FIGURE 2 FOR WELL SCHEMATIC.

B. WELL DOES NOT CURRENTLY HAVE A FINISHED MONUMENT AND IS IN CONSTRUCTION SEQUENCING STAGES DESCRIBED IN PLAY AREA AS-BUILTS SHEET 6.0 OR 7.0 AND MONUMENT COMPLETION WILL FOLLOW SPR CONSTRUCTION.

NOTES:
1. INJECTION SYSTEM SURVEY INFORMATION PROVIDED BY TRUE NORTH LAND SURVEYING INC. AUGUST 14, 2017. VERTICAL DATUM IS NAVD88.
2. PATHWAY ASPHALT WAS REMOVED AND REPLACED TO ORIGINAL CONDITIONS TO INSTALL INJECTION PIPING AND VAULTS.
3. BRICK PAVERS ALONG THE C AND D TRENCH FOOTPRINT REMOVED FOR INJECTION PIPING. BRICK PAVERS REMOVED FOR REUSE AND IN GOOD CONDITION STORED ON A PALLET WITHIN THE PROJECT AREA.



LEGEND

- EXISTING CONTOUR (NAVD88)
- EXISTING STORMDRAIN
- EXISTING WATER
- EXISTING ELECTRICAL
- EXISTING SUBSURFACE CONCRETE TANKS
- PLAY AREA RENOVATION FOOTPRINT
- APPROXIMATE EDGE OF EXISTING IMPERMEABLE LINER
- EXISTING ASPHALT, GRAVEL, AND/OR CONCRETE
- EXISTING MONITORING WELL - FILL
- EXISTING MONITORING WELL - OUTWASH
- STRAW WATTLE
- APPROXIMATE LOCATION OF ASPHALT DEMOLITION AND RESTORATION

AS-BUILT INJECTION SYSTEM LAYOUT

- A1 INJECTION WELL - FILL
- B3 INJECTION WELL - OUTWASH
- MW-46S MONITORING WELL - FILL
- MW-46D MONITORING WELL - OUTWASH
- TRENCHED INJECTION PIPE
- SYSTEM VAULT
- APPROXIMATE LOCATION OF CONTROLLED DENSITY FILL (CDF) BACKFILL AREAS

N

0 10 20
SCALE IN FEET

NO.	DATE	BY	REVISION

GeoEngineers
600 STEWART ST : SUITE 1700 : SEATTLE, WA 98101 : 206-728-2674 : WWW.GEOENGINEERS.COM

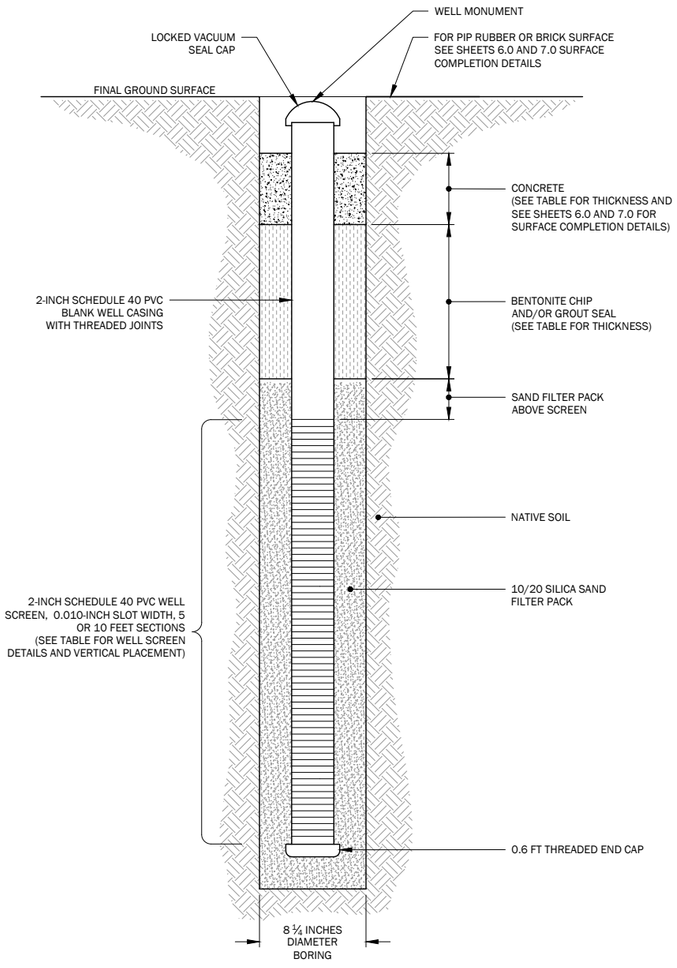
GAS WORKS PARK SITE
PLAY AREA GROUNDWATER INFRASTRUCTURE INSTALLATION AS-BUILT
SEATTLE, WASHINGTON

INJECTION SYSTEM LAYOUT

DRAWN:	CFS	PROJ NO:	0186-846-01
DESIGN:	SMS	SHEET	1 OF 4
CHECKED:	CLB	DATE:	09.21.2017

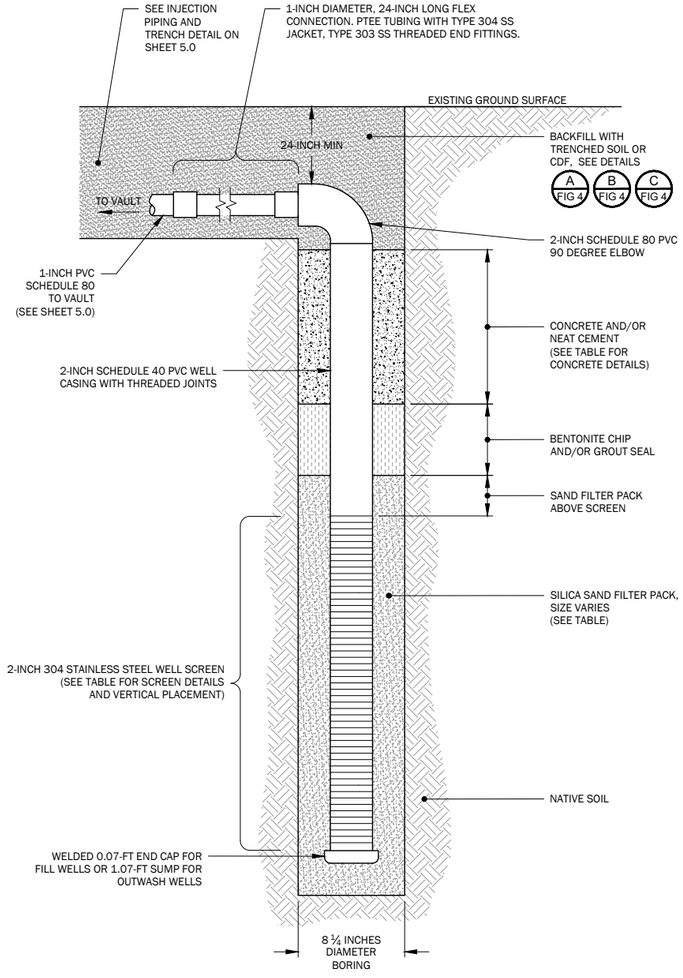
SHEET NO.
FIGURE 3

Plotted: 11/10/2021 - 11:47 | cstickel P:\0\0186846\01\CAD\Task 1808 Play Area Action\Completion Report\0186846_F03_Injection System Layout.dwg



MONITORING WELL SCHEMATIC 1

SCALE: NOT TO SCALE



INJECTION WELL SCHEMATIC 2

SCALE: NOT TO SCALE

WELL ID	WELL SCREEN GEOLOGIC UNIT	ELEVATION FEET (NAVD88)						DEPTH (FEET BELOW GROUND SURFACE AT TIME OF INSTALLATION)		SCREEN LENGTH (FEET)	THICKNESS (FEET)				SAND FILTER PACK	SLOT SIZE[B]
		TOP OF CONCRETE	TOP OF NEAT CEMENT	TOP OF BENTONITE CHIP/ GROUT SEAL	TOP OF SAND	SCREEN START	SCREEN END	SCREEN START	SCREEN END		CONCRETE	NEAT CEMENT	BENTONITE CHIP/ GROUT SEAL	SAND FILTER PACK ABOVE SCREEN		
INJECTION WELLS																
A1	FILL	24.6	22.5	22.5	21.5	20.5	15.0	6.3	11.8	5.5	2.1 A	0.0	1.0	1.0	6/9	50
A2	FILL	24.3	23.2	23.2	22.2	21.2	15.7	5.7	11.2	5.5	1.1 A	0.0	1.0	1.0	6/9	50
A3	FILL	25.0	22.9	22.9	21.9	20.9	15.9	6.1	11.1	5.0	2.1 A	0.0	1.0	1.0	6/9	50
A4	FILL	25.1	23.3	23.3	22.3	21.3	17.8	6.2	9.7	3.5	1.8 A	0.0	1.0	1.0	6/9	50
A5	FILL	26.5	24.8	24.8	23.8	23.3	18.3	6.1	11.1	5.0	1.7	0.0	1.0	0.5	6/9	50
B1	FILL	23.7	22.3	22.3	21.3	20.3	10.8	6.5	16.0	9.5	1.4 A	0.0	1.0	1.0	6/9	50
B2	FILL	24.0	21.8	21.8	20.8	19.8	10.8	6.9	15.9	9.0	2.2 A	0.0	1.0	1.0	6/9	50
B3	OUTWASH	23.5	21.5	11.0	10.0	9.0	2.5	17.6	24.1	6.5	2.0	10.5	1.0	1.0	10/20	20
B4	FILL	23.9	21.9	21.9	20.9	19.9	13.4	6.9	13.4	6.5	2.0	0.0	1.0	1.0	6/9	50
B5	OUTWASH	23.8	21.8	11.3	10.3	9.3	2.3	17.5	24.5	7.0	2.0	10.5	1.0	1.0	10/20	20
B6	FILL	24.0	22.4	22.4	21.4	20.4	13.9	6.6	13.1	6.5	1.6	0.0	1.0	1.0	6/9	50
B7	FILL	24.3	22.4	22.4	21.4	20.4	15.4	7.0	12.0	5.0	1.9 A	0.0	1.0	1.0	6/9	50
B8	FILL	25.9	23.9	23.9	22.9	21.9	16.4	7.5	13.0	5.5	2.0	0.0	1.0	1.0	6/9	50
C1	FILL	25.4	22.8	22.8	21.8	20.8	13.3	10.3	17.8	7.5	2.6	0.0	1.0	1.0	6/9	50
C2	FILL	25.4	22.8	22.8	21.8	20.8	12.8	10.0	18.0	8.0	2.6	0.0	1.0	1.0	6/9	50
C3	OUTWASH	25.5	21.8	10.8	9.8	8.8	0.8	22.0	30.0	8.0	3.7	11.0	1.0	1.0	10/20	20
C4	FILL	25.9	23.2	23.2	22.2	21.2	15.7	9.5	15.0	5.5	2.7	0.0	1.0	1.0	6/9	50
C5	OUTWASH	25.6	21.4	9.4	8.4	7.4	0.4	23.3	30.3	7.0	4.2	12.0	1.0	1.0	10/20	20
C6	FILL	25.9	22.1	21.6	20.6	19.6	16.6	11.4	14.4	3.0	3.8	0.5	1.0	1.0	6/9	50
C7	OUTWASH	25.8	24.8	12.2	11.2	10.2	3.2	20.7	27.7	7.0	1.0	12.6	1.0	1.0	10/20	20
C8	FILL	25.9	23.6	23.6	22.6	21.6	16.1	9.3	14.8	5.5	2.3	0.0	1.0	1.0	6/9	50
C9	FILL	26.0	22.7	22.7	21.7	20.7	15.7	8.3	13.3	5.0	3.3	0.0	1.0	1.0	6/9	50
C10	OUTWASH	25.2	23.0	13.5	12.5	11.5	0.5	16.8	27.8	11.0	2.2	9.5	1.0	1.0	10/20	20
C11	OUTWASH	23.9	22.4	10.9	9.9	8.9	-3.1	18.6	30.6	12.0	1.5	11.5	1.0	1.0	10/20	20
C12	OUTWASH	24.0	21.2	5.2	4.2	3.2	-5.8	24.2	33.2	9.0	2.8	16.0	1.0	1.0	10/20	20
D1	FILL	25.5	21.7	20.7	19.7	18.7	12.7	12.1	18.1	6.0	3.8	1.0	1.0	1.0	4/8	90
D2	OUTWASH	25.3	21.8	12.8	11.8	10.8	1.3	19.7	29.2	9.5	3.5	9.0	1.0	1.0	10/20	20
D3	FILL	25.3	21.5	20.5	19.5	18.5	11.5	11.8	18.8	7.0	3.8	1.0	1.0	1.0	4/8	90
D4	OUTWASH	25.3	20.3	9.3	8.3	7.3	-1.7	23.1	32.1	9.0	5.0	11.0	1.0	1.0	10/20	20
D5	FILL	25.6	22.4	21.4	20.4	19.4	9.4	11.1	21.1	10.0	3.2	1.0	1.0	1.0	4/8	90
D6	OUTWASH	25.4	21.5	9.5	8.5	7.5	-2.5	23.0	33.0	10.0	3.9	12.0	1.0	1.0	10/20	20
D7	FILL	24.9	21.3	21.3	20.3	19.3	12.3	8.7	15.7	7.0	3.6	0.0	1.0	1.0	4/8	90
D8	OUTWASH	24.6	19.6	11.0	10.0	9.0	-3.0	19.1	31.1	12.0	5.0	8.6	1.0	1.0	10/20	20
D9	OUTWASH	24.6	22.6	11.6	10.6	9.6	-2.4	18.2	30.2	12.0	2.0	11.0	1.0	1.0	10/20	20
D10	FILL	24.7	21.1	21.1	20.1	19.1	14.1	8.8	13.8	5.0	3.6	0.0	1.0	1.0	4/8	90
MONITORING WELLS																
MW-41S	FILL	27.6	–	26.1	24.6	24.1	19.1	5.5	10.5	5.0	1.5	0.0	1.5	0.5	10/20	10
MW-41D	OUTWASH	26.5	–	25.0	12.2	10.7	0.7	18.8	28.8	10.0	1.5	0.0	12.8	1.5	10/20	10
MW-42S	FILL	26.6	–	25.6	24.1	23.1	18.1	3.8	8.8	5.0	1.0	0.0	1.5	1.0	10/20	10
MW-43S	FILL	28.5	–	26.8	23.0	21.5	16.5	7.8	12.8	5.0	1.7	0.0	3.8	1.5	10/20	10
MW-44S	FILL	30.2	–	28.3	24.8	23.4	13.4	7.4	17.4	10.0	1.9	0.0	3.5	1.4	10/20	10
MW-45S	FILL	29.3	–	27.8	25.8	24.0	14.0	6.8	16.8	10.0	1.5	0.0	2.0	1.8	10/20	10
MW-45D	OUTWASH	29.8	–	28.3	7.3	5.2	0.2	25.6	30.6	5.0	1.5	0.0	21.0	2.1	10/20	10
MW-46S	FILL	24.4	–	23.0	20.5	18.0	8.0	7.5	17.5	10.0	1.4	0.0	2.5	2.5	10/20	10
MW-46D	OUTWASH	24.4	–	23.4	2.9	0.9	-4.1	24.5	29.5	5.0	1.0	0.0	20.5	2.0	10/20	10
MW-47S	FILL	29.3	–	28.0	19.5	15.7	10.7	14.8	19.8	5.0	1.3	0.0	8.5	3.8	10/20	10
MW-48D	OUTWASH	26.2	–	24.7	5.7	4.7	-5.3	22.5	32.5	10.0	1.5	0.0	19.0	1.0	10/20	10
MW-49D	OUTWASH	25.6	–	22.2	3.7	2.1	-7.9	24.6	34.6	10.0	3.4	0.0	18.5	1.6	10/20	10
MW-50D	OUTWASH	24.5	–	23.0	-1.0	-4.1	-9.1	29.6	34.6	5.0	1.5	0.0	24.0	3.1	10/20	10
MW-51S	FILL	24.8	–	23.2	19.7	18.8	8.8	6.9	16.9	10.0	1.6	0.0	3.5	0.9	10/20	10
MW-52D	OUTWASH	24.8	–	20.8	-1.7	-4.0	-9.0	29.8	34.8	5.0	4.0	0.0	22.5	2.3	10/20	10

A. CONCRETE DIAMETER FOR A1 AND A2 IS 20 INCHES. CONCRETE DIAMETER FOR A3, A4, B1, B2 AND B7 IS 18 INCHES.
B. SLOT SIZES: 10 = 0.010-INCH OPENINGS. 20 = 0.020-INCH OPENINGS. 50 = 0.050-INCH OPENINGS. 90 = 0.090-INCH OPENING

NOTES:
1. REFER TO SHEETS 6.0 AND 7.0 FOR SURFACE COMPLETION IN BRICK AND PIP RUBBER. SURFACE COMPLETION IN ASPHALT AND GRASS TO MATCH EXISTING CONDITIONS PRIOR TO DRILLING. 12-INCH MONUMENT SKIRT LENGTH SHALL BE USED FOR MONITORING WELL COMPLETIONS.
2. WELL DETAILS BASED ON FIELD MEASUREMENTS.

NO.	DATE	BY	REVISION

GEOENGINEERS
600 STEWART ST : SUITE 1700 : SEATTLE, WA 98101 : 206-728-2674 : WWW.GEOENGINEERS.COM

GAS WORKS PARK SITE
PLAY AREA GROUNDWATER INFRASTRUCTURE INSTALLATION AS-BUILT
SEATTLE, WASHINGTON

WELL CONSTRUCTION SCHEMATIC DETAILS

DRAWN: CFS	PROJ NO: 0186-846-01
DESIGN: SMS	SHEET 2 OF 4
CHECKED: CLB	DATE: 09.21.2017

SHEET NO.
FIGURE 4

Plotted: 11/10/2021, 11:42 | cstickel P:\0\0186846\01\CAD\Task 1808 Play Area Action\Completion Report\0186846_F04_Well Construction Schematic Details.dwg

AS-BUILT INJECTION SYSTEM LAYOUT

A1 INJECTION WELL - FILL
B3 INJECTION WELL - OUTWASH
MW-46S MONITORING WELL - FILL
MW-46D MONITORING WELL - OUTWASH
TRENCHED INJECTION PIPE
SYSTEM VAULT
APPROXIMATE LOCATION OF CONTROLLED DENSITY FILL BACKFILL AREAS

N
0 6 12
SCALE IN FEET

NOTE:
INJECTION SYSTEM SURVEY INFORMATION PROVIDED BY TRUE NORTH LAND SURVEYING INC. AUGUST 14, 2017. VERTICAL DATUM IS NAVD88.

NO.	DATE	BY	REVISION

GeoEngineers
600 STEWART ST : SUITE 1700 : SEATTLE, WA 98101 : 206-728-2674 : WWW.GEOENGINEERS.COM

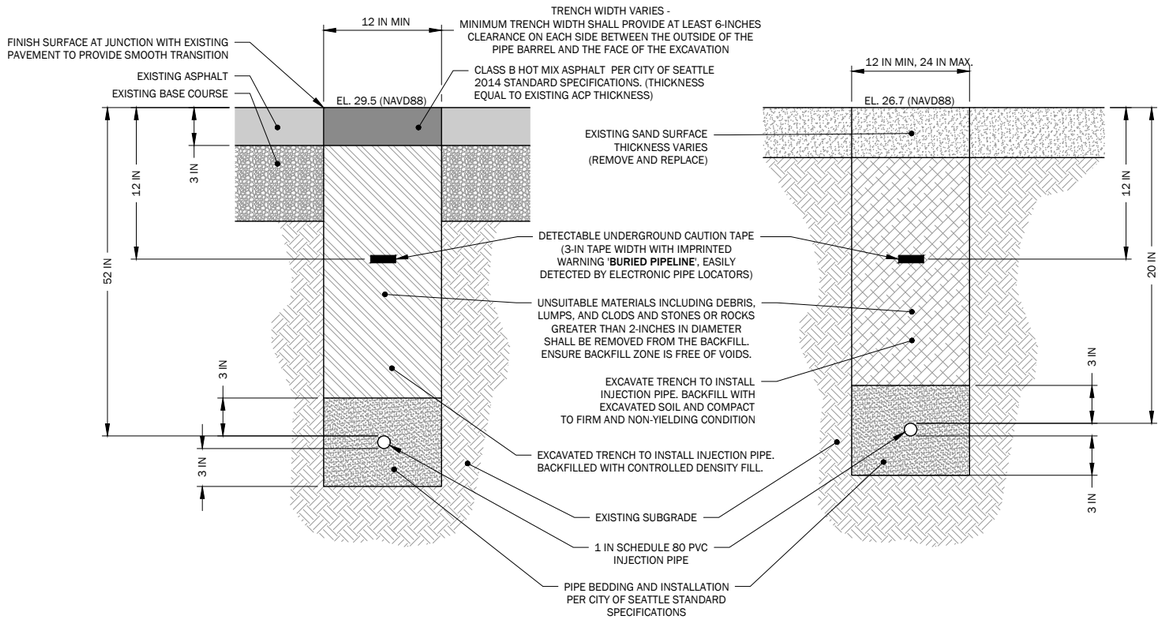
GAS WORKS PARK SITE
PLAY AREA GROUNDWATER INFRASTRUCTURE INSTALLATION AS-BUILT
SEATTLE, WASHINGTON

INJECTION SYSTEM ELEVATIONS

DRAWN: CFS	PROJ NO: 0186-846-01		
DESIGN: SMS	SHEET 3 OF 4		
CHECKED: CLB	DATE: 09.21.2017		

SHEET NO.
FIGURE 5

Plotted: 11/10/2021, 11:43 | csticket P:\0\0186846\01\CAD\Task 1808 Play Area Action\Completion Report\0186846_F05_Injection System Elevations.dwg

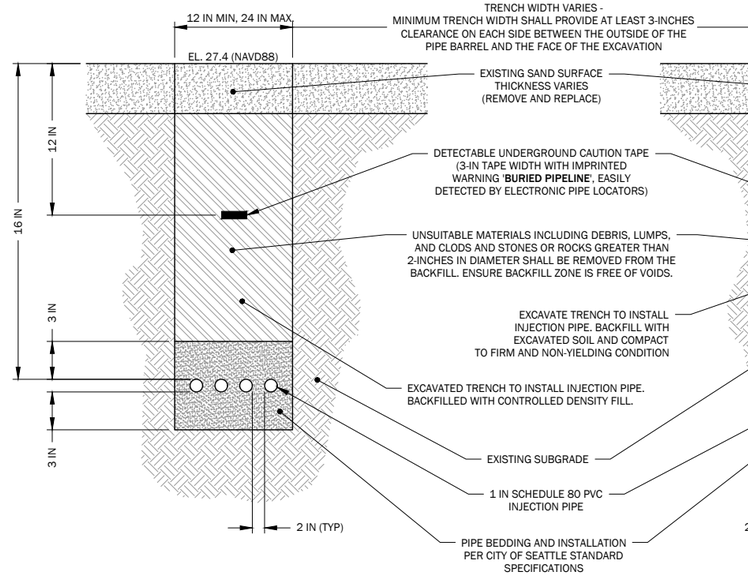


VIEW ALONG TRENCH ALIGNMENT - ASPHALT PATHWAY

CROSS-SECTION A-A' (A)
SCALE: NOT TO SCALE

VIEW ALONG TRENCH ALIGNMENT - PLAYGROUND

CROSS-SECTION B-B' (B)
SCALE: NOT TO SCALE



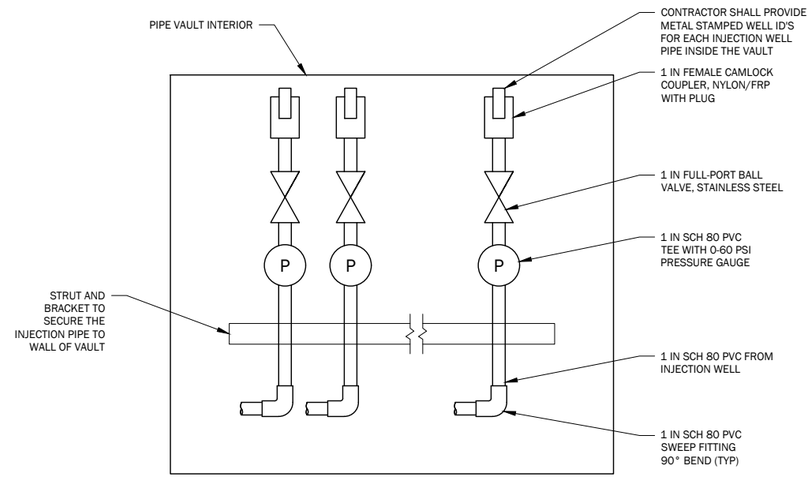
VIEW ALONG TRENCH ALIGNMENT - PLAYGROUND

CROSS-SECTION C-C' (C)
SCALE: NOT TO SCALE

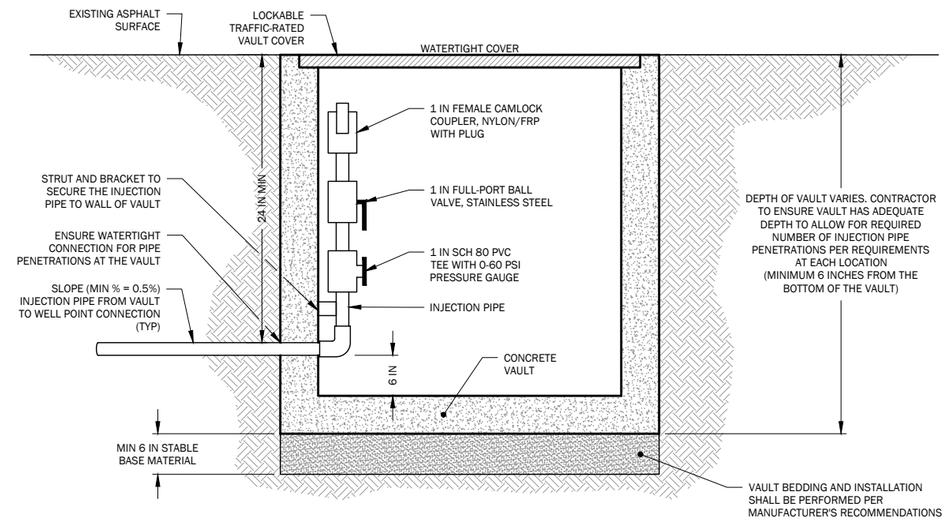
VIEW ALONG TRENCH ALIGNMENT - PLAYGROUND

CROSS-SECTION D-D' (D)
SCALE: NOT TO SCALE

INJECTION PIPING AND TRENCH DETAIL (-)
SCALE: NOT TO SCALE



VAULT PIPING DETAIL (1)
SCALE: NOT TO SCALE



WEST VAULT
CONTRACTOR INSTALLED OLDCASTLE PRECAST VAULT MODEL 444-LA AND WATER TIGHT LID

EAST VAULT
CONTRACTOR INSTALLED OLDCASTLE PRECAST VAULT MODEL 504-LA AND WATER TIGHT LID

INJECTION SYSTEM VAULT DETAIL (2)
SCALE: NOT TO SCALE

NO.	DATE	BY	REVISION

GeoEngineers
600 STEWART ST : SUITE 1700 : SEATTLE, WA 98101 : 206-728-2674 : WWW.GEOENGINEERS.COM

GAS WORKS PARK SITE
PLAY AREA GROUNDWATER INFRASTRUCTURE INSTALLATION AS-BUILT
SEATTLE, WASHINGTON

TRENCHING AND INJECTION SYSTEM DETAILS

DRAWN: CFS	PROJ NO: 0186-846-01
DESIGN: SMS	SHEET 4 OF 4
CHECKED: CLB	DATE: 09.21.2017

SHEET NO.
FIGURE 6

Plotted: 11/10/2021, 11:44 | cstickel P:\0\0186846\01\CAD\Task 1808 Play Area Action\Completion Report\0186846_F06_Trenching and Injection System Details.dwg

APPENDICES

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