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FINAL REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORK PLAN

GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DRIVE NORTHWEST
GIG HARBOR, WASHINGTON
FACILITY SITE IDENTIFICATION NO. 2566095
AGREED ORDER NO. DE 12803

Submitted by:
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Farallon PN: 1303-001

For:
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On Behalf of:
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August 30, 2016

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ACRONYMS AND ABBREVIATIONS

Agreed Order	Agreed Order DE No. 12803 for Gig Harbor Sportsman's Club, 9721 Burnham Drive Northwest, Gig Harbor, Washington; Facility Site No. 2566095; Cleanup Site No. 3115
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
CLARC	Cleanup Levels and Risk Calculations
COPC	constituent of potential concern
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
FS	Feasibility Study
GHSC	Gig Harbor Sportsman's Club
GHSC Property	Gig Harbor Sportsman's Club property at 9721 Burnham Drive Northwest in Gig Harbor, Washington
HASP	Health and Safety Plan
ITRC	Interstate Technology and Regulatory Council
mg/kg	milligrams per kilogram
µg/l	micrograms per liter
MTCA	Washington State Model Toxics Control Act Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code
North Creek Tributary	an intermittent stream with no official name that traverses the eastern portion of the Gig Harbor Sportsman's Club Property
PAHs	polycyclic aromatic hydrocarbons
RCW	Revised Code of Washington
rifle and pistol range	bermed firing range at the Gig Harbor Sportsman's Club Property for the use of pistols and rifles
RI	Remedial Investigation
RI/FS Work Plan	*Final Remedial Investigation/Feasibility Study Work Plan, Gig Harbor Sportsman's Club, 9721 Burnham Drive Northwest, Gig Harbor, Washington* dated August 30, 2016, prepared by Farallon Consulting, L.L.C. (this document)
shotgun range	shotgun firing range

SMS	Washington State Sediment Management Standards, Chapter 173-204 of the Washington Administrative Code
TPCHD	Tacoma-Pierce County Health Department
WAC	Washington Administrative Code

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Final Remedial Investigation/Feasibility Study Work Plan (RI/FS Work Plan) to provide the scope of work to complete an RI/FS for the Gig Harbor Sportsman's Club (GHSC) property at 9721 Burnham Drive Northwest in Gig Harbor, Washington (herein referred to as the GHSC Property) (Figure 1). Continuous operation of the GHSC Property as an active outdoor firing range since 1947 may have resulted in releases of hazardous substances, including metals from shot, bullets, and bullet jackets; and polycyclic aromatic hydrocarbons (PAHs) from clay targets, to the environment. The nature and extent of the releases of hazardous substances from operation of the GHSC have not been delineated.

GHSC has entered into Agreed Order No. DE 12803 (Agreed Order) with the Washington State Department of Ecology (Ecology). The scope of work described in the RI/FS Work Plan is in accordance with the schedule and requirements of the Agreed Order.

1.1 PURPOSE

The purpose of the RI/FS Work Plan is to present a scope of work to collect and evaluate sufficient information to characterize the nature and extent of hazardous substances on the GHSC Property and to evaluate technically feasible cleanup alternatives.

The results from the Remedial Investigation (RI) will be used to develop, evaluate, and select technically feasible cleanup alternatives in accordance with the Washington State Model Toxics Control Act Cleanup Regulation (MTCA), as set forth in Chapter 173-340 of the Washington Administrative Code (WAC 173-340) and the Washington State Sediment Management Standards (SMS), as set forth in WAC 173-204.

The RI/FS Work Plan provides an overview of current and historical conditions at the GHSC Property and adjacent properties, and presents the scope of work to complete an RI/FS.

1.2 ORGANIZATION

This RI/FS Work Plan has been organized into the following sections:

- **Section 2—Background**: This section provides a description of the environmental setting of the GHSC Property, historical operations of the GHSC, and a summary of previous environmental investigations and a previous lead reclamation event conducted at the GHSC Property.
- **Section 3—Preliminary Conceptual Site Model:** This section presents potential media of concern, constituents of potential concern (COPCs), and potential sources of COPCs. Identified data gaps that need to be eliminated to complete the RI also are presented in this section.

- **Section 4—Remedial Investigation Scope of Work:** This section describes the components of the RI approach, the field sampling program, interim reporting, and the RI Report that will be prepared as part of the scope of work.
- **Section 5—Feasibility Study Scope of Work:** This section presents the preliminary applicable or relevant and appropriate requirements (ARARs) related to the future cleanup action, and the preliminary screening levels. The scope of work and approach for the Feasibility Study (FS) and the planned content of the FS report also are discussed.
- **Section 6—Schedule:** This section describes the schedule for conducting the scope of work described in this RI/FS Work Plan, and additional future deliverables as defined in the Agreed Order.
- **Section 7—References:** This section lists the documents used in preparing this RI/FS Work Plan.
- **Section 8—Limitations:** This section provides Farallon's standard limitations.

2.0 BACKGROUND

This section describes the environmental setting and historical operations, and summarizes previous environmental investigations and lead-reclamation activities conducted at the GHSC Property.

2.1 DESCRIPTION AND ENVIRONMENTAL SETTING

The GHSC Property includes an outdoor open firing range, shooting berms, and an office building and a storage building constructed in 1950 (Pierce County Assessor-Treasurer's Office 2015). The GHSC Property comprises approximately 35 acres on Pierce County Parcel Nos. 0222313044 and 0222314016 (Figure 2). The GHSC Property is primarily wooded, with the exceptions of an open grass field that comprises the shotgun firing range (shotgun range), buildings, and a bermed firing range for use with pistols and rifles (rifle and pistol range) on the central and western portions of the GHSC Property. The use of the surrounding area is mixed commercial and residential.

The Site is underlain by Pleistocene-age glacial till consisting of a dense to very dense silty sand with gravel that is relatively impermeable to groundwater (Washington State Department of Natural Resources – Geological Survey 2014). Information obtained from Ecology – Water Resources (2014) indicated that the depth to groundwater in the vicinity of the GHSC Property is approximately 19 feet below ground surface (bgs).

An unnamed intermittent stream (herein referred to as the North Creek Tributary) traverses the eastern portion of the GHSC Property (Figure 2), entering from a recently constructed residential area east of the Site. Stormwater retention ponds for the recently constructed residential area have been installed proximate to the headwaters of the North Creek Tributary, which appear to receive overflow from the stormwater retention ponds. The North Creek Tributary discharges to North Creek, south of the GHSC Property and Burnham Drive Northwest (U.S. Geological Survey 2015).

North Creek is a perennial salmon-bearing stream that flows to Gig Harbor in Puget Sound (Ecology 2008). Historical sample names and investigation documents prepared by others referred to North Creek as "Donkey Creek," and to the North Creek Tributary as "North Creek" (Tacoma-Pierce County Health Department [TPCHD] 2009; Ecology 2008, 2011). These references reflect longstanding local usage, but do not correspond to references in topographic maps prepared by the United States Geological Survey, which uses the name "North Creek" to refer to the creek locally referred to "Donkey Creek." In this RI/FS Work Plan, the sample names used in the previous investigations have been retained, but the United States Geological Survey stream names are used in discussions of those samples.

Rainfall data from March 2012 through December 2014 obtained from the National Oceanic and Atmospheric Administration – National Climatic Data Center (2015) indicate that the average annual rainfall for Gig Harbor, Washington is 39.14 inches. Approximately 85 percent of the average annual rainfall occurs during the wet season between October and April. The North Creek

Tributary typically flows briefly when there is sufficient rainfall and is dry otherwise. The North Creek Tributary is more likely to have flowing water during the wet season.

Stormwater that falls on the southern portion of the rifle and pistol range enters a catch basin that discharges onto the unpaved surface of the western portion of the GHSC Property. The southern portion of the rifle and pistol range is primarily covered by a roof, so very little stormwater enters the catch basin. Stormwater that falls on the remainder of the rifle and pistol range flows to a small stormwater retention pond on the eastern portion of the rifle and pistol range. GHSC currently plans to reroute the discharge from the catch basin on the southern portion of the rifle and pistol range to the stormwater retention pond.

Stormwater that falls on the remainder of the GHSC Property infiltrates the ground surface or runs-off as sheet flow to the North Creek Tributary during major storm events.

2.2 GHSC OPERATIONS

The GHSC Property has operated as an outdoor firing range since 1947. Historical configurations and locations of shooting activities at the GHSC Property are not well documented. The current configurations of the shotgun and rifle and pistol ranges are shown on Figure 2.

Areas of potential deposition of metals and PAHs from clay target shooting and pistol shooting at the GHSC Property likely are similar to those described in an industry-wide study of firing ranges conducted by the Interstate Technology and Regulatory Council [ITRC] (2003). Lead, arsenic, copper, antimony, and zinc commonly are associated with lead shot, bullets, and bullet jackets; PAHs are the primary components of many commonly used clay targets (ITRC 2003).

2.2.1 Shotgun Range

The current configuration of the shotgun range includes seven traps that launch clay targets over an open field. Debris from broken and unbroken clay targets is aerially deposited on the ground surface primarily in a fan-shaped arc approximately 125 to 225 feet down-range (east) of each trap. These arcs of clay target debris overlap between the traps, resulting in areas where clay target debris is likely to be most concentrated. A lesser volume of clay target debris is likely to be present on the ground surface between each trap and its corresponding arc of clay target debris. Bullet jackets and lead shot are aerially deposited in these areas, although lead shot was found to be deposited primarily in the area farther east, beyond each arc of clay target debris. The North Creek Tributary extends through this zone and flows during the wet season and periods of heavy rain, potentially allowing lead shot to come into contact with surface water in the North Creek Tributary. A shot curtain was installed in summer 2014 to prevent additional lead shot from being deposited in the wooded area proximate to the North Creek Tributary.

The North Creek Tributary potentially could provide a pathway for contaminants previously deposited beyond the shot curtain to migrate in surface water and/or surface sediments off the GHSC Property.

2.2.2 Rifle and pistol Range

The rifle and pistol range has berms on the eastern, western, and northern sides that serve as backstops for bullets fired during target shooting by GHSC patrons (Figure 2). The berms are composed of soil excavated from the rifle and pistol range area, and concrete debris from an off-site construction project. Bullets from direct shooting and ricochets penetrate these berms. Bullets and bullet jackets from aerial deposition and misfires may be deposited on the ground surface of the rifle and pistol range.

2.3 PREVIOUS INVESTIGATIONS

Previous investigations have been conducted on portions of the GHSC Property, in the North Creek Tributary, and in North Creek to assess potential contamination in surface water and sediment (TPCHD 2009; Ecology 2008, 2011; Floyd|Snider 2014; TestAmerica 2014). Lead reclamation was completed by GHSC in 2011 to remove lead shot from shallow soil of the shotgun range and the wooded area beyond the shotgun range on the eastern portion of the GHSC Property.

2.3.1 Surface Water

Surface water samples were collected by TPCHD (2009) in May 2002 from the North Creek Tributary on the southeastern portion of the GHSC Property (TP-North-1), and on the northeastern portion of the GHSC Property proximate to the eastern property boundary (TP-North-2) (Figure 2). TPCHD (2009) collected a surface water sample from North Creek, upstream of the confluence of North Creek and the North Creek Tributary (TP-Donkey-1). The surface water samples were submitted for laboratory analysis for lead and copper.

Dissolved lead was detected at a concentration of 231 micrograms per liter (µg/l) in the surface water sample collected from the North Creek Tributary at TP-North-1. Dissolved lead was detected at a concentration of 19.5 µg/l in the surface water sample collected from the North Creek Tributary at TP-North-2. Dissolved lead was not detected at a concentration exceeding the laboratory practical quantitation limit in the surface water sample collected from North Creek at TP-Donkey-1 (Table 1).

Between April 2008 and March 2010, Ecology (2008, 2011) collected surface water samples from: the North Creek Tributary proximate to the eastern GHSC Property boundary (EC-NCreek-1), downstream of the southern GHSC Property boundary (EC-NCreek-2), and upstream of the confluence with North Creek (EC-NCreek-3); and in North Creek upstream (EC-Donkey-4) and downstream (EC-Donkey-5) of the confluence with the North Creek Tributary (Figure 2). The surface water samples were submitted for laboratory analysis for lead and copper.

Dissolved lead was detected at concentrations ranging from 0.82 to 0.997 µg/l, and dissolved copper was detected at concentrations ranging from 2.19 to 2.95 µg/l in surface water samples collected from sample location EC-NCreek-1. Dissolved lead was detected at concentrations ranging from 178 to 304 µg/l, and copper was detected at concentrations ranging from 1.96 to 2.52 µg/l in surface water samples collected from sample location EC-NCreek-2. Dissolved lead was

detected at concentrations ranging from 21.8 to 25.1 µg/l, and copper was detected at concentrations ranging from 0.81 to 1.02 µg/l in surface water samples collected from sample location EC-NCreek-3. Dissolved lead was detected at concentrations ranging from 0.08 to 0.09 µg/l, and copper was detected at concentrations ranging from 0.39 to 0.43 µg/l in surface water samples collected from sample location EC-Donkey-4. Dissolved lead was detected at concentrations ranging from 0.77 to 1.25 µg/l, and copper was detected at concentrations ranging from 0.33 to 0.35 µg/l in surface water samples collected from sample location EC-Donkey-5 (Table 1).

Floyd|Snider (2014) collected a surface water sample (FS-North Creek-W) in March 2014 from the North Creek Tributary proximate to the southern GHSC Property boundary. Dissolved lead was detected at a concentration of 0.13 µg/l in this surface water sample (Table 1). This surface water sample was analyzed only for lead.

2.3.2 Sediment

Floyd|Snider (2014) collected sediment samples FS-NCS-1 through FS-NCS-5 from the North Creek Tributary downstream of the GHSC Property between the southern GHSC Property boundary and Burnham Drive Northwest in March 2014 (Figure 2). Arsenic was detected at concentrations ranging from 4.2 to 17 milligrams per kilogram (mg/kg), and lead was detected at concentrations ranging from 220 to 500 mg/kg (Table 2).

Farallon collected surface sediment samples SD1 and SD2 in the downstream portions of the North Creek Tributary on the GHSC Property north of and proximate to the 97th Street Northwest bridge in July 2014. These samples were analyzed for copper, lead, and PAHs to assess potential impacts from lead shot and clay targets. Copper was detected at concentrations ranging from 3.1 to 3.3 mg/kg, and lead was detected at concentrations ranging from 73 to 420 mg/kg (Table 2). PAHs were not detected at the laboratory practical quantitation limit in surface sediment samples SD1 and SD2 (Table 3).

2.3.3 Lead Reclamation

GHSC completed lead reclamation in 2011 to remove lead shot from the ground surface of the shotgun range and the wooded area east of the shotgun range. This reclamation activity is not well documented, although GHSC (2011) indicated in a letter to the City of Gig Harbor that approximately 200,000 pounds of lead shot were removed from the GHSC Property. No analytical results were provided.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

The following section presents a preliminary conceptual site model for the Site. Additional data must be collected through the RI before a complete conceptual site model can be provided. Data obtained through completion of the RI will be evaluated, and a refined conceptual site model will be presented in the RI Report that will be prepared to summarize the results from the RI and satisfy the requirements of the Agreed Order.

3.1 POTENTIAL MEDIA OF CONCERN, EXPOSURE PATHWAYS, AND RECEPTORS

Results from previous investigations and a review of GHSC operations indicate that the potential media of concern for the RI/FS include:

- Surface water;
- Soil;
- Surface sediment; and
- Groundwater.

The area of the GHSC Property is underlain by low-permeability glacial till (Washington State Department of Natural Resources – Geological Survey 2014). Depth to groundwater in the vicinity of the GHSC Property is approximately 19 feet bgs (Ecology – Water Resources 2014). Lead in shot and bullets may be soluble in acidic or alkaline pH ranges and relatively insoluble at surface conditions (ITRC 2013). The PAHs associated with clay targets are relatively insoluble at surface conditions.

Aerial deposition is the source of COPCs on the ground surface of the GHSC Property. GHSC patrons using and maintaining the GHSC Property may be exposed to COPCs through the soil direct contact pathway. These COPCs may become mobilized by stormwater runoff during major rainfall events. These COPCs may be transported to the North Creek Tributary if sufficient surface stormwater flow occurs. The North Creek Tributary flows into North Creek downstream of the GHSC Property.

Farallon will conduct a Terrestrial Ecological Evaluation to assess potential exposure pathways following completion of field work for the RI and evaluation of the resulting analytical data.

Based on the impermeability of underlying soil, depth to groundwater, relative insolubility of metals from lead shot and bullets, relative insolubility of PAHs from clay targets, and surface deposition as the primary method of emplacement, there does not appear to be a pathway for metals or PAHs to groundwater. However, Ecology (2015) requested that groundwater be evaluated during the RI to assess whether COPCs have affected groundwater at the GHSC Property through the soil leeching pathway.

3.2 CONSTITUENTS OF POTENTIAL CONCERN

Lead, arsenic, copper, antimony, and zinc are the primary components of lead shot, bullets, and/or bullet jackets (ITRC 2003), and therefore are COPCs for the RI.

PAHs are primary components of many commonly used clay targets (ITRC 2003), and therefore are COPCs for the RI.

3.3 POTENTIAL SOURCES

The source of COPCs at the GHSC Property is lead shot and clay targets from current and historical operation of the shotgun range, and bullets and bullet jackets from current and historical operation of the rifle and pistol range. A detailed description of potential impacted areas at the GHSC Property is provided in Section 2.2, GHSC Operations.

The GHSC Property is located within the Asarco Smelter Plume area (Ecology 2014a). The Asarco Smelter aerially deposited lead and arsenic at hazardous levels across a wide area of the Puget Sound Region, including Gig Harbor, Washington (Ecology 2014b), and may be a potential contributing source of lead and arsenic to soil and sediment in the area of the GHSC Property.

3.4 DATA GAPS

The following data gaps, which will need to be eliminated to complete the RI/FS, have been identified:

- The nature and extent of lead, arsenic, copper, zinc, antimony, and PAHs in surface water in North Creek and the North Creek Tributary have not been defined;
- The nature and extent of lead, arsenic, copper, zinc, antimony, and PAHs in soil have not been defined;
- The nature and extent of lead, arsenic, copper, zinc, antimony, and PAHs in groundwater have not been assessed or defined; and
- The nature and extent of lead, arsenic, copper, zinc, antimony, and PAHs in surface sediment in North Creek and the North Creek Tributary have not been defined.

4.0 REMEDIAL INVESTIGATION SCOPE OF WORK

This section provides the approach and scope of work for the RI. The scope of work is designed to collect sufficient information to address the data gaps presented in Section 2.4, Data Gaps, and to support evaluation and selection of technically feasible cleanup alternatives.

4.1 REMEDIAL INVESTIGATION APPROACH

Farallon relied on data collected by TPCHD (2009), Ecology (2008, 2011), and Floyd|Snider (2014) between 2002 and 2014, and data collected by Farallon in 2014 to develop a scope of work for the RI field sampling program. The RI field sampling and analysis program will collect sufficient information to develop a conceptual site model for use in evaluating and selecting technically feasible cleanup alternatives.

The objectives for the RI field program are to assess the nature and extent of COPCs in the media of potential concern resulting from the current and historical operation of the GHSC. Specific objectives include assessing the nature and extent of COPCs in the following media:

- Surface water in the North Creek Tributary and North Creek and in the discharge from the catch basin in the rifle and pistol range;
- Soil on and near the GHSC Property;
- Surface sediment in the North Creek Tributary and North Creek and, if present, in the discharge area for the catch basin in the rifle and pistol range; and
- Groundwater at the GHSC Property, and assessing groundwater flow direction.

The RI field program includes collecting and analyzing surface water, soil, surface sediment, and groundwater samples to fill data gaps and obtain sufficient information to develop, evaluate, and select technically feasible cleanup alternatives. Additional phases of RI work may be implemented if analytical results indicate that the requirements set forth in WAC 173-340-350 have not been met, and/or the nature and extent of COPCs in surface water, soil, surface sediment, and groundwater have not been adequately characterized.

A description of the individual elements of the scope of work for the RI field program is provided below.

4.2 REMEDIAL INVESTIGATION FIELD PROGRAM

The scope of work for the RI field program has been developed in accordance with WAC 173-340-350 and is discussed in the following sections.

4.2.1 Health and Safety

In accordance with WAC 173-340-810, a Health and Safety Plan (HASP) is required for all field activities due to the potential for exposure to hazardous substances. The HASP will comply with the requirements of the Occupational Safety and Health Act of 1970 and the Washington Industrial Safety and Health Act, Chapter 49.17 of the Revised Code of Washington (RCW 49.17). A draft of the HASP prepared for the GHSC Property is provided in Appendix A. Ecology approval of the HASP is not required.

4.2.2 Sample Locations

Surface water and surface sediment samples will be collected from the North Creek Tributary and from North Creek on and in the vicinity of the GHSC Property (Figure 3). The sample locations were chosen based on their proximity to potential sources of contamination and accessibility of the streams across the vicinity of the GHSC Property. These locations will provide data regarding the nature and extent of contamination in the following areas:

- In surface water and surface sediment at the discharge location for the catch basin in the rifle and pistol range on the western portion of the GHSC Property;
- In surface water and surface sediments where the North Creek Tributary enters the GHSC Property proximate to the eastern property boundary;
- In locations across the eastern portion of the GHSC Property where the North Creek Tributary may encounter sources of COPCs;
- At locations in the North Creek Tributary downstream of the GHSC Property;
- At a location in North Creek upstream of its confluence with the North Creek Tributary; and
- At a location in North Creek downstream of its confluence with the North Creek Tributary.

Soil samples will be collected from 42 borings advanced across the GHSC Property and on east-adjacent properties (Figure 3). The soil sample locations were chosen to characterize the nature and extent of contamination in the following areas:

- Within the shotgun range;
- In the wooded area on the eastern portion of the GHSC Property, beyond the shotgun range;
- Within the rifle and pistol range; and
- On adjacent properties proximate to the eastern boundary of the GHSC Property that could be affected by historical shooting

Additional borings will be advanced in the wooded areas on the northern and southern portions of the GHSC Property to obtain background metals concentrations to assess possible influences from the Asarco Smelter Plume (Ecology 2014a). The Asarco Smelter aerially deposited lead and arsenic at hazardous levels across a wide area of the Puget Sound Region, including Gig Harbor,

Washington (Ecology 2014b), and may be a potential contributing source of lead and arsenic to soil and sediment in the area of the GHSC Property.

Groundwater samples will be collected from each of the four monitoring wells that will be installed in the shotgun range and in the wooded area on the eastern portion of the GHSC Property (Figure 3).

4.2.3 Borings and Monitoring Well Installation

Farallon will advance 42 borings across the GHSC Property and on east-adjacent properties (Figure 3). Thirty-eight of these borings will be advanced to a total depth of approximately 5 feet bgs using a direct-push drill rig, hand-auger, or other appropriate hand-held tool, depending on the accessibility of the boring locations. Soil samples will be collected from the borings at multiple depths, as described in the Sampling and Analysis Plan (SAP) for the RI (Appendix B of this RI/FS Work Plan).

The four monitoring wells will be installed using a track-mounted hollow-stem-auger drill rig at four select boring locations to characterize the groundwater-bearing zone at the Site (Figure 3). The preliminary locations are one in the southern portion of the shotgun range, and three in the wooded area east of the shotgun range. If evidence of contamination such as odor, debris related to current and/or historical operations of the GHSC, photoionization detector measurements, or staining is noted, additional soil samples will be collected in the boreholes for the monitoring wells at depths below 5 feet bgs. The monitoring wells will be constructed using 2-inch-diameter Schedule 40 polyvinyl chloride casing with a 10-foot section of 0.010-inch slotted screen to a depth of approximately 25 feet bgs. The monitoring wells will be completed with flush-mounted steel monuments, and developed immediately following installation. A Washington State-licensed surveyor will survey the locations and elevations of each new monitoring well following installation.

4.2.4 Sampling and Analysis Plan

Several sample locations have been proposed to assess the potential media of concern and COPCs at the GHSC Property and surrounding area, to characterize the nature and extent of contamination beyond the active operating area of the GHSC resulting from current and historical operations. The proposed sample locations are shown on Figure 3. A detailed discussion of sampling standards and procedures is provided in the SAP (Appendix B). The SAP provides details pertaining to surface water, soil, surface sediment, and groundwater sampling and analysis for the RI.

4.2.5 Quality Assurance Project Plan

The Quality Assurance Project Plan identifies the quality assurance/quality control protocols to be implemented in association with completion of the scope of work presented in this RI/FS Work Plan and the SAP for the GHSC Property to ensure that data quality objectives for the RI are met. The Quality Assurance Project Plan is provided in Appendix C.

4.2.6 Waste Disposal

Soil cuttings, excess sediment, groundwater, and decontamination water generated during the RI field program will be temporarily contained in 55-gallon U.S. Department of Transportation-approved steel drums with locking lids pending receipt of laboratory analytical results. Drum storage will be coordinated with the property owner. Analytical results from the RI field program activities will be used to profile the waste and identify appropriate disposal options.

4.3 INTERIM REPORTING

The following interim reporting will be conducted in accordance with the schedule and requirements put forth in the Agreed Order:

- Farallon will submit validated laboratory and field data and field-screening results to the Ecology Project Manager within 15 days of receipt of the laboratory data or collection of the field-screening results.
- GHSC will submit a technical memorandum to Ecology with a summary of field activities, updated figures, and updated analytical tables comparing new and historical analytical data to the preliminary screening levels. The technical memorandum will be submitted to Ecology within 45 days of receipt of the final laboratory analytical data from the RI.
- Analytical data will be uploaded to Ecology's Environmental Information Management database within 30 days of completion of data validation.

4.4 REMEDIAL INVESTIGATION REPORT

Following completion of the RI field program and receipt and review of laboratory analytical reports, the data will be evaluated to support the development and evaluation of technically feasible cleanup alternatives in accordance with WAC 173-340-360 through 173-340-390. If data gaps remain, Farallon will develop an addendum to this RI/FS Work Plan to address remaining data gaps for completion of the RI. The RI Report will include:

- A brief narrative of the scope of work and procedures employed for the RI.
- A summary of existing data and the phases of field investigation conducted to characterize the GHSC Property, defined per MTCA as the areas where hazardous substances have come to be located.
- Background information, including a description of the GHSC Property and adjacent properties, surrounding land use and zoning, and geology and hydrogeology.
- An updated conceptual site model, with a discussion of the sources and nature and extent of contamination, contaminants of concern (COCs), affected media, and the fate and transport of COCs; cleanup standards, including screening levels, cleanup levels, and points of compliance; a Terrestrial Ecological Evaluation; and the preliminary exposure assessment.

- Tables summarizing surface water, soil, surface sediment, and groundwater analytical results.
- Figures depicting the extent of COCs in surface water, soil, surface sediment, and groundwater, including the depth, areal extent, and isoconcentration contours of COCs; and/or cross-sections depicting stratigraphy and COPC concentrations.
- A summary of the RI results, and conclusions regarding fulfilling the requirements for an RI under WAC 173-340-350 and 173-204-550.

5.0 FEASIBILITY STUDY SCOPE OF WORK

This section provides the approach and scope of work for the FS. Farallon will evaluate potential cleanup technologies for the GHSC Property based on the results from the RI, potential impacts to human health and the environment, and site-specific conditions that may affect the effectiveness of the cleanup technologies evaluated.

5.1 PRELIMINARY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The primary ARARs and guidance documents related to the future cleanup action include:

- MTCA Statute, RCW 70.105D;
- MTCA Regulation, WAC 173-340;
- Sediment Management Standards, WAC 173-204;
- Water Quality Standards for Surface Waters of the State of Washington, WAC 173-201A;
- Surface Water Quality Criteria from the National Toxics Rule and Clean Water Act, as summarized in the MTCA Cleanup Regulation Cleanup Levels and Risk Calculations (CLARC) Master Table (Ecology 2016); and
- Ecology (1994) Publication No. 94-115, Natural Background Soil Metals Concentrations in Washington State.

These primary ARARs are applicable to the RI, because they provide the framework for the future cleanup action, including applicable and relevant regulatory guidelines, cleanup standards, references for additional ARARs, and standards for documentation of the cleanup action.

Other applicable ARARs and guidance documents related to the cleanup action for the GHSC Property include:

- Washington Industrial Safety and Health Act, RCW 49.17;
- Occupational Safety and Health Act, Part 1910 of Title 29 of the Code of Federal Regulations;
- Hazardous Waste Operations, WAC 296-843; and
- Accreditation of Environmental Laboratories, WAC 173-50.

Additional ARARs and other information identified during implementation of the RI to be considered will be included in the investigation. Final ARARs will be defined in the RI Report.

5.2 SCREENING LEVELS

Based on the ARARs and COPCs applicable to the GHSC Property, the following preliminary screening levels will be used in the RI to evaluate whether a COPC represents a potential risk to human health or the environment. Preliminary cleanup levels will be defined in the RI based on a pathway analysis. The screening levels for surface water, soil and surface sediment, and groundwater are summarized in Tables 4, 5, and 6, respectively.

5.2.1 Surface Water

Preliminary screening levels for surface water include:

- Site-specific values for lead, copper, and zinc calculated using hardness values for surface water samples collected during the RI, applying the formulas in Table 240(3), Section 250 of the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A), as amended on August 1, 2016;
- Standard water quality criteria from Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A), as amended on August 1, 2016; and
- Surface Water Quality Criteria from the National Toxics Rule and the Clean Water Act, as summarized in the MTCA CLARC Master Table (Ecology 2016).

The screening levels from the Water Quality Standards for Surface Waters of the State of Washington, the National Toxics Rule, and the Clean Water Act are provided in Table 4. MTCA Method B and Method C screening levels were not included in the list of potential screening levels for surface water because the water quality criteria summarized in Table 4 are more conservative, and more likely to be representative of Site conditions. The Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A) were amended on August 1, 2016 and submitted to the U.S. Environmental Protection Agency for approval. The water quality criteria from this amended regulation are subject to change pending approval.

5.2.2 Soil

Standard MTCA Method A and Method B cleanup levels for unrestricted land use will be used as preliminary screening levels to evaluate concentrations of COPCs in soil (Table 5). MTCA Method A or Method B cleanup levels include:

- Lead—250 mg/kg;
- Arsenic—20 mg/kg;
- Copper—3,200 mg/kg;
- Zinc—24,000 mg/kg;
- Antimony—32 mg/kg; and
- PAHs—0.1 mg/kg, expressed using the toxicity equivalency method presented in WAC 173-340-708(8).

5.2.3 Freshwater Surface Sediment

For intermittent streams such as the North Creek Tributary, the Sediment Management Standards Freshwater Sediment Cleanup Objectives and Screening Levels (WAC 173-204-563, Table VI), and the MTCA soil cleanup levels presented in Section 5.2.2, Soil, are applicable. For freshwater streams that flow year-round, only the Sediment Management Standards apply. The preliminary screening levels for surface sediment are summarized in Table 5.

5.2.4 Groundwater

Standard MTCA Method A and Method B cleanup levels for groundwater will be used as preliminary screening levels to evaluate concentrations of COPCs in groundwater (Table 6). The MTCA Method A or Method B cleanup levels include:

- Lead—15 µg/l;
- Arsenic—5 µg/l;
- Copper—320 µg/l;
- Zinc—4,800 µg/l;
- Antimony—6.4 µg/l; and
- PAHs—0.1 mg/kg, expressed using the toxicity equivalency method presented in WAC 173-340-708(8).

5.3 EVALUATION OF POTENTIAL DATA NEEDS

Very little data have been collected at the GHSC Property and surrounding area in recent years. The purpose of the RI field program is to collect data to eliminate the data gaps discussed in Section 2.4, Data Gaps, and to provide sufficient information regarding the nature and extent of contamination, COCs, and contaminated media to support the evaluation and selection of a feasible cleanup alternative.

5.4 EVALUATION AND SELECTION OF CLEANUP ACTION

The purpose of the FS is to develop and evaluate cleanup alternatives and eliminate those that are not technically feasible, those whose costs are clearly disproportionate under WAC 173-340-360(3)(e), and those that would substantially impair the function of the GHSC. Bench- and pilot-scale testing may be used to test and support the recommendation of a final cleanup action for the GHSC Property in conformance with WAC 173-340-360 through 173-340-390 and WAC 173-204-560 through 173-204-564.

A cleanup alternative must satisfy the following threshold criteria, as specified in WAC 173-340-360(2)(a) and 173-204-570(3):

- Protection of human health and the environment;

- Compliance with cleanup standards;
- Compliance with applicable state and federal laws; and
- Provision for compliance monitoring.

In addition to meeting the threshold criteria, cleanup actions under MTCA also must meet the following requirements specified in WAC 173-340-360 and 173-204-570(3):

- Provide for a reasonable restoration time frame based on the factors provided in WAC 173-340-360(4)(b) and 173-204-570(5);
- Use permanent solutions to the maximum extent practicable based on the criteria defined in WAC 173-340-360(3)(f) and 173-204-570(4); and
- Consider public concerns raised during public comment on the Cleanup Action Plan (WAC 173-340-600) and WAC 173-204-570(3)(i).

Farallon will conduct the FS upon completion of the RI field program and evaluation of the results.

5.5 FEASIBILITY STUDY REPORT

The evaluation process and results from the FS will be summarized in an FS report in accordance with the Agreed Order. The FS report will include:

- A brief narrative of the scope of work and procedures employed for the FS;
- Descriptions of the cleanup alternatives that were developed and evaluated for the GHSC Property;
- A description of the process used to evaluate the cleanup alternatives considered;
- A discussion of any bench- or pilot-scale studies that were performed as a part of the evaluation process; and
- A description of the chosen cleanup alternative, the reasoning behind the choice of cleanup technology, anticipated results from the cleanup action, and the anticipated restoration time frame.

6.0 SCHEDULE

The scope of work discussed in this RI/FS Work Plan will be conducted in accordance with the scheduled agreed upon by GHSC and Ecology in Section VII of the Agreed Order. The schedule described in the Agreed Order includes the following elements, presented in working days:

DELIVERABLE	SCHEDULE
Draft RI/FS Work Plan	60 days from effective date of Agreed Order
Final RI/FS Work Plan	30 days from receiving Ecology comments on Draft RI/FS Work Plan
Begin RI Field Work	30 days from Ecology approval of Final RI Work Plan
Submit Laboratory Results	15 days from receipt of validated laboratory data
Submit Field-Screening Results	15 days from conducting field-screening
RI Data Memorandum and Data Spreadsheets	45 days from receipt of validated laboratory data
Electronic Data Submittal to Environmental Information Management database	30 days from completion of data validation
Initial Draft RI Report	90 days from completion of field work
Final Draft RI Report	60 days from receiving Ecology comments on Initial Draft RI Report
Initial Draft FS Report	90 days from Ecology approval of Final Draft RI Report
Final Draft FS Report	30 days from receiving Ecology comments on Initial Draft FS Report
Initial Draft Corrective Action Plan	60 days from Ecology approval of Final Draft FS Report
Revised Draft Corrective Action Plan	30 days from receiving Ecology comments on Initial Draft Corrective Action Plan

7.0 REFERENCES

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8.0 LIMITATIONS

8.1 GENERAL LIMITATIONS

The conclusions contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- **Accuracy of Information.** Farallon obtained, reviewed, and evaluated certain information used in this report/assessment from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy or authenticity. Should the information upon which Farallon relied prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.
- **Reconnaissance and/or Characterization.** Farallon performed a reconnaissance and/or characterization of the GHSC Property that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions. Contamination may exist in other areas of the GHSC Property that were not investigated or were inaccessible. Activities at the GHSC Property beyond Farallon's control could change at any time after the completion of this report/assessment.

For the foregoing reasons, Farallon cannot and does not warrant or guarantee that the GHSC Property is free of hazardous or potentially hazardous substances or conditions, or that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions can be considered valid only as of the date of the report hereof.

This report/assessment has been prepared in accordance with the contract for services between Farallon and the Gig Harbor Sportsman's Club, and currently accepted industry standards. No other warranties, representations, or certifications are made.

8.2 LIMITATION ON RELIANCE BY THIRD PARTIES

Reliance by third parties is prohibited. This report/assessment has been prepared for the exclusive use of the Gig Harbor Sportsman's Club to address the unique needs of the Gig Harbor Sportsman's Club at the GHSC Property at a specific point in time. Services have been provided to the Gig Harbor Sportsman's Club in accordance with a contract for services between Farallon and the Gig Harbor Sportsman's Club, and generally accepted environmental practices for the subject matter at the time this report was prepared.

No other party may rely on this report unless Farallon agrees in advance to such reliance in writing. Any use, interpretation, or reliance upon this report/assessment by anyone other than the

Gig Harbor Sportsman's Club is at the sole risk of that party, and Farallon will have no liability for such unauthorized use, interpretation, or reliance.

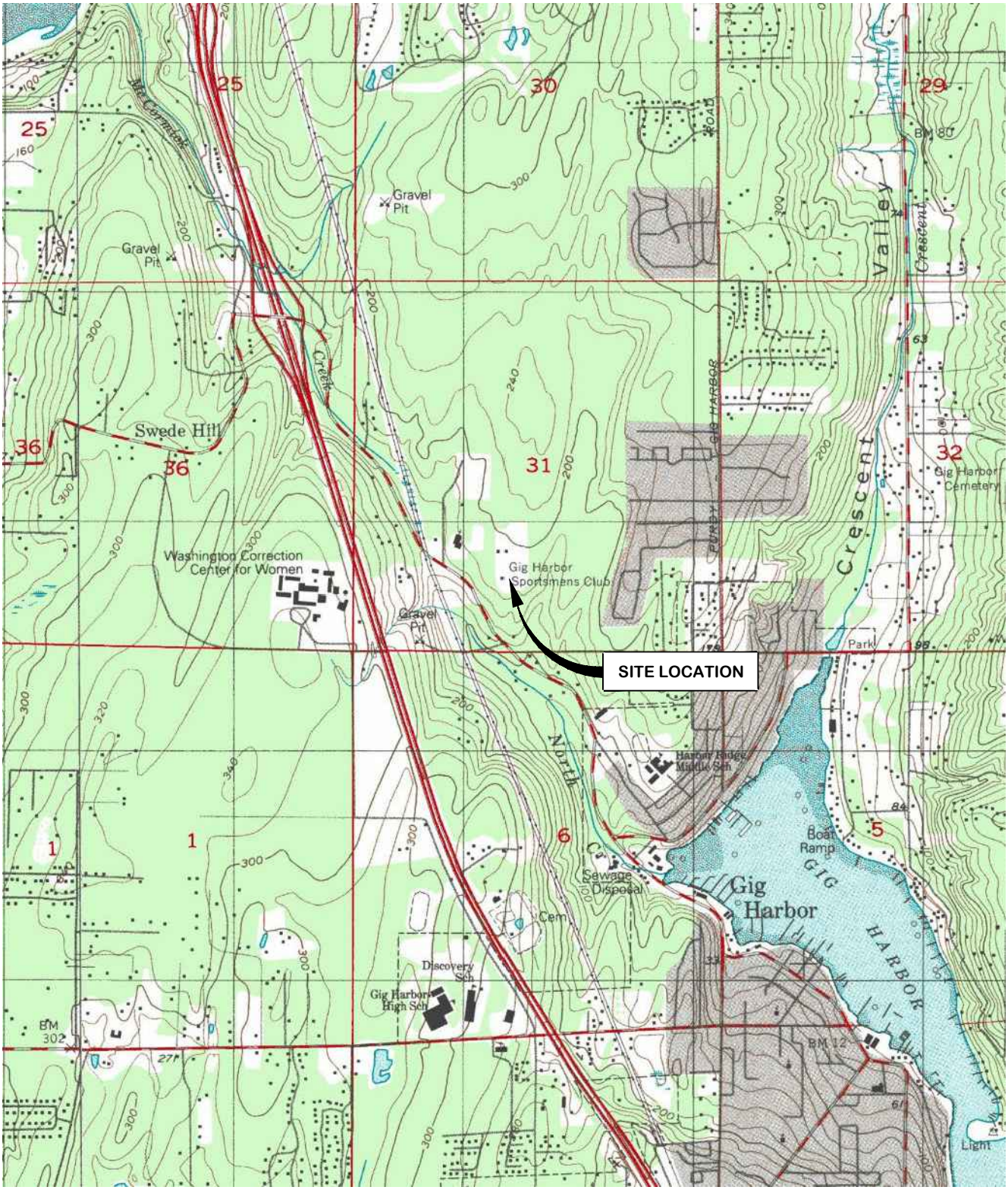
Do not rely on this report/assessment if:

- It was not prepared for you;
- It was not prepared for your project;
- It was not prepared for your specific property; or
- It was not prepared under an approved scope of work for which you are under contract with Farallon.

FIGURES

FINAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY WORK PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE GIG HARBOR, WASHINGTON. DATED 1996

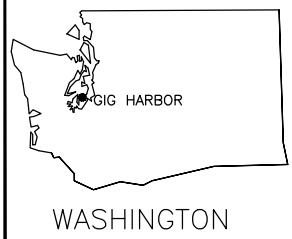


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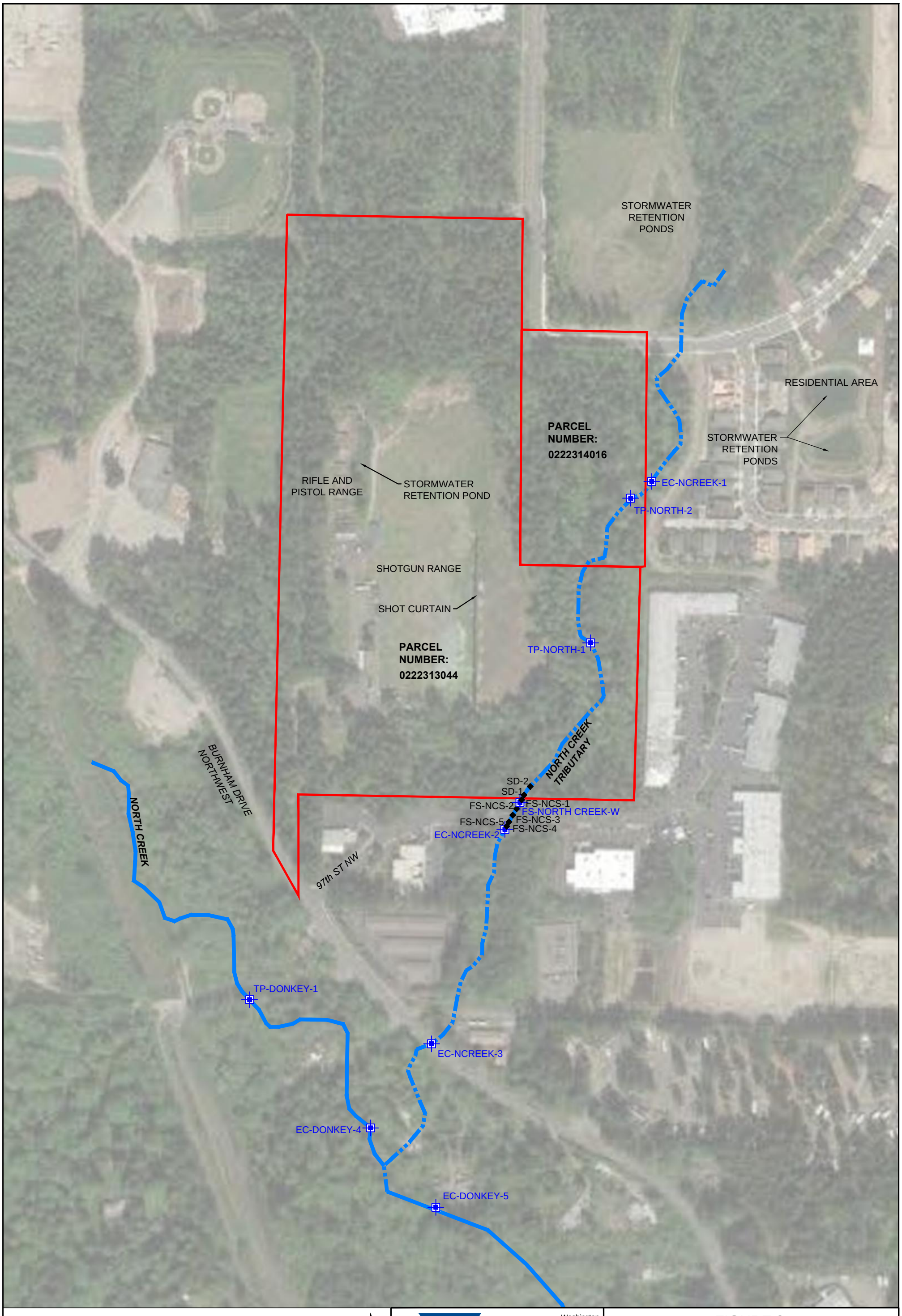
FIGURE 1

SITE VICINITY MAP
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DEW Checked By: JM Date: 11/12/2015 Disk Reference: 1303-001



LEGEND

- SURFACE WATER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION
- PARCEL BOUNDARY

0 250

SCALE IN FEET

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FIGURE 2

SITE PLAN SHOWING HISTORICAL
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DJR Checked By: JM Date: 1/18/2016 Disk Reference: 1303-001_b.dwg

4002470041
0222312013
4002470030
STORMWATER RETENTION PONDS
4002470080
4003100790
4003100840
4003100780
4003100770
4003100760
4003100850
4003100750
4003100740
4003100730
4003100690
4003100700
4003100710
0222313023
4003100430
4003100420
4003100440
4003100870
4003100410
4003100450
4003100400
4003100460
STORMWATER RETENTION PONDS
0222313069
STORMWATER RETENTION POND
PARCEL NUMBER: 0222314016
4003100390
4003100470
4003100380
4003100480
4003100830
4003100490
SOCCER FIELD
0222313070
RIFLE AND PISTOL RANGE
4003100360
4003100330
4003100510
4003100530
4003100340
4003100880
COMMUNITY THEATER
0222313012
SHOTGUN RANGE
4003100320
4003100280
4003100820
SHOT CURTAIN
4001020141
4001020121
0222313024
PARCEL NUMBER: 0222313044
BUSINESS PARK
4001020200
BURNHAM DRIVE NORTHWEST
4348100430
0222313020
4001020161
4001020101
NORTH CREEK TRIBUTARY
4001020190
0222313072
4001020010
BUSINESS PARK
4001020052
COMMERCIAL PROPERTIES
4348100150
NORTH CREEK
0222313027
4001020061
0222313052
4001020020
4001020031
4348100140
97th ST NW
COMMERCIAL PROPERTIES
0222313018
0222313063
STORAGE UNITS
ELECTRICAL SUBSTATION
0222313016
0222313050
0222314036
0222314037
0222313053
0222313049
0222313066
RESIDENTIAL
0222062006
STORAGE UNITS
0221062070
0221062064
0221061094
0221061093
0221062010
0221066010
RESIDENTIAL
0221066009
0221065014
0221061050
0221062059
0221062063
0221065013
0221061028

LEGEND

- PARCEL BOUNDARY
- CREEK
- INTERMITTENT CREEK
- PROPOSED LOCATION OF SOIL/SEDIMENT AND SURFACE WATER SAMPLES
- PROPOSED BORING LOCATIONS
- PROPOSED BACKGROUND BORING LOCATIONS
- PROPOSED MONITORING WELL LOCATIONS

ALL LOCATIONS ARE APPROXIMATE

0 250
SCALE IN FEET

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FIGURE 3

SITE PLAN SHOWING
PROPOSED SAMPLE LOCATIONS
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DJR | Checked By: JM | Date: 8/12/2016 | Disk Reference: 1303-001_c.dwg

TABLES

FINAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY WORK PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

Table 1
Surface Water Analytical Results for Metals
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Sample Location	Sample Identification	Sampled By	Sample Date	Analytical Results		
				micrograms per liter		milligrams per liter
				Lead (Dissolved)	Copper (Dissolved)	Hardness
North Creek Tributary Samples						
TP-NORTH-1[1,4]	NORTH CREEK 1	TPCHD	05/09/02	231	NA	13
TP-NORTH-2[1,4]	NORTH CREEK 2	TPCHD	05/09/02	19.5	NA	14
EC-NCREEK-1[2,3]	NCREEK 1	Ecology	04/10/08	0.82	2.19	12.5
EC-NCREEK-1[2,3]	NCREEK 1	Ecology	04/21/08	0.82	2.41	13
EC-NCREEK-1[2,3]	NCREEK 1	Ecology	12/22/09	0.997	2.95	15.9
EC-NCREEK-1[2,3]	NCREEK 1	Ecology	03/04/10	0.825	2.43	13.1
EC-NCREEK-2[2,3]	NCREEK 2	Ecology	04/10/08	200	1.96	11.1
EC-NCREEK-2[2,3]	NCREEK 2	Ecology	04/21/08	178	2.08	10
EC-NCREEK-2[2,3]	NCREEK 2	Ecology	12/22/09	304	2.52	14.9
EC-NCREEK-2[2,3]	NCREEK 2	Ecology	03/04/10	236	2.11	11.3
EC-NCREEK-3[2,3]	NCREEK 3	Ecology	04/10/08	21.8	0.81	39.9
EC-NCREEK-3[2,3]	NCREEK 3	Ecology	04/21/08	25.1	1.02	26
FS-North Creek-W[1]	North Creek/W	Floyd|Snider	03/19/14	0.13	NA	NA
North Creek Samples						
TP-DONKEY-1[1,4]	DONKEY CREEK	TPCHD	05/09/02	<0.5	NA	51
EC-DONKEY-4[2,3]	DONKEY 4	Ecology	04/10/08	0.09	0.43	51
EC-DONKEY-4[2,3]	DONKEY 4	Ecology	04/21/08	0.08	0.39	55.5
EC-DONKEY-5[2,3]	DONKEY 5	Ecology	04/10/08	1.25	0.35	53.3
EC-DONKEY-5[2,3]	DONKEY 5	Ecology	04/21/08	0.77	0.33	57.3

NOTES:

< denotes analyte not detected at or exceeding the reporting limit listed.

[1]Total and dissolved metals analyzed by U.S. Environmental Protection Agency (EPA) Method 6020.

[2]Total and dissolved metals analyzed by EPA Method 200.8.

[3]Hardness analyzed by EPA Method 200.7.

[4]Hardness analyzed by EPA Method 130.2.

Ecology = Washington State Department of Ecology

NA = not analyzed

TPCHD = Tacoma-Pierce County Health Department

Table 2
Sediment Analytical Results for Metals
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Sample Location	Sample Identification	Sampled By	Sample Date	Analytical Results (milligrams per kilogram)[1]		
				Arsenic	Copper	Lead
FS-NCS-1	NCS-1	Floyd|Snider	03/19/14	4.2	NA	300
FS-NCS-2	NCS-2	Floyd|Snider	03/19/14	8.3	NA	240
FS-NCS-3	NCS-3	Floyd|Snider	03/19/14	8.1	NA	240
FS-NCS-4	NCS-4	Floyd|Snider	03/19/14	6.1	NA	220
FS-NCS-5	NCS-5	Floyd|Snider	03/19/14	17	NA	500
SD1	SD1-072914	Farallon	07/29/14	NA	3.3	73
SD2	SD2-072914	Farallon	07/29/14	NA	3.1	420

NOTES:

< denotes analyte not detected at or exceeding the reporting limit listed.

[1]Analyzed by U.S. Environmental Protection Agency Method 6020.

Farallon = Farallon Consulting, L.L.C.

NA = not analyzed

Table 3
Sediment Analytical Results for Polycyclic Aromatic Hydrocarbons
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Sample Location	Sample Identification	Sampled By	Sample Date	Analytical Results (micrograms per kilogram)[1]														
				1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(b,k,j)fluoranthene
SD1	SD1-072914	Farallon	07/29/14	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.0085	<0.017
SD2	SD2-072914	Farallon	07/29/14	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0069	<0.0138

NOTES:

< denotes analyte not detected at or exceeding the reporting limit listed.

Farallon = Farallon Consulting, L.L.C.

[1]Analyzed by U.S. Environmental Protection Agency Method 8270D/SIM.

Table 4
Evaluation of Potential Surface Water Screening Levels
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Source of Potential Surface Water Screening Level	Metals				cPAHs																
	Lead	Arsenic	Copper	Zinc	Antimony	Acenaphthene	Anthracene	Benzo(g,h,i)-perylene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)-pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene
	micrograms per liter																				
Surface Water Aquatic Life, Fresh Water/Acute, 173-201A WAC[1]	calc[2]	360	calc[2]	calc[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Aquatic Life, Fresh Water/Acute, CWA §304	65	340	13	120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Aquatic Life, Fresh Water/Acute, NTR 40 CFR 131	65	360	17	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Aquatic Life, Fresh Water/Chronic, 173-201A WAC[1]	calc[2]	190	calc[2]	calc[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Aquatic Life, Fresh Water/Chronic, CWA §304	2.5	150	9	120	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Aquatic Life, Fresh Water/Chronic, NTR 40 CFR 131	2.5	190	11	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Surface Water Human Health, Water and Organisms, 173-201A WAC[1]	--	10	1300	2300	12	110	3100	--	0.014	0.0014	0.014	0.014	1.4	0.0014	16	420	0.014	--	--	--	310
Surface Water Human Health, Organisms Only, 173-201A WAC[1]	--	10		2900	180	110	4600	--	0.021	0.0021	0.021	0.21	2.1	0.0021	16	610	0.021	--	--	--	460
Surface Water Human Health, Fresh Water, CWA §304	--	0.02	--	7400	5.6	670	8300	--	0	0	0	0	0	0	130	1100	0	--	--	--	830
Surface Water Human Health, Fresh Water, NTR 40 CFR 131	--	0.02	--	--	14	--	9600	--	0	0	0	0	0	0	300	1300	0	--	--	--	960

NOTES:

-- = No screening level established for this parameter under the listed rule or regulation.

[1]Value from Table 240, Section 250 of the Water Quality Standards for Surface Waters of the State of Washington, as established in Chapter 173-201A of the Washington Administrative Code (WAC 173-201A), as amended on August 1, 2016. These values are subject to approval by the U.S. Environmental Protection Agency and are subject to change.

[2]Site-specific value calculated using hardness values for surface water samples from the Gig Harbor Sportsman's Club Site. Calculations are based on formulas in Table 240, Section 250 of the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A), as amended on August 1, 2016.

calc = calculated value
CFR = Code of Federal Regulations
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
CWA = Clean Water Act
NTR = National Toxics Rule
WAC = Washington Administrative Code

Table 5
Evaluation of Potential Soil and Surface Sediment Screening Levels
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Parameter	Soil Cleanup Levels (mg/kg)	Freshwater Sediment Cleanup Objectives (mg/kg)[1]
Lead	250 [2]	360
Arsenic	20 [2]	14
Copper	3200 [3]	400
Zinc	24000 [3]	3200
Antimony	32 [3]	NA
PAHs	0.1 [2,4]	17 [5]

NOTES:

[1]Washington State Sediment Cleanup Objectives, Table VI of Section 563 of Chapter 173-204 of the Washington Administrative Code, as revised February 2013.

[2]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as amended November 2007.

[3]Washington State Department of Ecology Cleanup Levels and Risk Calculations, under the MTCA Standard Method B Formula Values for Soil (Unrestricted Land Use) - Direct Contact (Ingestion Only) and Leaching Pathway, https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx

[4]Total carcinogenic polycyclic aromatic hydrocarbons derived using the total toxicity equivalency method in Section 708(8) of Chapter 173-340 of the Washington Administrative Code.

[5]The total PAH criteria in Table VI of Section 563 of Chapter 173-204 of the Washington Administrative Code represent the sum of the following PAH compounds: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(ghi)perylene, chrysene, dibenz(ah)anthracene, fluoranthene, fluorene, indeno(123-cd)pyrene, naphthalene, phenanthrene, pyrene, total benzofluoranthenes (b+k+j).

Table 6
Evaluation of Potential Groundwater Screening Levels
Gig Harbor Sportsman's Club
Gig Harbor, Washington
Farallon PN: 1303-001

Parameter	Groundwater Cleanup Levels (µg/l)
Lead	15 [1]
Arsenic	5 [1]
Copper	320 [2]
Zinc	4800 [2]
Antimony	6.4 [2]
PAHs	0.1 [1,3]

NOTES:

[1]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A cleanup levels for Groundwater, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013.

[2]Washington State Department of Ecology Cleanup Levels and Risk Calculations, under MTCA Standard Method B Formula Values for Groundwater, https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx.

[3]Total carcinogenic polycyclic aromatic hydrocarbons derived using the total toxicity equivalency method in Section 708(8) of Chapter 173-340 of the Washington Administrative Code.

µg/l = micrograms per liter

PAHs = polycyclic aromatic hydrocarbons

APPENDIX A
HEALTH AND SAFETY PLAN

FINAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY WORK PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

FARALLON CONSULTING

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Bend | Baker City
California
Oakland | Sacramento | Irvine

DRAFT

HEALTH AND SAFETY PLAN

REMEDIAL INVESTIGATION
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DRIVE NORTHWEST
GIG HARBOR, WASHINGTON

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 1303-001

For:
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington 98332

DATE

HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

Client: Gig Harbor Sportsman's Club
Facility Name: Gig Harbor Sportsman's Club
Type of Work: Remedial Investigation
Project Number: 1303-001
Start Date: September 1, 2016
End Date: March 31, 2017

Plan Expiration Date: March 31, 2017 (Last day of expected field work or no longer than 6 months)

APPROVED BY:

Jennifer L. Moore
Project Manager

_____ _____
Signature ***Date***

Joseph Rounds
Health and Safety Coordinator

_____ _____
Signature ***Date***

Peter Jewett
Principal-in-Charge

_____ _____
Signature ***Date***

This Health and Safety Plan (HASP) was written for the use of Farallon Consulting, L.L.C. (Farallon) and its employees. It may be used also by trained and experienced Farallon subcontractors as a guidance document. However, Farallon does not guarantee the health or safety of any person entering this site.

Due to the potentially hazardous nature of the site and the activities occurring thereon, it is not possible to discover, evaluate, or provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but does not eliminate, the potential for injury. The health and safety guidelines in this HASP were prepared specifically for this site, its conditions, purposes, dates of field work, and personnel, and must be amended if conditions change.

Farallon claims no responsibility for the use of this HASP by others. This HASP will provide useful information to subcontractors and will assist them in developing their own HASP, but it should not be construed as a substitute for their own HASP. Subcontractors should sign this HASP (see Attachment 1, *Health and Safety Plan Acknowledgment and Agreement Form*) as an acknowledgement of hazard information and as notice that this HASP does not satisfy their requirement to develop their own HASP.

CONTENTS

ATTACHMENTS

1.0 SITE-SPECIFIC INFORMATION

Information specifically pertaining to the project site, the scope of work for the project, and related safety concerns are discussed in this section.

1.1 BACKGROUND INFORMATION

Farallon Consulting, L.L.C. (Farallon) has prepared this Health and Safety Plan (HASP) for the Gig Harbor Sportsman's Club property at 9721 Burnham Drive Northwest in Gig Harbor, Washington (herein referred to as the Site). The Site is an operating outdoor archery and live-round shooting range. Years of use for these purposes, including the use of live ammunition and clay pigeons, may have resulted in metals and/or polycyclic aromatic hydrocarbon (PAH) contamination to surface soil, creek sediments, and surface water. Farallon's role at the Site includes sampling surface water, soil, surface sediment, and groundwater; and possible clean-up work. Field work will be conducted on and off the Site in areas known as the shotgun range, the pistol/rifle range, the east-adjacent parcels, the North Creek Tributary, and North Creek. Samples will be collected off of the Site from:

- The east-adjacent property;
- A private driveway south of 97th Street Northwest;
- A private residence at 9428 Burnham Drive Northwest (Helget Property); and
- The private property proximate to the north and west of the Helget Property (Mashburn Property).

1.2 SCOPE OF WORK

This HASP was prepared for the use of Farallon personnel while performing the following tasks at the Site in accordance with the *Final Remedial Investigation/Feasibility Study Work Plan, Gig Harbor Sportsman's Club, 9721 Burnham Drive Northwest, Gig Harbor, Washington* dated August 30, 2016, prepared by Farallon (RI/FS Work Plan).

As a part of the remedial investigation, Farallon will advance 42 borings across the Site and on the adjacent properties to the east. Thirty-eight of these borings will be advanced to a total depth of approximately 5 feet below ground surface (bgs) using a direct-push drilling rig, a hand-auger, or other appropriate hand-tooling depending on accessibility of the boring locations. Soil samples will be collected from the borings as described in the Sampling and Analysis Plan provided in Appendix A of the RI/FS Work Plan.

Four monitoring wells will be installed using a track-mounted hollow-stem auger drill rig at select boring locations to characterize the groundwater-bearing zone at the Site. The preliminary monitoring well locations include three monitoring wells in the shotgun range and one monitoring well in the woods to the east of the shotgun range. Additional soil samples will be collected below 5 feet bgs in the boreholes for the monitoring wells if there are signs of contamination, including

odor, debris related to current and historical operations of the Gig Harbor Sportsman's Club, photoionization detector measurements, and/or staining. The monitoring wells will be constructed using 2-inch-diameter Schedule 40 polyvinyl chloride casing with a 10-foot section of 0.010-inch slotted screen to a depth of approximately 25 feet bgs. The monitoring wells will be completed with flush-mounted steel monuments and developed immediately following installation. A Washington State-licensed surveyor will survey the locations and elevations of each new monitoring well following installation. Farallon employees will conduct quarterly groundwater monitoring events using the monitoring wells.

Surface water and surface sediment samples will be collected from eight locations in creeks on and off the Site.

The tasks will be conducted in a manner consistent with the methods and assumptions outlined in the RI/FS Work Plan.

1.3 SITE-SPECIFIC SAFETY CONCERNS

This phase of the project involves advancing soil borings, installing monitoring wells, and collecting samples from a variety of media, including soil, groundwater, surface sediment, and surface water. Specific hazards that the field employee(s) will encounter on this project include, but are not limited to:

- Working around heavy equipment;
- Slips, trips, and falls particularly when working in the wooded/overgrown areas and in and around the stream channels;
- Loud noise;
- Chemical exposure related to contaminated soil and windblown dust; and
- Environmental hazards, including exposure to sun, heat, cold, and rain; overgrowth of plants, including blackberries; and local wildlife that may include a bear.

Field employees are encouraged to make a lot of noise when working in the more remote areas of the Site, particularly when alone or when not in the presence of large equipment. Field employees will be provided with bear mace. It is important that field employees introduce themselves to landowners who have granted access for off-Site sample locations so that the landowners are aware of Farallon's presence.

Some field work will intentionally be completed during or immediately following rain events and while standing in streams. Adequate rain gear and steel-toed rubber boots are necessary personal protective equipment when sampling the streams.

2.0 DRUG AND ALCOHOL POLICY

It is Farallon's policy to maintain a drug-free workplace. Farallon has a responsibility to all of its staff members to provide a safe and inoffensive work environment, and a responsibility to its clients to provide accurate and consistent service. For these reasons, Farallon prohibits the following behavior by staff members in the field:

- Use of tobacco in any form by any person at any time in sensitive or hazardous areas that may pose a health and safety or environmental risk. The Site Health and Safety Officer (SHSO) may designate an area away from hazards that is safe for tobacco use.
- Possession or consumption of alcohol and/or marijuana, or being under the influence of alcohol and/or marijuana during field activities.
- Abuse of prescription and/or over-the-counter drugs in such a manner as to negatively impact performance or field safety.
- Possession, use, sale, or being under the influence of illicit drugs while in the field or during any work hours.

Violation of any of the above codes of conduct is grounds for immediate removal from the project Site and discipline in accordance with Farallon company policy. If an incident occurs as a result of an employee's actions, drug and alcohol testing will be performed in accordance with Farallon company policy.

3.0 WEAPONS POLICY

Farallon employees, contractors, subcontractors, and their employees working at the Site are to ensure that they do not bring weapons onto the work site. Weapons include but are not limited to guns, knives, and explosives. Tools that are used during the course of field events, including but not limited to box knives, are exempt from this weapons policy. All vehicles and persons can be subjected to search while working at the property.

Failure to comply with the weapons policy can result in disciplinary action for the individual(s) involved in accordance with Farallon company policy.

4.0 INCIDENT PREPAREDNESS AND RESPONSE

Farallon employees and subcontractors working at the Site must be prepared to respond appropriately to an incident involving injury, illness, death, spills, or utility breaches. This section outlines the degree of preparedness required for employees at a work site, and describes the actions to be taken in the event of a health and safety incident.

4.1 HEALTH AND SAFETY PREPAREDNESS

All individuals working at the Site are required to be familiar with the contents of this HASP. Additionally, the items on the following health and safety preparedness list should be reviewed prior to the commencement of work and during daily health and safety meetings:

- The directions to the hospital (provided in Attachment 2);
- The locations of first aid kits, personal eye washes, and fire extinguishers (located in Site vehicles);
- The locations of the keys to Site vehicles; and
- Hand sign language providing for the immediate stoppage of work (such as a horizontal hand movement in front of the neck).

Additional topics for daily health and safety meetings are included in Attachment 3, Potential Topics for Daily Health and Safety Meeting. Participation in daily health and safety meetings should be documented in Attachment 4, Daily Health and Safety Briefing Log.

4.2 INJURY OR ILLNESS

If an injury or illness occurs, the following actions should be taken, regardless of the severity of the injury or illness:

- Stop work.
- Determine whether emergency response staff (e.g., fire, ambulance) are necessary. If so, dial 911 on a cell phone or the closest available telephone. Describe the location of the injured person and provide other details as requested. If an individual requires non-emergency medical care at a hospital, follow the directions to the nearest hospital, which are provided in Attachment 2. IF EMERGENCY MEDICAL CARE IS NEEDED, CALL 911.
- Administer first aid to the individual immediately, using the first aid kit provided in the Site vehicle. Use the bloodborne pathogens kit and personal eyewash, as needed.
- Notify the SHSO immediately. The SHSO is responsible for preparing and submitting an Incident Report form to Farallon's Health and Safety Coordinator (HSC) within 24 hours of the incident, and for notifying the employee's supervisor and the Principal-in-Charge. The Incident Report form is provided in Attachment 5.

- ***All incidents must be reported to the HSC within 24 hours; however, the actual investigation need not be completed within 24 hours***. **A telephone message that includes the date, time, and general incident circumstances should be left at one of the following numbers if the HSC cannot be reached directly**:
  - HSC work phone: (425) 295-0800
  - HSC cell phone: (206) 484-2748
  - If the HSC cannot be located, contact the Principal-in-Charge
- The SHSO will assume responsibility during a medical emergency until emergency response personnel arrive at the Site.

4.3 REPORTING PROCEDURES FOR MINOR CUTS, SCRATCHES, BRUISES, ETC.

Every occupational illness or injury is to be reported immediately by the employee to the SHSO. The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC.

4.4 NEAR MISSES

A near miss is defined as an incident in which no personal injury is sustained and no property damage is incurred, but in which injury and/or property damage could have occurred under slightly different timing or location.

In the event of a near miss, the following actions are to be taken:

- Stop work if there is immediate danger of injury or property damage;
- Report the near miss to the SHSO as soon as practicable;
- Resume work upon satisfactory resolution of the near-miss condition, if work was stopped, and document the corrective action(s) taken by the SHSO; and
- Complete and submit the Near Miss Report form in Attachment 6 to the HSC within 2 business days.

4.5 MEDICAL INCIDENTS NOT REQUIRING AMBULANCE SERVICE

Medical incidents not requiring ambulance services include injuries and conditions such as minor lacerations and sprains. In the event of an injury, an illness, or a condition that does not require ambulance service, the following actions are to be taken:

- Stop work.
- Administer first aid as necessary to stabilize the individual for transport to the hospital.

- The SHSO is to facilitate prompt transportation of the individual to the hospital. Directions to the nearest hospital are provided in Attachment 2.
- A representative of Farallon or the subcontractor is to drive the individual to the medical facility and remain at the facility until the individual is able to return to the work site, or arrangements for further care have been established.
- If the driver is not familiar with the route to the hospital, a second person who is familiar with the route is to accompany the driver and the injured employee to the hospital.
- If it is necessary for the SHSO to accompany the injured employee to a medical facility, provisions must be made for another employee who is trained and certified in first aid to act as the temporary SHSO before work at the work site can resume.
- If the injured employee is able to return to the work site the same day, he/she is to bring a statement from the doctor that provides the following information:
  - Date of incident
  - Employee's name
  - Diagnosis
  - Date he/she is able to return to work, and whether regular or light duty
  - Date he/she is to return to the doctor for a follow-up appointment, if necessary
  - Signature and address of doctor
- The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC.
- If the injured employee is unable to return to the work site the same day, the employee who transported him/her should bring the statement from the doctor back to the work site. The information on this statement should be reported to the HSC immediately.

4.6 EMERGENCY CASES REQUIRING AMBULANCE SERVICE

In the event of an injury or illness that requires emergency response and transport to a hospital by ambulance the following actions should be taken:

- **Dial 911** to request ambulance service;
- Notify the SHSO;
- Administer first aid until the ambulance service arrives;
- One designated company representative should accompany the injured employee to the medical facility and remain there until final diagnosis, treatment plan, and other relevant information has been obtained; and

- The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC immediately.

4.7 EMPLOYEE DEATH, OR HOSPITALIZATION OF THREE OR MORE EMPLOYEES

The procedures outlined in Section 6.2 should be followed in the event of an employee injury or illness. If an employee fatality occurs, the HSC, local emergency personnel, and the coroner must be notified **immediately**. **The HSC will initiate the required State of Washington Department of Labor and Industries and Occupational Safety and Health Administration (OSHA) notifications within 8 hours of a fatality or the hospitalization of three or more employees.**

4.8 RESPONSE TO SPILLS OR UTILITY BREACHES

The location of underground utilities (e.g., product, sewer, telephone, fiber optic) and facilities (e.g., underground storage tanks, septic tanks, utility vaults) is to be noted prior to commencement of intrusive subsurface work activities. Use the public and private locate services as required and complete the Utility Clearance Log (Attachment 7). If a utility line or tank is breached or a spill or release occurs, the event is to be documented on the Incident Report form provided in Attachment 5 as soon as possible. The date, time, name of the person(s) involved, actions taken, and discussions with other affected parties are to be included. The SHSO, Project Manager (PM), and client are to be notified immediately. The PM is to notify the regulatory authority and/or utility company, as necessary.

In the event of a spill or release, the following actions should be taken:

- Stay upwind of the spill or release.
- Don appropriate personal protective equipment (PPE).
- Turn off equipment and other sources of ignition.
- Turn off pumps and shut valves to stop the flow or leak.
- Plug the leak or collect drippings, if possible.
- Use sorbent pads to collect the product and impede its flow, if possible.
- Dial 911 or telephone the local fire department immediately if a fire or another emergency situation develops.
- Inform the Farallon PM of the situation.
- Determine whether the client would like Farallon to repair the damage or would rather use an emergency repair contractor.

- Advise the client of spill discharge notification requirements, and establish who will complete and submit the required forms. ***Do not report or submit information to an agency without the client's consent.*** Document each interaction with the client and regulators, and note in writing names, titles, authorizations, refusals, decisions, and commitments to any action.
- Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soil and/or product may meet criteria for hazardous waste.
- Do not sign manifests as a generator of wastes. Contact the PM to discuss waste transportation.

4.9 NOTIFICATIONS

A spill or release requires completion of an Incident Report form (provided in Attachment 5) per Farallon's Health and Safety program. **The PM must involve the client and/or generator in the incident reporting process. The client and/or generator is under obligation to report the incident to the appropriate government agency(ies). If the spill extends into waterways, the Coast Guard and the National Response Center must be notified immediately by the client or with client permission (1-800-424-8802).**

4.10 SHUTOFF VALVES AND/OR SWITCHES FOR UTILITIES AND PRODUCTS

Before starting work, locate and list below the location of utility and product line shutoff valves and switches on the work site. Review the location of shutoff valves and switches with field personnel before beginning work.

The shutoff valves and/or switches for electrical, natural gas, gasoline, water lines, etc.:

Will be located in the field before work commences, as applicable.

5.0 EMERGENCY RESPONSE AND EVACUATION PLAN

Farallon personnel and subcontractors working on the Site are to be aware of Site-specific emergency and evacuation procedures, including alarm systems and evacuation plans and routes. If an incident occurs that requires emergency response, such as a fire or spill, **CALL 911 and request assistance**. Farallon staff, subcontractors, and/or others working in an area where an emergency occurs are to evacuate to a safe location away from the incident area, preferably upwind, and take attendance.

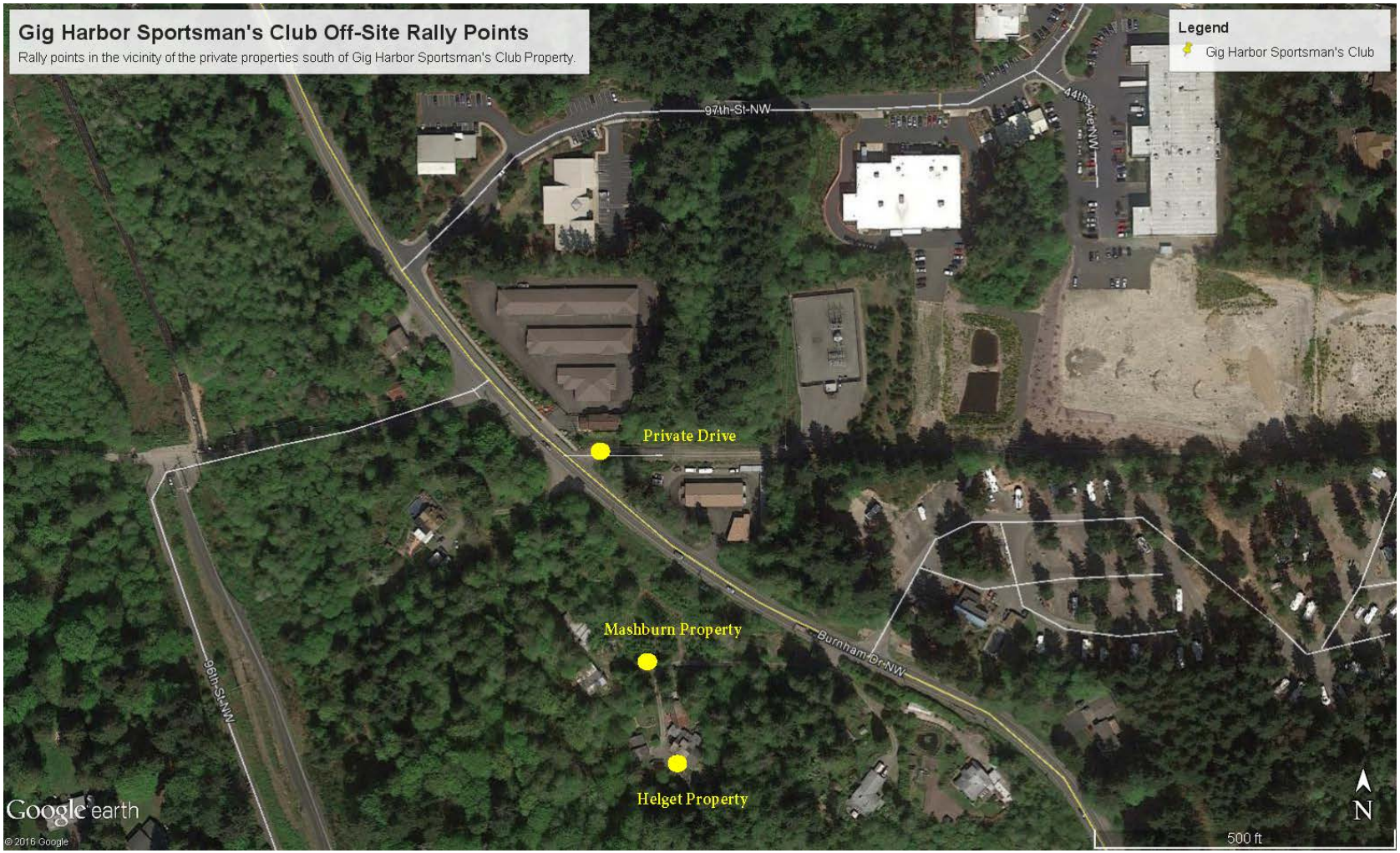
There are multiple emergency evacuation locations for this project, depending on the portion of the Site in which employees are conducting work. These emergency evacuation locations include:

- **The main building at Gig Harbor Sportsman's Club when working on the Gig Harbor Sportsman's Club property;**
- **The northwestern corner of the commercial building when working on the east-adjacent property;**
- **At the end of the driveway, proximate to Burnham Drive Northwest when working in the driveway area south of 97th Street Northwest;**
- **At the front door of the home at 9428 Burnham Drive Northwest when working on the Helget Property; and**
- **At the driveway intersection when working on the Mashburn Property.**

If the emergency causes the route to be obstructed, Farallon personnel and subcontractors are to move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (e.g., police, fire, ambulance personnel, paramedics) to do otherwise.

Subcontractors have the responsibility to account for their own employees and provide requested information to emergency response personnel immediately upon request. Farallon staff, subcontractors, and/or contractors may not reenter the scene of the emergency without specific approval from emergency response personnel.


Gig Harbor Sportsman's Club Rally Points
Rally points in the vicinity of the Gig Harbor Sportsman's Club Property.
Legend
Gig Harbor Sportsman's Club
Gig Harbor Sportsman's Club
50th Ave NW
Burnham Dr NW
Sentinel Loop
44th Ave NW
97th St NW
Google earth
© 2016 Google
500 ft
N


Gig Harbor Sportsman's Club Off-Site Rally Points
Rally points in the vicinity of the private properties south of Gig Harbor Sportsman's Club Property.
Legend
Gig Harbor Sportsman's Club
97th-St-NW
44th-Ave-NW
Private Drive
Mashburn Property
Burnham-Dr-NW
96th-St-NW
Helget Property
Google earth
© 2016 Google
500 ft
N

6.0 LOCAL EMERGENCY CONTACT NAMES AND TELEPHONE NUMBERS

Local emergency response personnel can be contacted at the following numbers. Directions and a map to the hospital are included in Attachment 2.

Emergency Contact	Name and Location	Telephone No.
Hospital	St. Anthony Hospital 11567 Canterwood Boulevard Northwest Gig Harbor, Washington	(253) 530-2000
Police	Gig Harbor Police Department 3510 Grandview Street Gig Harbor, Washington	**911** or (253) 851-2236
Fire	Gig Harbor Fire Department 10222 Bujacich Road Northwest Gig Harbor, Washington	**911** or (253) 851-3111
National Response Center		**1-800-424-8802**
Washington State Department of Ecology		**(360) 407-6300**
Poison Control		**1-800-424-5555**

7.0 PROJECT PERSONNEL AND RELEVANT INFORMATION

The following section provides contact information for the project and the HSC and client-specific health and safety requirements. Farallon field personnel training and medical surveillance dates are included in Attachment 8.

7.1 PROJECT PERSONNEL CONTACT INFORMATION

Questions about this project that are posed by neighbors, the press, or other interested parties should be directed to the Principal-in-Charge at Farallon: (425) 295-0800.

Personnel Title **Personnel Name** **Personnel Contact Information**	**General Project Responsibilities**
Health and Safety Coordinator Joseph Rounds Office: (425) 295-0800 Cell: (206) 484-2748	Provide support in implementing HASP. Provide immediate support upon notice of any incident.
Principal-in-Charge Peter Jewett Office: (425) 295-0800 Cell: (425) 765-3366	Provide immediate support upon notice of any incident.
Project Manager Jennifer Moore Office: (425) 295-0800 Cell: (425) 420-0014	Provide immediate support upon notice of any incident.
Client Contact Clark Davis Davis Law Office, PLLC Office: (253) 858-9423	Provide known analytical data from work performed by others. Provide notice of Site hazards. Provide access to Site. Provide information regarding available emergency supplies at the Site.

8.0 POTENTIAL AIRBORNE CONTAMINANTS

The potential airborne contaminants of concern in the immediate vicinity at the Site are listed in the table on the following page. The table should be reviewed, and questions directed to the SHSO. The air monitoring table and forms are included in Attachment 9.

POTENTIAL AIRBORNE CHEMICALS ON SITE FOR THIS PROJECT REVIEW THIS TABLE AND CONTACT THE SHSO WITH ANY QUESTION						
Chemical (or Class)	**OSHA PEL ACGIH TLV**	**Other Pertinent Limits**	**Properties**	**Routes of Exposure or Irritation**	**Acute Health Effects**	**Chronic Health Effects/ Target Organs**
Lead	PEL - 0.05 mg/m^3 TLV - 0.05 mg/m^3	IDLH - 100 mg/m^3	A heavy, flexible, soft, gray solid.	Inhalation; dermal; ingestion; eye contact.	Lassitude (weakness, exhaustion); abdominal pain; gingival lead line; tremor; irritation to eyes; hypotension.	Insomnia; facial pallor; anorexia; weight loss; malnutrition; constipation; colic; anemia; paralysis: wrist, ankles; encephalopathy; kidney disease; potential for damage to eyes, gastrointestinal tract, CNS, kidneys, blood, gingival tissue.

NOTES:
ACGIH = American Conference of Governmental Industrial Hygienists
AIHA = American Industrial Hygiene Association
AIHA WEEL = AIHA-set workplace environmental exposure limits
C = ceiling limit
CNS = central nervous system
CVS = cardiovascular system
IDLH = immediately dangerous to life or health
mg/m^3 = milligrams per cubic meter
NIOSH = National Institute for Occupation Safety and Health
OSHA = Occupation Safety and Health Administration
PEL = permissible exposure limit
ppm = parts per million
RBC = red blood cells
REL = recommended exposure limit set by NIOSH
Skin = skin absorption
STEL = short-term exposure limit
TLV = threshold limit value set by ACGIH
TWA = time-weighted average

9.0 POTENTIAL SITE HAZARDS AND APPROPRIATE PRECAUTIONS

Activities listed may be associated with work performed by others. The information contained in this section is for the use of Farallon personnel and not intended for use by others. The following tables list potential hazards and appropriate precautions associated with planned field work.

9.1 ENVIRONMENTAL DRILLING

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Clear drilling locations.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Traffic hazards. Overhead or underground installations. Product releases. Property damage. Occupant inconvenience.	• Refer to Utility Clearance Log (**Attachment 7**). • Coordinate with Site Manger (or designee) to minimize potential conflicts. • Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. • Mark out the proposed borehole locations. • Call underground utility locating service for public line location clearance and obtain a list of utilities being contacted. If necessary, coordinate private line locator for private property. • Develop a traffic control plan with the client and local agencies, as applicable, which may include use of cones, barrier tape, jersey barriers, etc.
Mobilize with equipment/supplies suitable for drilling.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment on Site.	• Begin each work day with tailgate safety meeting. • Follow safe driving procedures. • Employ safe lifting procedures. • Verify that subcontractors are aware of their responsibilities for labor, equipment, and supplies. • Review permit conditions.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Visually clear proposed drilling locations.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Underground or overhead installations.	• Complete Utilities and Structures checklist on the Utility Clearance Log (provided in **Attachment 7**) and adjust drilling locations as necessary.
Set up necessary traffic control.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Struck by vehicle during placement. Vehicle accident resulting from improper placement of traffic control equipment.	• Use buddy system for implementing traffic control plan, such as setting out cones and tape to define the safety area.
Assist with setup of rig.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Vehicle accident during rig movement. Damage caused by rig while accessing set-up location. Contact with overhead installations. Soft terrain. Unexpected rig movement.	• All staff should know the location of the kill switch for the drilling rig. • Verify a clear pathway to the drilling location and clearance for raising mast. • Provide hand signals and guidance to the driver, as needed, to place rig. • Visually inspect rig (e.g., fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition). • Use wooden blocks under jacks to spread load, if necessary. Chock wheels.
Set up exclusion zone(s) and work stations (drilling and logging and/or sample collection).	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, and work gloves.	Struck by vehicle during setup. Slip or fall hazards.	• Implement exclusion zone setup. Set up work stations with clear walking paths to and from rig. Use safety tape and cone(s).

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Clear upper 5 feet of drilling location using post-hole digger or hand auger.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, and work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, and chemical-resistant apron as required.	Back strain. Exposure to chemical hazards. Hitting an underground utility. Repetitive motion.	• Keep full-face respirator with organic vapor cartridges readily accessible. • Initiate air quality monitoring in accordance with the air monitoring protocol presented in **Attachment 9**. • Stand upwind to avoid exposure when possible. • Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources, such as the core when it is being raised from the hole, the core is opened, etc. • Evaluate any soil samples inside a resealable plastic bag at arm's length. DO NOT EVALUATE THE SAMPLE IN THE OPEN, IN ORDER TO AVOID UNNECESSARY EXPOSURE. • Use correct lifting techniques and tools. • Complete the Pre-Drilling section of the Borehole Clearance Review form.
Drilling.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Heat or cold. Eye injury. Noise. Exposure to chemical hazards. Breaching an underground utility. Trip or fall. Equipment failure.	• Stand clear of operating equipment. • Use correct lifting techniques. • Monitor air quality in accordance with the air monitoring protocol presented in **Attachment 9**. • Monitor drilling progress. • Keep work area clear of tripping or slipping hazards. • Perform periodic visual inspections of drill rig.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Collect samples in accordance with sampling plan.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Heat or cold. Eye injury. Noise. Exposure to chemical hazards. Breaching an underground utility. Trip or fall. Equipment failure.	• Stand clear of operating equipment. • Use correct lifting techniques. • Monitor air quality in accordance with the air monitoring protocol presented in **Attachment 9**. • Monitor drilling progress. • Keep work area clear of tripping or slipping hazards. • Perform periodic visual inspections of drill rig.
Manage cuttings.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Heat or cold. Eye injury. Noise. Exposure to chemical hazards. Breaching an underground utility. Trip or fall. Equipment failure.	• Stand clear of operating equipment. • Use correct lifting techniques. • Monitor air quality in accordance with the air monitoring protocol presented in **Attachment 9**. • Monitor drilling progress. • Keep work area clear of tripping or slipping hazards. • Perform periodic visual inspections of drill rig.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Backfill borehole.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Trip hazards. Eye injury from splashing or release of pressurized grout.	• Mix grout to specification and completely fill the hole. • Use proper lifting techniques. • Keep work area clear of tripping hazards. • Verify presence of and/or authorization by required grouting inspectors.
Develop well.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Physical injury from mechanical failure, drill rig, or air compressor. Trip hazards. Exposure to contaminants. Electric shock.	• Verify that equipment is in good working order and that pressurized hoses are whip-checked. • Keep full-face respirator with organic cartridges readily accessible. • Keep work area orderly. • Any generators must be equipped with GFCI circuit.
Gauge water levels and product thickness in wells, where applicable.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Inhalation or dermal exposure to chemical hazards. Repetitive motion.	• Have full-face respirator with organic cartridges readily accessible. • Conduct air quality monitoring in accordance with the protocol presented in **Attachment 9.** • Maintain a safe distance from the well head. • Bend at knees rather than at the waist.
Purge well(s) and collect purge water.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Inhalation or dermal exposure to chemical hazards. Slip or fall. Contaminated water spill.	• Use proper lifting techniques. • Use PPE, and adhere to air monitoring guidelines as presented in **Attachment 9**. • Keep work area clear of tripping or slipping hazards. • Store purge water in appropriate containers.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Collect groundwater samples in accordance with sampling plan.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Cross-contamination. Back strain. Inhalation or dermal exposure to chemical hazards. Slip or fall. Improper labeling or storage of samples. Injury from broken sample bottle (cuts or acid burns).	• Decontaminate sampling equipment between each well (unless disposable). • Use proper lifting techniques. • Have full-face respirator with organic cartridges within 3 to 5 feet of working location, and readily accessible. • Label samples in accordance with sampling plan. • Keep samples stored in appropriate containers, at correct temperature, and away from work area. • Handle bottles carefully.
Dispose of or store any purge water on Site.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Exposure to contaminants.	• Use suitable equipment to transport water (e.g., pumps, drum dollies). • Have full-face respirator with organic cartridges within 3 to 5 feet of working location, and readily accessible. • Label storage containers properly, and locate in an isolated area away from traffic and other Site functions. • Coordinate off-Site disposal (where applicable).
Clean the Site; demobilize.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Traffic. Lifting hazards.	• Use buddy system to remove traffic control, as necessary. • Leave the Site clear of refuse and debris. • Clearly mark or barricade any borings that need topping off or curing at a later time. • Notify Site personnel of departure, final well locations, and any cuttings and/or purge water left on the Site. • Use proper lifting techniques.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Package and deliver samples to laboratory.		Back strain. Traffic accidents.	• Handle and pack bottles carefully (e.g., bubble wrap bags). • Use proper lifting techniques. • Apply safe driving practices.
Typical work.	Steel-toed and -shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, leather gloves for non-chemical aspects of work. Chemical-resistant gloves and apron if chemical exposure is suspected.	Weather-related incidents: automobile accidents, slips or falls.	• Check weather reports daily. Project visits are not to be performed during inclement weather. Sampling may be performed during light rain mist. Wear raincoats. • Drive at speed limit or less, as needed, to keep a safe distance from vehicle in front. Avoid short stops.
Typical work.		Cold stress.	• For temperatures below 40°F, adequate insulating clothing must be worn. If the temperature is below 20°F, workers will be allowed to enter a heated shelter at regular intervals. Warm, sweet drinks should be available. Coffee intake should be limited. • No one should begin work or return to work from a heated shelter with wet clothes. • Workers should be aware of signs of cold stress, such as heavy shivering, pain in fingers or toes, drowsiness, or irritability. Onset of any of these signs is an indication that immediate return to a heated shelter is needed. • Refer to ACGIH TLV Booklet for the section on Cold Stress.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Typical work.		Heat stress.	• Discuss health effects and symptoms during daily health and safety meetings. • Drink water regularly (at least one cup every 20 to 30 minutes, depending upon level of effort and the PPE worn). • Refer to ACGIH TLV booklet for heat stress guidance, especially regarding PPE, type of work, and frequency of breaks. • Breaks should be taken in an area cooler than the work area. • Monitor temperature and relative humidity using WBGT meter.
No eating, drinking, or smoking on the Site. No contact lenses to be worn on the Site. No facial hair that would interfere with respirator fit.			
A safety meeting is to be held every day, even if only one person is working on the project on a given day.			• Topics are to always include the work scheduled for the day and restatement of hazards and the means to avoid them. Other topics may include sampling in general, and advances in technology and how they may be applied to the project. • Use the *Daily Health and Safety Briefing Log* in **Attachment 4** to log the topics discussed.

9.2 MONITORING WELL SAMPLING/GAUGING

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with equipment/supplies suitable for sampling.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Vehicle accident. Lifting hazards. Delay or unsafe performance of work due to lack of necessary equipment on Site. Cross-contamination of wells.	• Follow safe driving procedures. • Use proper lifting techniques. • Review work plan to determine equipment/supply needs. • Verify that all sampling/gauging equipment has been decontaminated. • Bring ice for sample storage. • Review the HASP. • Gather the necessary PPE.
Set up necessary traffic control.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic-control equipment placement.	• Use buddy system for placing traffic control. Refer to the traffic control plan section of the HASP (which may include specific requirements based on encroachment permit).
Set up exclusion zone(s).	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Struck by vehicle. Slip or fall hazards to workers.	• Face incoming traffic. • Implement exclusion zone setup instructions of the HASP (e.g., barricades, caution tape, cones). • Set up work area free of trip hazards.
Gauge water levels and product thickness (where applicable) in wells.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Inhalation of, or dermal exposure to, chemical hazards. Repetitive motion.	• Wear required PPE. • Initiate air quality monitoring in accordance with the HASP. • Maintain a safe distance from wellhead. • Bend at knees rather than at waist.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Purge well(s) and collect purge water.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Cross-contamination. Back strain. Inhalation of, or dermal exposure to, chemical hazards. Slip or fall. Contaminated water spill.	• Decontaminate purging equipment between each sampling location. • Use proper lifting techniques. • Use PPE and conduct monitoring in accordance with the HASP. • Keep work area clear of tripping or slipping hazards. • Store purge water in appropriate containers.
Collect samples in accordance with sampling plan.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Cross-contamination. Back strain. Inhalation of, or dermal exposure to, chemical hazards. Slip or fall. Improper labeling or storage. Injury from broken sample bottle (e.g., cut or acid burn).	• Decontaminate sampling equipment between each well (unless disposable equipment). • Use proper lifting techniques. • Use PPE in accordance with the HASP. • Label samples in accordance with sampling plan. • Keep samples stored in suitable containers, at correct temperature, and away from work area. • Handle bottles carefully.
Dispose of or store purge water on the Site.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Exposure to contaminants. Damage or injury from improper use of on-Site treatment system equipment. Improper storage or disposal.	• Use suitable equipment to transport water (e.g., pumps, drum dollies). • Wear PPE in accordance with the HASP. • Review any necessary instructions for use of on-Site treatment systems. • Label storage containers properly and locate in an isolated area away from traffic and other Site functions. • Coordinate off-Site disposal, where applicable.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clean the Site; demobilize.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Traffic. Safety hazard left on Site. Lifting hazard.	• Use buddy system to remove traffic control, as necessary. • Leave the Site clear of refuse and debris. • Notify business personnel of departure, and of any purge water left on the Site. • Use proper lifting techniques.
Package and deliver samples to laboratory.		Bottle breakage. Back strain.	• Handle and pack bottles carefully (e.g., bubble wrap bags). • Use proper lifting techniques.

9.3 TERRESTRIAL SURFACE WATER AND SEDIMENT SAMPLING

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Material/equipment handling.	Reflective vest, steel-toed and -shanked rubber boots, hard hat, safety glasses with side shields, water-proof work gloves, nitrile sample gloves, and rain gear if it is raining.	Muscle strain/injuries from improper lifting/carrying. Hypothermia from exposure to rain and wind.	• Exercise caution when moving equipment over uneven terrain. • Use proper lifting techniques. • Do not overfill boxes or coolers. • Seek assistance with lifting/carrying/maneuvering when necessary. • Wear rain gear and rubber boots as needed to protect against moisture and hypothermia.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Drilling activities, sediment grab sample collection, and sediment processing.	Reflective vest, steel-toed and -shanked rubber boots, hard hat, safety glasses with side shields, water-proof work gloves, nitrile sample gloves, and rain gear if it is raining.	Ingestion of sediments, skin/eye contact with sediments. Slips, trips, and falls. Hypothermia from exposure to rain and wind. Injury from hand tool use.	• Wear appropriate PPE to prevent/reduce exposure. • If skin contact occurs, wash skin using soap/mild detergent and water, and rinse thoroughly. • If eye contact occurs, rinse eyes with large amounts of water. • Consult Safety Data Sheets for specific procedures for contact with known Site contaminants or chemicals used during sampling. • Be mindful of uneven terrain, slippery footing, and thick mud while accessing the sample location and collecting samples. • Wear rain gear and rubber boots as needed to protect against moisture and hypothermia. • Exercise caution and be aware of sharp edges on hand tools and mechanical parts. • Inspect all hand tools daily for damage, and replace or repair defective tools.
Working outdoors.		Heat stress.	• Discuss health effects and symptoms during daily health and safety meetings. • Monitor workers' physical conditions regularly. • Monitor outside temperature versus worker activity levels. • Have abundant drinking water available to prevent dehydration. Drink water regularly (at least one cup every 20 to 30 minutes, depending upon level of effort and the PPE worn). • Adjust work schedules to avoid hottest part of day. • Take rest breaks as needed. • Provide shelter (air-conditioned, if possible) or shaded areas to protect workers during rest periods. • Train workers to recognize symptoms of heat-related illness.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Working outdoors (continued).		Cold stress.	• Monitor workers' physical conditions and PPE regularly. • Monitor outside and water termperatures versus worker PPE. • For temperatures below 40°F, adequate insulating clothing must be worn. If the temperature is below 20°F, workers will be allowed to enter a heated shelter at regular intervals. Warm, sweet drinks should be available. Coffee intake should be limited. • Have abundant drinking water available to prevent dehydration. • Provide shelter in an enclosed, heated area to protect workers during rest periods. • Ensure each worker has a dry change of clothing available. No one should begin work or return to work from a heated shelter with wet clothes. • Workers should be aware of signs of cold stress such as heavy shivering, pain in fingers or toes, drowsiness, or irritability. Onset of any of these signs is an indication that immediate return to a heated shelter is needed.
	Steel-toed and -shanked rubber boots and rain gear.	Rain/snow.	• PPE should be inspected daily prior to use. • Routinely inspect work area for deteriorating conditions. • Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. • If extremely cold conditions are forecast, consider additional precautions or postponing work activity.

Job Steps	Personal Protective Equipment (PPE)	Potential Hazards	Critical Actions
Working outdoors (continued).		Sunshine.	• Ensure that sunscreen and water are available to all workers; • Ensure that abundant drinking water is available to prevent dehydration. • Consider wearing lightweight, sun-blocking clothing.
		Fog.	• Wait for fog to lift for adequate visibility.
		Lightning.	• Obtain weather forecast and updates as needed. • Disconnect and do not use or touch electronic equipment. • Do not begin or continue work until lightning subsides for at least 30 minutes.
		High river flows or high waves.	• Obtain weather forecast and updates as needed. • Be aware of tides, forecasts, and recent rainfall within your watershed.
		High winds.	• Obtain weather forecast and updates as needed. • Wear goggles or safety glasses if dust/debris is visible.
		Biological hazards (e.g., bear, mosquitoes, bees, yellow jackets, hornets, deer flies, horse flies, etc.).	• Ensure that bear mace is available, as a bear may be present on areas in or proximate to the Site. • Ensure that insect repellant is available. • Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellent as needed.

10.0 WASTE CHARACTERISTICS

Waste anticipated to be generated on the Site:

Type(s): ☒ Liquid ☒ Solid ☐ Sludge ☐ Other (fill-in)

The approximate volume for each anticipated waste stream:

Waste: Soil Cuttings Approximate Volume: TBD

Waste: Purge/Decon Water Approximate Volume: TBD

Waste: (fill-in) Approximate Volume: (fill-in)

Characteristics**:**

☐ Corrosive ☐ Flammable/Ignitable ☐ Radioactive ☒ Toxic

☐ Reactive ☐ Unknown ☐ Other *(specify)* (fill-in)

11.0 TRAFFIC CONTROL

Work on the Site will be conducted in areas of uncontrolled traffic access. Traffic control/warning devices will be placed around the work area to prevent undesirable interface between pedestrian and automotive traffic and project workers and equipment. These devices may include:

- Cones;
- Tubular markers;
- Barricades;
- Temporary fencing; and
- Barricade tape.

The traffic control/warning devices will be placed around the work in such a way that traffic access is inhibited (i.e., place cones less than 8 feet apart so cars cannot easily drive through work area without moving a cone). Barricade tape or temporary fencing will be used to inhibit access to the work area in locations where pedestrians will be encountered.

ATTACHMENT 1
HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT AND AGREEMENT FORM

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All Farallon and subcontractor personnel must sign on a daily basis.)

This Health and Safety Plan (HASP) has been developed for the purpose of informing Farallon employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Subcontractors and other parties at the site must develop their own HASP to address the hazards faced by their own employees. Farallon will make a copy of this HASP available to subcontractors and other interested parties to fully disclose hazards we may be aware of, and to satisfy Farallon's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, subcontractors and others on site are required to inform Farallon of any hazards they are aware of or that their work on site might possibly pose to Farallon employees, including but not limited to Material Safety Data Sheets for chemicals brought on site. This plan should NOT be understood by contractors to provide information pertaining to all of the hazards that a contractor's employees may be exposed to as a result of their work.

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer (SHSO). Your signature below affirms that you have read and understand the hazards discussed in this HASP, and that you understand that subcontractors and other parties working on site must develop their own HASP for their employees. Your signature also affirms that you understand that you could be prohibited by the SHSO or other Farallon personnel from working on this project for not complying with any aspect of this HASP. The SHSO will be noted on the sheet below on a daily basis.

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM					
Check for SHSO	**Name**	**Title**	**Signature**	**Company**	**Date**

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM					
Check for SHSO	**Name**	**Title**	**Signature**	**Company**	**Date**

ATTACHMENT 2
DIRECTIONS TO HOSPITAL

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

DIRECTIONS TO HOSPITAL

(INSERT PDF OR JPEG, BOTH MAP AND WRITTEN DIRECTIONS)

ATTACHMENT 3
POTENTIAL TOPICS FOR DAILY HEALTH AND SAFETY MEETING

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

POTENTIAL TOPICS FOR DAILY HEALTH AND SAFETY MEETING

- ☐ Emergency response plan, emergency vehicle (full of fuel) and muster point
- ☐ Route to medical aid (hospital or other facility)
- ☐ Work hours. Is night work planned?
- ☐ Hand signals around heavy equipment
- ☐ Traffic control
- ☐ Pertinent legislation and regulations
- ☐ Above- and below-ground utilities (energized or de-energized)
- ☐ Material Safety Data Sheets
- ☐ Reporting an incident: to whom, what, why, and when to report
- ☐ Fire extinguisher and first aid kit locations
- ☐ Excavations, trenching, sloping, and shoring
- ☐ Personal protective equipment and training
- ☐ Safety equipment and training
- ☐ Emergency telephone location(s) and telephone numbers (in addition to 911)
- ☐ Eye wash stations and washroom locations
- ☐ Energy lock-out/tag-out procedures. Location of “kill switches,” etc.
- ☐ Weather restrictions
- ☐ Site security. Site hazards. Is special waste present?
- ☐ Traffic and people movement
- ☐ Working around machinery (both static and mobile)
- ☐ Sources of ignition, static electricity, etc.
- ☐ Stings, bites, large animals, and other nature-related injuries and conditions
- ☐ Working above grade
- ☐ Working at isolated sites
- ☐ Decontamination procedures (for both personnel and equipment)
- ☐ How to prevent falls, trips, sprains, and lifting injuries
- ☐ Right to refuse unsafe work
- ☐ Adjacent property issues (e.g., residence, business, school, daycare center)

ATTACHMENT 4
DAILY HEALTH AND SAFETY BRIEFING LOG

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

DAILY HEALTH AND SAFETY BRIEFING LOG

PROJECT INFORMATION	
Farallon PN:	Project Name:
Site Address:	City/State:
MEETING INFORMATION	
Conducted By:	Weather:
Major Job Task:	Date:

DAILY EQUIPMENT CHECKLIST

☐ Site Check In	☐ First Aid Kit Location(s)	☐ Ear Plugs (if required)
☐ Proper ID/Safety Credentials	☐ Fire Extinguisher Location(s)	☐ Hand Protection (if required)
☐ Hard Hat	☐ Eye Wash Station	☐ Face Shield (if required)
☐ Safety Glasses	☐ Traffic Control (if needed)	☐ Respirator (if required)
☐ Orange Reflective Vest (H or X back BNSF)		☐ _____
☐ Safety Toe Boots (lace up and leather BNSF)		☐ _____

HEALTH AND SAFETY BRIEFING

☐ Head Count (No. of employees:)	☐ Excavation Safety (if applicable)
☐ Emergency Response	☐ Health Hazards
☐ Who will...? (provide names below) Call 911: Alternate to call 911: Provide First Aid/CPR:	☐ Environmental Hazards
	☐ Physical Hazards
	☐ Slips, Trips and Falls
	☐ Utility Locates
☐ Emergency Exits/ Rally Points/Hospital Route	☐ Near Miss Reporting (reminder to look)
☐ Site Security and Exclusion Zone	☐ Incident Reporting (procedures and forms)
☐ Vehicle/Equipment-Specific Safety Practices	☐ Traffic Control
☐ Stop Work Authority	☐ HASP Reviewed and Signed

SITE-SPECIFIC HEALTH AND SAFETY ISSUES DISCUSSED

1)
2)
3)
4)
5)

DAILY HEALTH AND SAFETY BRIEFING ATTENDEES

NAME	COMPANY	SIGNATURE

ATTACHMENT 5
INCIDENT REPORT FORM

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

FARALLON CONSULTING

Accidental Injury, Occupational Illness, or Workplace Incident
INCIDENT REPORT

DRAFT

INCIDENT TYPE			**INCIDENT DATE:**
☐ FATALITY	☐ INDUSTRIAL NON-RECORDABLE	☐ SPILL/LEAK	☐ GENERAL LIABILITY
☐ LOST WORKDAY	☐ NON-INDUSTRIAL	☐ PRODUCT INTEGRITY	☐ CRIMINAL ACTIVITY
☐ LW RESTRICTED DUTY	☐ OFF-THE-JOB INJURY	☐ EQUIPMENT	☐ NOTICE OF VIOLATION
☐ OSHA MEDICAL OR ILLNESS W/O LW	☐ MVA	☐ BUSINESS INTERRUPTION	☐ OTHER
☐ FIRST AID	☐ FIRE	**(TO BE COMPLETED BY HEALTH AND SAFETY COORDINATOR)**	

This report must be completed by the employee or Health and Safety Coordinator immediately upon learning of the incident. The completed report must be reviewed and signed by a Principal, within 24 hours of the incident, even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Gerald Portele within 24 hours of the initial exam and any subsequent exams. After hours or weekends, please call Joe Rounds, Mobile (206) 484-2748.

EMPLOYEE INFO

LAST NAME:	FIRST NAME AND MIDDLE INITIAL:	TITLE:	TIME OF EVENT OR EXPOSURE: ☐ AM ☐ PM
EMPLOYMENT STATUS: ☐ FULL-TIME ☐ PART-TIME ☐ HOURLY-AS-NEEDED		HOW LONG?	
DATE OF INJURY OR ONSET OF ILLNESS (MM/DD/YYYY)			

INJURY OR ILLNESS INFO

EXACT LOCATION OF INCIDENT (ADDRESS, GEOGRAPHICAL LOCATION, FLOOR, BUILDING, ETC.):	
COUNTY:	ON EMPLOYER'S PREMISES? ☐ YES ☐ NO
COMPLETE DESCRIPTION OF INCIDENT, INCLUDE SPECIFIC ACTIVITY DURING INCIDENT (LIFTING, PUSHING, WALKING, ETC.):	
DESCRIBE THE EQUIPMENT, MATERIALS, OR CHEMICALS THAT DIRECTLY HARMED THE PARTY (E.G., THE MACHINE EMPLOYEE STRUCK AGAINST OR WHICH STRUCK EMPLOYEE; THE VAPOR INHALED OR MATERIAL SWALLOWED; WHAT THE EMPLOYEE WAS LIFTING, PULLING, ETC.):	
DESCRIBE THE SPECIFIC INJURY OR ILLNESS (E.G., CUT, STRAIN, FRACTURE, SKIN RASH, ETC.):	
BODY PART(S) AFFECTED (E.G., BACK, LEFT WRIST, RIGHT EYE, ETC.):	
DATE EMPLOYER NOTIFIED:	TO WHOM REPORTED:

MEDICAL PROVIDER (HOSPITAL, DOCTOR, CLINIC, ETC.) INFO

NAME AND ADDRESS OF HEALTH CARE PROVIDER:	PHONE NO.:
TREATED IN EMERGENCY ROOM: ☐ YES ☐ NO	HOSPITALIZED OVERNIGHT AS INPATIENT: ☐ YES ☐ NO

INJURY/ILLNESS SEVERITY	TIME LOSS (Check all that apply)	WORKDAY PHASE
☐ NO TREATMENT REQUIRED	☐ RETURN TO WORK THE NEXT DAY	☐ PERFORM NORMAL WORK DUTIES
☐ FIRST AID ONLY	☐ NO TIME LOSS	☐ MEAL PERIOD
☐ MEDICAL TREATMENT	☐ RESTRICTED ACTIVITY	☐ REST PERIOD
☐ FATALITY, ENTER DATE:	BEGIN DATE:	☐ ENTERING/LEAVING
	RETURN DATE:	☐ CHRONIC EXPOSURE
	☐ LOST WORKDAY, NOT AT WORK	☐ OTHER, SPECIFY:
	BEGIN DATE:	
	RETURN DATE:	

MOTOR VEHICLE ACCIDENT (MVA)				PROFESSIONAL DRIVER?	☐ YES ☐ NO	
TOTAL YEARS DRIVING:	COMPANY VEHICLE? ☐ YES ☐ NO			VEHICLE TYPE:		
NO. OF VEHICLES TOWED		NO. OF INJURIES:		NO. OF FATALITIES:		
THIRD-PARTY INCIDENTS						
NAME OF OWNER		ADDRESS		PHONE NO.:		
DESCRIPTION OF DAMAGE:						
INSURANCE INFORMATION:						
WITNESS NAME		ADDRESS		PHONE NO.:		
WITNESS NAME		ADDRESS		PHONE NO.:		

REVIEWED BY			
NAME (PRINT)	SIGNATURE	TITLE	DATE

ADDITIONAL INFORMATION	(USE SPACE BELOW FOR ADDITIONAL INFROMATION AS NECESSARY TO COMPLETE THIS FORM.)		

ATTACHMENT 6
SAFETY OBSERVATION AND NEAR MISS REPORT

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

SAFETY OBSERVATION AND NEAR MISS REPORT

This report is to be filled out by any employee involved in or witnessing a near miss, or making a safety observation. A near miss is an incident that did not result in any personal injury, property damage, or production interruption, but could have under slightly different circumstances. A safety observation is witnessing any activity that places a person or property at risk of injury, accident, or damage. These are very important indicators of potentially harmful future accidents, and provide valuable insights to preventing personal injury and/or property damage.

PROJECT INFORMATION	
Farallon PN:	Project Name:
Site Address:	City/State:
INCIDENT INFORMATION	
Date:	Time: ☐ AM ☐ PM
Exact Location:	
Description of Incident or Potential Hazard:	
Corrective Action Taken:	
Lessons Learned:	

Employee Signature _____ Date: _____

Printed Name _____

Supervisor Signature _____ Date: _____

Printed Name _____

ATTACHMENT 7
UTILITY CLEARANCE LOGS

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

UTILITY CLEARANCE LOG

Project Name: _____ **Project Number:** _____

Location: _____ **Date of Work:** _____

Instructions. This log must be completed by a Farallon staff member **before** any Farallon-directed excavation (e.g., test pit excavation) or drilling operation.

DRILLING OR EXCAVATION WORK MAY NOT COMMENCE UNTIL UTILITY LOCATES HAVE BEEN COMPLETED (see the One-Call Utility Locate Request Procedure on the following page)

Farallon is responsible for having underground utilities and structures located and marked when drilling or directing test pit excavation operations. Any drilling or excavation within 2 feet of a marked utility must be done with hand tools.

Owners of underground utilities are required by law to mark underground facilities on public and private property. Owners of underground utilities are **not required** to mark existing service laterals or appurtenances. Utility owners in Washington are required to subscribe to the One-Call service.

Private utility locate services must be hired to locate service laterals and other buried utilities (e.g., on-Site electric distribution lines, irrigation pipes) on private property.

Re-mark after 10 days or maintain as appropriate.

Utility Locate Checklist

☐ Attach map showing drilling and/or excavation sites and known utilities

☐ Attach copy of One-Call Utility Notification Ticket (http://www.searchandstatus.com/)

One-Call Utility Notification Ticket Number: _____

☐ Attach copy of Side Sewer Card (available for City of Seattle; check municipality for availability)

☐ Attach copy of Private Locate Receipt

☐ Photograph all excavation and/or drilling locations and download to project file

☐ Review utilities with Site Contact:

Name: _____ Phone: _____

Utilities and Structures

Utility Type	**Utility Name**	**Public Utilities Marked (Y/N)**	**Private Utilities/Laterals Marked (Y/N)**	**Marking Method** (flags, wooden stakes, paint on pavement, etc.)
Petroleum product				
Natural gas line				
Water line				
Sewer line				
Storm drain				
Telephone cable				
Electric power line				
Product tank				
Septic tank/drain field				
Other				

Farallon Consulting, L.L.C.

Field Team Leader: _____ Date: _____

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

ONE-CALL UTILITY LOCATE REQUEST PROCEDURE

THE ONE-CALL UTILITY NOTIFICATION CENTER REQUIRES 48 HOURS NOTICE TO MARK UTILITIES BEFORE YOU CAN DIG OR DRILL

Washington: 1-800-424-5555
Oregon: 1-800-332-2344

Washington state law states that "before commencing **any** excavation," the excavator or driller must provide notice to all owners of underground utilities by use of the One-Call locator service, and that the excavator or driller shall not dig or drill until all known utilities are marked. To fully comply with the law, you **must** take the following steps:

1. **Call before you dig or drill:** Notify the One-Call Utility Notification Center (OCUNC) a minimum of 48 hours (2 full business days) before digging or drilling. Provide the following **required** information:
    a. Your name and phone number, company name and mailing address, and Farallon Account Number 25999.
    b. The type of work being done.
    c. Who the work is being done for.
    d. The county and city where the work is being done.
    e. The address or street where the work is being done.
    f. Marking Instructions: "Generally locate entire site including rights-of-way and easements."

    Provide the following information if applicable or requested:

    a. The name and phone number of an alternate contact person.
    b. If the work is being done within 10 feet of any overhead power lines.
    c. The nearest cross street.
    d. The distance and direction of the work site from the intersection.
    e. Township, range, section, and quarter section of the work site.
2. **Record the utilities that will be notified:** OCUNC will tell you the utilities that are on or adjacent to the work site, based on their database. Record the name(s) of the utility on the reverse side of this form.
3. **After the 48-hour waiting period, confirm that the utility locations have been marked:** Before digging or drilling, walk the work site and confirm that the utility companies have marked the utility locations in the field.
4. **If a locate appears to be missing:** If a utility locate appears to be missing and the utility company has not notified you that there are no utilities in the area, call OCUNC and:
    a. Provide the OCUNC locate number.
    b. Clearly state which utility has not been marked. The call is being recorded.
    c. Ask for a contact person at that utility.

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

d. Call the contact person for the missing utility locate: Determine why there is no utility locate in the field.

e. Record the reason(s) for the missing locate(s): There are valid reasons that locates do not appear in the field (e.g., there are no utilities located on the work site or the utility has been abandoned). However, IF THEY ARE LATE, **YOU MUST WAIT** TO DRILL OR DIG. If the utility fails to mark a locate within the required 48 hours (2 full business days), the utility is liable for delay costs.

5. **Hand dig within 2 feet of a marked utility:** When digging or drilling within 2 feet of any marked utility, the utility must be exposed first by using hand tools.

6. **Record reason(s) for missing locate(s)**: There may be reasons that locates do not appear in the field (e.g., no utilities are located on the site, utility has been abandoned). Record the reason given. IF THEY ARE LATE – YOU WAIT TO DRILL OR DIG. If the utility failed to mark within the required two days, they are liable for delay costs.

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

FARALLON CONSULTING, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington
98027

TELEPHONE CONVERSATION
Date: _____ **Time:** _____
Project Name: _____
Job No.: _____
Phone No.: **1-800-424-5555 WA, 1-800-332-2344**
OR _____
Prepared By/Initials: _____
Call: ☐ **Placed** ☐ **Received**

Contact/Title: _____

Agency/Region: One-Call Utility Notification Center

PROJECT: _____

1. Your name and the Farallon Account No. #25999: _____

2. What is the type of work being conducted (e.g., environmental drilling, test pit excavation) ?

_____

3. Who is the property owner? _____

4. County and city were work is being done? _____

5. Address or street where work is taking place? _____

_____

6. Nearest cross street? _____

7. Distance and direction of the work site from the intersection? _____

8. Marking Instructions (generally locate on entire Site, including rights-of-way and easements): _____

_____

_____

9. What time and date will the locate be completed? _____

10. Utility Locate Request Number? _____

11. Utilities that will be notified? _____

_____

12. Any Overhead Concerns? _____

_____

_____

cc:_____**Page**_____**of**_____

Note: Bold indicates required information.

ATTACHMENT 8
FARALLON FIELD PERSONNEL TRAINING DATES

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

ATTACHMENT 9
AIR MONITORING TABLE AND FORMS

HEALTH AND SAFETY PLAN
Remedial Investigation
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

ACTION LEVEL TABLE FOR AIR MONITORING

The Air Monitoring table (following page) presents protocol for monitoring ambient air for constituents of concern and other parameters that may affect worker safety. Please note the following with respect to use of this table:

- The Level for Respirator Use indicates the concentration at which a respirator must be donned. It does not require that the job stop. The respirator is a piece of equipment that is to be used while determining why a concentration has reached that level. Implement engineering controls such as water mist, spray foam, plastic cover, etc. to reduce the concentration.
- The Level for Work Stoppage indicates the concentration at which work on the job must stop. Determine why a concentration has reached that level, and how it can be decreased. Site evacuation is not necessary at this level. Stopping work does not imply that the concentration level will decrease. Implement engineering controls to reduce the concentration; resume work when it is safe to do so.
- These values can be modified under particular Site conditions and with specific knowledge of the contaminant(s). Should such conditions arise, contact Farallon's Health and Safety Officer at (425) 295-0800.

AIR MONITORING

Chemical (or Class)	Monitoring Equipment	Task	Monitoring Frequency and Location	Level for Respirator Use	Level for Work Stoppage
Volatile Organic Vapors	Flame ionization detector (FID)/photoionization detector (PID) as appropriate for chemicals of concern. Read manual to determine. Draeger Tube for vinyl chloride (Model 1/a; Part Number 67 28031). Draeger Tube for benzene (Model 0.5/a).	From start of mobilization to completion and demobilization.	Sampling should be continuous during the project while disturbing potentially contaminated soil, uncovering and/or removing tanks and piping, or drilling —at least every 15 minutes in the breathing zone. Sample at the exclusion zone boundaries every 30 minutes. Continuously sample during each soil and groundwater sampling interval. If 10 parts per million (ppm) in breathing zone, collect a Draeger Tube for benzene and/or vinyl chloride (depending upon contaminants of concern).	20 ppm above background sustained in breathing zone for 2 minutes, and no benzene and/or vinyl chloride tube discoloration. If a color change appears on the tube for benzene or vinyl chloride at 10 ppm on FID/PID, don respirator. If no Draeger Tube is available, the level for respirator use is to be 5 ppm.	50 ppm above background in breathing zone and no vinyl chloride or benzene tube discoloration. Stop work if tube indicates > 1 ppm for benzene or vinyl chloride. If no Draeger Tube is available, stop work at 25 ppm.

AIR MONITORING EQUIPMENT CALIBRATION/CHECK LOG

Date	Instrument/ Model No.	Serial No.	Battery Check OK?	Zero Adjust OK?	Calibration Gas (ppm)	Reading (ppm)	Leak Check	Performed By	Comments

AIR MONITORING LOG

Date	Time	Location	Source/Area/ Breathing Zone	Instrument	Concentration/Units	Sampled by

APPENDIX B
SAMPLING AND ANALYSIS PLAN

FINAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY WORK PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

FARALLON CONSULTING

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Bend | Baker City
California
Oakland | Sacramento | Irvine

SAMPLING AND ANALYSIS PLAN

GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DRIVE NORTHWEST
GIG HARBOR, WASHINGTON
FACILITY SITE IDENTIFICATION NO. 2566095
AGREED ORDER NO. DE 12803

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 1303-001

For:
Washington State Department of Ecology
Toxics Cleanup Program
300 Desmond Drive Southeast, Lacey
PO Box 47775
Olympia, Washington 98504-7775

On Behalf of:
Gig Harbor Sportsman's Club
c/o Mr. Clark Davis
Davis Law Office, PLLC
7525 Pioneer Way, Suite 101
Gig Harbor, Washington 98335

August 30, 2016

Prepared by:

Jennifer L. Moore
Associate Scientist

Reviewed by:

Peter Jewett, L.G., L.E.G.
Principal Engineering Geologist

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FIGURES

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Sampling and Analysis Plan (SAP) on behalf of the Gig Harbor Sportsman's Club (GHSC) in accordance with the requirements of Agreed Order No. DE 12803 entered into by GHSC and the Washington State Department of Ecology (Ecology) in November 2015, and in accordance with the Washington State Model Toxics Control Act Cleanup Regulation, as established in Chapter 173-340 of the Washington Administrative Code (WAC 173-340). Sampling conducted under this SAP will also be conducted in accordance with the Washington State Sediment Management Standards, as established in WAC 173-204.

The purpose of the SAP is to provide details pertaining to surface water, soil, surface sediment, and groundwater sampling and analysis for the Remedial Investigation (RI) to be conducted at the GHSC property at 9721 Burnham Drive Northwest in Gig Harbor, Washington (herein referred to as the GHSC Property) (Figure 1) and meets the requirements for a Sampling and Analysis Plan as defined in WAC-173-340-820 and WAC 173-204-600. The scope of the RI is discussed further in the *Final Remedial Investigation/Feasibility Study Work Plan, Gig Harbor Sportsman's Club, 9721 Burnham Drive Northwest, Gig Harbor, Washington* dated August 30, 2016, prepared by Farallon (RI/FS Work Plan). This SAP summarizes the standards and procedures to be followed for field quality control, and surface water, soil, surface sediment, and groundwater sample collection and analysis. Quality assurance and quality control (QA/QC) procedures and samples discussed in this SAP are further detailed in the Quality Assurance Project Plan provided in Appendix C of the RI/FS Work Plan.

2.0 BACKGROUND

The GHSC Property includes an outdoor open firing range, shooting berms, and an office building and a storage building constructed in 1950 (Pierce County Assessor-Treasurer's Office 2015). The GHSC Property comprises approximately 35 acres on Pierce County Parcel Nos. 0222313044 and 0222314016 (Figure 2). The GHSC Property is primarily wooded, with the exceptions of an open grass field that comprises the shotgun firing range (shotgun range), buildings, and a bermed firing range for the use of pistols and rifles (rifle and pistol range) on the central and western portions of the GHSC Property. The use of the surrounding area is mixed commercial and residential. GHSC has been in operation since 1947.

An unnamed intermittent stream (herein referred to as the North Creek Tributary) traverses the eastern portion of the GHSC Property (Figure 2). The North Creek Tributary flows into North Creek, south of the GHSC Property. North Creek is a perennial salmon-bearing stream that flows to Gig Harbor in Puget Sound (Ecology 2008).

Current and historical operation of GHSC may have resulted in releases to the environment of hazardous substances, including the metals lead, arsenic, copper, zinc, and antimony from shot, bullets, and bullet jackets, and polycyclic aromatic hydrocarbons (PAHs) from commonly used clay targets. The nature and extent of these hazardous substances, which have been identified as the constituents of potential concern (COPCs) for the RI, have not been adequately assessed. The COPCs are further discussed in the RI/FS Work Plan. The purpose of the RI is to characterize the nature and extent of COPCs resulting from current and historical operation of GHSC, and to provide sufficient information to conduct a feasibility study to assess technically feasible cleanup alternatives for the GHSC Property.

3.0 SAMPLING PROCEDURES

This section details the sampling standards and procedures that will be applied in conducting the RI, presented below by potential media of concern. Samples collected as part of the RI will be submitted to OnSite Environmental Inc. of Redmond, Washington under standard chain-of-custody protocols for analysis according to the procedures described below.

3.1 SURFACE WATER SAMPLING AND ANALYSIS

Surface water samples will be collected from the North Creek Tributary and North Creek at locations across GHSC and downstream areas (Figure 3). The samples will be collected during the wet season between October and April, when there is more consistent flow in both of the creek channels. Additional surface water samples may be collected where surface water enters the creek channels to refine potential source areas for detections of COPCs in surface water samples collected from within the creek channels.

A surface water sample will be collected from the discharge area for the catch basin in the rifle and pistol range. This discharge area is on the western portion of the GHSC Property, proximate to the rifle and pistol range.

3.1.1 Surface Water Sample Identification

The surface water samples will be assigned a unique sample identifier, including the name of the sample location, the medium sampled, and the date the sample was collected (e.g., SD1-SW-010116). The sample identifier will be placed on the sample label, the Field Report form, Sample Summary forms, and the Chain of Custody form.

3.1.2 Surface Water Sample Collection and Handling Procedures

The surface water samples will be collected and handled in accordance with the procedures listed below:

- The samples will be collected by dipping a laboratory-supplied sample container directly into the center of the stream channel flow.
- Care will be taken not to handle the seal or inside cap of the container when the sample is placed into the containers, and the seals/caps will be secured.
- The sample container will be labeled with the medium (surface water), date, time sampled, sample identification and number, project name, project number, and sampler's initials.
- The sample will be logged on a Chain of Custody form and placed into a chilled cooler for transport to the laboratory under chain-of-custody protocols.
- Disposable sampling and health and safety supplies and equipment will be discarded in an appropriate waste dumpster.

- The depth of the flowing water at each surface water sample location will be measured, staked, and surveyed using a portable geopositioning system, and plotted on a scaled drawing. Digital photographs of each location will be taken.

Surface water samples will be analyzed for total and dissolved lead, arsenic, copper, zinc, and antimony by U.S. Environmental Protection Agency (EPA) Method 200.8; for hardness by Method SM 2340B; for PAHs by EPA Method 8270D; and for turbidity by EPA Method 180.1. Additional water quality parameters, including pH, conductivity, and temperature, will be obtained in the field using a Horiba multiparameter probe. The results from the surface water sampling will be evaluated; if COPCs are detected at concentrations exceeding preliminary screening levels, an additional phase of investigation will be required to evaluate the nature and extent of contamination in surface water.

3.2 SOIL SAMPLING AND ANALYSIS

Soil samples will be collected from 42 boring locations in the shotgun range; the rifle and pistol range; and wooded areas on the northern, eastern, and southern portions of the GHSC Property; and on properties east-adjacent to the GHSC Property boundary that could be affected by historical operations of GHSC (Figure 3). Thirty-eight of the borings will be advanced to a total depth of 5 feet below ground surface (bgs), and four of the borings will be advanced to a total depth of approximately 25 feet bgs for the installation of monitoring wells.

Soil cores from each boring will be field-screened for evidence of contamination, including odor, the presence of debris related to current and historical operations of GHSC, photoionization detector measurements, and/or staining. Soil samples will be collected from depths of 0 (ground surface), 0.5, 1.0, and 2.0 feet bgs, and the maximum depth of 5.0 feet bgs. If evidence of contamination is noted during field-screening, additional soil samples will be collected in the boreholes for the monitoring wells at depths below 5 feet bgs.

3.2.1 Soil Sample Identification

The soil samples will be assigned a unique sample identifier, including the name of the sample location, the depth at which the soil sample was collected in feet bgs, and the date the soil sample was collected (e.g., FB1-1.5-010116). The sample identifier will be placed on the sample label, the Field Report form, Sample Summary forms, and the Chain of Custody form.

3.2.2 Soil Sample Collection and Handling Procedures

The soil samples will be collected and handled in accordance with the procedures listed below:

- The samples will be collected from the sample liner or decontaminated hand-auger using decontaminated stainless steel utensils, and placed into a decontaminated stainless steel mixing bowl. Non-dedicated sampling equipment will be decontaminated between uses, as appropriate.

- Information will be logged during each sampling event, including at a minimum: sample depth or elevation, Unified Soil Classification System description, soil moisture, and visual and olfactory indications of potential contamination.
- The soil sample will be thoroughly homogenized using decontaminated stainless steel utensils until the sample is uniform in texture and color.
- The homogenized sample will be placed into certified pre-cleaned sample jars for the specified analyses. Care will be taken not to handle the seal or inside cap of the jar when the sample is placed into the container, and the seal/cap will be secured.
- The sample container will be labeled with the medium (soil), date, time sampled, sample identification and number, project name, project number, and sampler's initials.
- The sample will be logged on a Chain of Custody form and placed into a chilled cooler for transport to the laboratory under chain-of-custody protocols.
- Disposable sampling and health and safety supplies and equipment will be discarded in an appropriate waste dumpster.
- The position of each boring location will be recorded using a portable geopositioning system and plotted on a scaled drawing. Digital photographs will be taken periodically to document soil sampling progress and locations.

Soil samples will be analyzed for lead, arsenic, copper, zinc, and antimony by EPA Method 6020. A subset of the soil samples collected in areas where clay targets have been used will be analyzed for PAHs using EPA Method 8270D. Select soil samples may be prepared using Synthetic Precipitation Leaching Procedures by EPA Method 1312 to assess the leaching potential of metal COPCs present at the GHSC Property. Following evaluation of soil sampling results, an additional phase of investigation may be conducted to evaluate the nature and extent of contamination in soil if the lateral or vertical extent of contamination has not been adequately delineated.

3.3 SURFACE SEDIMENT SAMPLING AND ANALYSIS

Surface sediment samples (0 to 0.5 foot below the mudline) will be collected from the creek beds of the North Creek Tributary and North Creek (Figure 3). The surface sediment samples will be collected proximate to the corresponding surface water samples using a sediment hand corer with a Lexan sample liner or a reusable stainless steel sample tip.

A surface sediment sample will also be collected from the discharge area for the catch basin in the rifle and pistol range. This discharge area is on the western portion of the GHSC Property, proximate to the rifle and pistol range.

3.3.1 Surface Sediment Sample Identification

The samples will be assigned a unique sample identifier, including the name of the sample location, the medium sampled, and the date the surface sediment sample was collected (e.g., SD1-SS-

010116). The sample identifier will be placed on the sample label, the Field Report form, Sample Summary forms, and the Chain of Custody form.

3.3.2 Surface Sediment Sample Collection and Handling Procedures

The surface sediment samples will be collected and handled in accordance with the procedures listed below:

- The samples will be collected from the sample liner or decontaminated stainless steel sampling tip using decontaminated stainless steel utensils, and placed into a decontaminated stainless steel mixing bowl. Reusable non-dedicated sampling equipment will be decontaminated between uses, as appropriate.
- Information will be logged during each sampling event, including at a minimum: sample depth or elevation, Unified Soil Classification System description, presence of debris and/or organisms, sediment moisture, and visual and olfactory indications of potential contamination.
- The surface sediment sample will be thoroughly homogenized using decontaminated stainless steel utensils until the sample is uniform in texture and color.
- The homogenized sample will be placed into certified pre-cleaned sample jars for the specified analyses.
- Care will be taken not to handle the seal or inside cap of the jar when the sample is placed into the sample containers, and the seals/caps will be secured.
- The sample jar will be labeled with the medium (surface sediment), date, time sampled, sample identification and number, project name, project number, and sampler's initials.
- The sample will be logged on a Chain of Custody form and placed into a chilled cooler for transport to the laboratory under chain-of-custody protocols.
- Disposable sampling and health and safety supplies and equipment will be discarded in an appropriate waste dumpster.
- The location of each surface sediment sample will be staked, surveyed using a portable geopositioning system, and plotted on a scaled drawing. Digital photographs of each location will be taken.

Each surface sediment sample will be analyzed for lead, arsenic, copper, and zinc by EPA Method 6020; for total organic carbon by EPA Method 9060A; for PAHs by EPA Method 8270D; and for particle size by Puget Sound Estuary Protocols (EPA – Region 10 1996) and/or American Society for Testing and Materials Standard D-422 methods. Following evaluation of surface sediment sample results, an additional phase of investigation may be required to evaluate the nature and extent of contamination in surface sediment if metals or PAHs are detected at concentrations exceeding sediment preliminary screening levels.

3.4 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples will be collected from each of the four monitoring wells that will be installed in the shotgun range and in the wooded area on the eastern portion of the GHSC Property (Figure 3).

3.4.1 Groundwater Sample Identification

The groundwater samples will be assigned a unique sample identifier, including the name of the sample location and the date the groundwater sample was collected (e.g., MW1-010116). The sample identifier will be placed on the sample label, the Field Report form, Sample Summary forms, and the Chain of Custody form.

3.4.2 Groundwater Sample Collection and Handling Procedures

The groundwater samples will be collected and handled in accordance with the procedures listed below:

- The samples will be collected from the monitoring wells in accordance with standard EPA low-flow groundwater sampling procedures. Each monitoring well will be purged using a bladder pump at flow rates of between 100 and 300 milliliters per minute. Groundwater geochemical parameters, including temperature, pH, specific conductivity, dissolved oxygen, and oxidation-reduction potential, will be recorded approximately every 3 minutes during purging using a Yellow Springs Instrument or Horiba multi-parameter meter equipped with a flow-through cell.
- The tubing intake will be placed at the approximate middle of the water column in each monitoring well.
- Following stabilization of the geochemical parameters, groundwater samples will be collected directly from the pump outlet in accordance with the EPA – Region 1 (1996) guidance for low-flow purging and sampling. If a monitoring well is completely dewatered during purging, samples will be collected after sufficient recharge has occurred to allow filling of all sample containers.
- Groundwater samples will be decanted directly into laboratory-supplied sample containers, with care taken to minimize turbulence. Care will be taken to not handle the seal or lid of the container when the sample is placed into the container. Each container will be filled to eliminate headspace, and the seal/lid will be secured.

Groundwater samples will be analyzed for lead, arsenic, copper, zinc, and antimony by EPA Method 6020, and for PAHs using EPA Method 8270D. Following evaluation of groundwater sampling results, an additional phase of investigation may be conducted to evaluate the nature and extent of contamination in groundwater if the lateral or vertical extent of contamination has not been adequately delineated.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

The QA/QC procedures presented in this section are in accordance with the Quality Assurance Project Plan provided in Appendix C of the RI/FS Work Plan.

4.1 EQUIPMENT DECONTAMINATION PROCEDURES

Reusable/non-dedicated equipment used in the collection of and in direct contact with soil, surface water, and/or surface sediment samples will be decontaminated prior to arrival at the GHSC Property, between samples collected, upon transition between sample locations, and upon exit from the GHSC Property as described below. The equipment will be:

- Rinsed and pre-cleaned with potable or distilled water;
- Washed in a solution of laboratory-grade non-phosphate based soap (i.e., Liquinox);
- Rinsed three times with potable or distilled water;
- Rinsed three times with laboratory-grade distilled deionized water; and
- Air dried.

If decontaminated equipment is not immediately used, it will be wrapped in aluminum foil (dull side facing the equipment) to prevent re-contamination.

The field technicians will wear disposable powder-free nitrile gloves during sample collection and processing. The gloves will be replaced between each sample interval to minimize potential cross-contamination of samples.

4.2 FIELD QUALITY CONTROL SAMPLES

Field quality control samples for this investigation will include field split samples, equipment wipes and wipe blanks for soil and surface sediment samples, and equipment rinsate and deionized distilled water blanks for surface water samples.

4.2.1 Field Duplicate Samples

Field duplicate samples will be collected and analyzed to assess the variability associated with sample processing. Blind field duplicate samples will be collected at a minimum frequency of 1 for every 20 field samples processed for each sample medium. One field duplicate sample will be collected from each sample medium with fewer than 20 samples.

4.2.2 Equipment Wipes and Wipe Blanks

Equipment wipe samples will be collected to help identify possible contamination from the sampling environment or from sampling equipment. Equipment wipe samples will consist of clean ashless filter papers supplied by the analytical laboratory, and will be collected at a minimum frequency of 1 for every 20 soil or surface sediment samples processed for each type of reusable non-dedicated equipment in direct contact with the soil and/or surface sediment being collected.

Equipment wipes will be prepared by wiping down the decontaminated sampling equipment with the filter paper between sampling stations.

One equipment wipe sample will be prepared for each type of analysis conducted (e.g., one equipment wipe sample for metals and one for PAHs), because the equipment can be wiped down only once for each piece of filter paper. This procedure ensures that the filter wipe result represents the most-conservative estimate of cross-contamination for each analysis type. (Note: Filter papers will be stored in pre-cleaned glass jars supplied by the analytical laboratory. Filter papers should not be stored in plastic bags.)

Wipe blanks will be submitted to the analytical laboratory for evaluation of potential background concentrations present in the filter papers used for the equipment wipes. Wipe blanks will be collected at a minimum frequency of one for each lot number of filter papers used for collecting the equipment wipes. Wipe blanks will be archived pending receipt of analytical results for the equipment wipe samples.

4.2.3 Equipment Rinsate and Deionized Distilled Water Blanks

One equipment rinsate sample will be collected for the eight surface water samples collected from the GHSC Property. If additional surface water sampling events are conducted, one equipment rinsate sample will be collected at a minimum frequency of one for every surface water sample event. One deionized distilled water blank will be collected for each equipment rinsate sample to evaluate potential background concentrations present in the laboratory-grade deionized distilled water used for the equipment rinsate samples.

5.0 REFERENCES

Pierce County Assessor-Treasurer's Office. 2015. Current Property Appraisal Report for Parcel Nos. 0222313044 and 0222314016. <http://epip.co.pierce.wa.us/cfapps/atr/epip/search.cfm>. (August 11, 2015.)

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6.0 LIMITATIONS

6.1 GENERAL LIMITATIONS

The conclusions contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- **Accuracy of Information.** Farallon obtained, reviewed, and evaluated certain information used in this report/assessment from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy or authenticity. Should the information upon which Farallon relied prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.
- **Reconnaissance and/or Characterization.** Farallon performed a reconnaissance and/or characterization of the GHSC Property that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions. Contamination may exist in other areas of the GHSC Property that were not investigated or were inaccessible. Activities at the GHSC Property beyond Farallon's control could change at any time after the completion of this report/assessment.

For the foregoing reasons, Farallon cannot and does not warrant or guarantee that the GHSC Property is free of hazardous or potentially hazardous substances or conditions, or that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions can be considered valid only as of the date of the report hereof.

This report/assessment has been prepared in accordance with the contract for services between Farallon and the Gig Harbor Sportsman's Club, and currently accepted industry standards. No other warranties, representations, or certifications are made.

6.2 LIMITATION ON RELIANCE BY THIRD PARTIES

Reliance by third parties is prohibited. This report/assessment has been prepared for the exclusive use of the Gig Harbor Sportsman's Club to address the unique needs of the Gig Harbor Sportsman's Club at the GHSC Property at a specific point in time. Services have been provided to the Gig Harbor Sportsman's Club in accordance with a contract for services between Farallon and the Gig Harbor Sportsman's Club, and generally accepted environmental practices for the subject matter at the time this report was prepared.

No other party may rely on this report unless Farallon agrees in advance to such reliance in writing. Any use, interpretation, or reliance upon this report/assessment by anyone other than the Gig Harbor Sportsman's Club is at the sole risk of that party, and Farallon will have no liability for such unauthorized use, interpretation, or reliance.

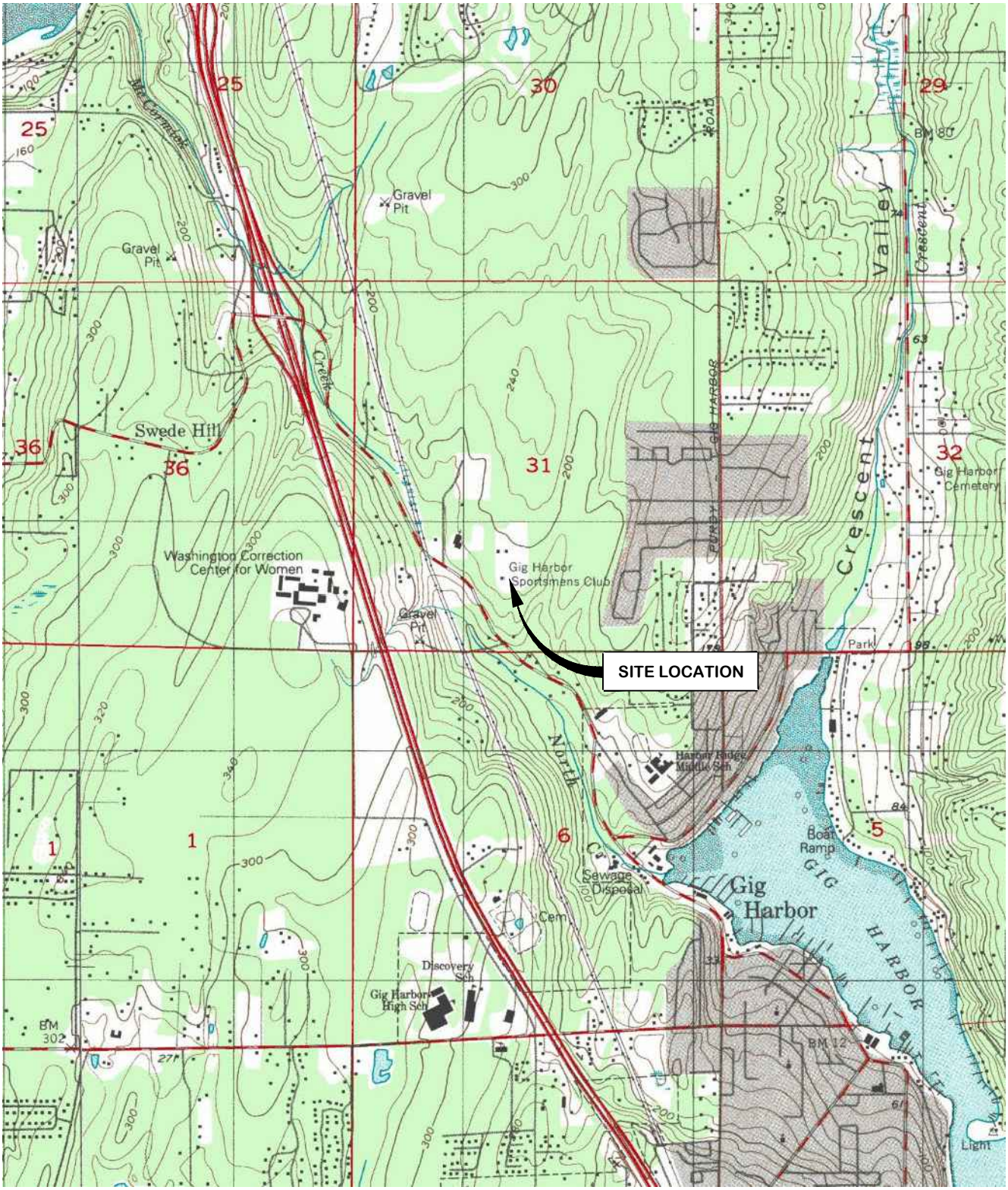
Do not rely on this report/assessment if:

- It was not prepared for you;
- It was not prepared for your project;
- It was not prepared for your specific property; or
- It was not prepared under an approved scope of work for which you are under contract with Farallon.

FIGURES

SAMPLING AND ANALYSIS PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE GIG HARBOR, WASHINGTON. DATED 1996

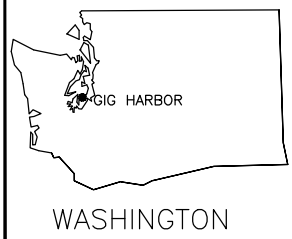


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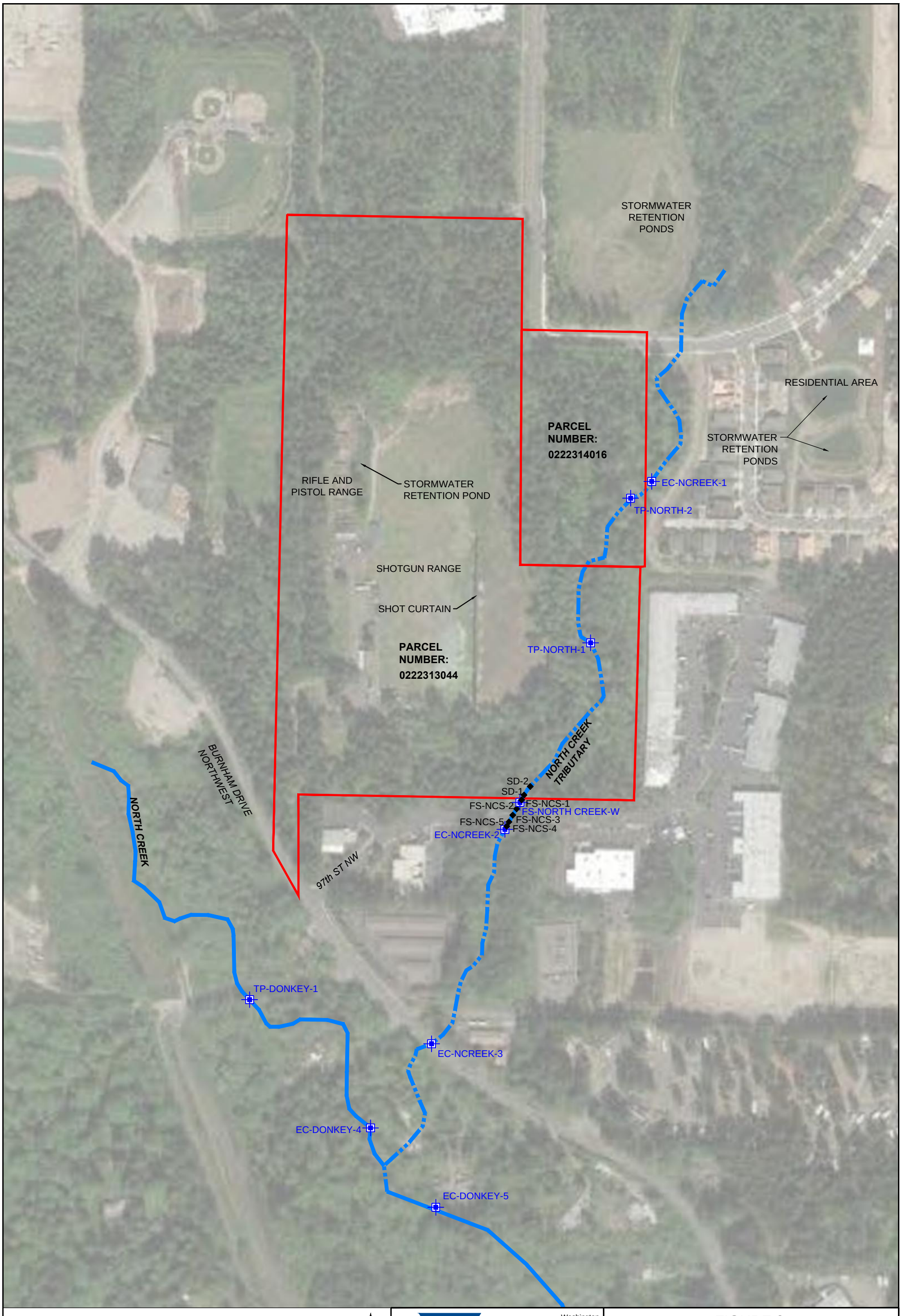
FIGURE 1

SITE VICINITY MAP
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DEW Checked By: JM Date: 11/12/2015 Disk Reference: 1303-001



LEGEND

- SURFACE WATER SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION
- PARCEL BOUNDARY

0 250

SCALE IN FEET

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FIGURE 2

SITE PLAN SHOWING HISTORICAL
SURFACE WATER AND SEDIMENTSAMPLE LOCATIONS
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DJR Checked By: JM Date: 1/18/2016 Disk Reference: 1303-001_b.dwg

4002470041
0222312013
4002470030
STORMWATER RETENTION PONDS
4002470080
4003100790
4003100840
4003100780
4003100770
4003100760
4003100850
4003100750
4003100740
4003100730
4003100690
4003100700
4003100710
0222313023
4003100430
4003100420
4003100440
4003100870
4003100410
4003100450
4003100400
4003100460
STORMWATER RETENTION PONDS
0222313069
STORMWATER RETENTION POND
PARCEL NUMBER: 0222314016
4003100390
4003100470
4003100380
4003100480
4003100830
4003100490
SOCCER FIELD
0222313070
RIFLE AND PISTOL RANGE
4003100360
4003100330
4003100510
4003100530
4003100340
4003100880
COMMUNITY THEATER
0222313012
SHOTGUN RANGE
4003100320
4003100280
4003100820
SHOT CURTAIN
4001020141
4001020121
0222313024
PARCEL NUMBER: 0222313044
BUSINESS PARK
4001020200
BURNHAM DRIVE NORTHWEST
4348100430
0222313020
4001020161
4001020101
NORTH CREEK TRIBUTARY
4001020190
0222313072
4001020010
BUSINESS PARK
4001020052
COMMERCIAL PROPERTIES
4348100150
NORTH CREEK
0222313027
4001020061
0222313052
4001020020
4001020031
4348100140
97th ST NW
COMMERCIAL PROPERTIES
0222313018
0222313063
STORAGE UNITS
ELECTRICAL SUBSTATION
0222313016
0222313050
0222314036
0222314037
0222313053
0222313049
0222313066
RESIDENTIAL
0222062006
STORAGE UNITS
0221062070
0221062064
0221061094
0221061093
0221062010
0221066010
RESIDENTIAL
0221066009
0221065014
0221061050
0221062059
0221062063
0221065013
0221061028

LEGEND

- PARCEL BOUNDARY
- CREEK
- INTERMITTENT CREEK
- PROPOSED LOCATION OF SOIL/SEDIMENT AND SURFACE WATER SAMPLES
- PROPOSED BORING LOCATIONS
- PROPOSED BACKGROUND BORING LOCATIONS
- PROPOSED MONITORING WELL LOCATIONS

ALL LOCATIONS ARE APPROXIMATE

0 250
SCALE IN FEET

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FIGURE 3

SITE PLAN SHOWING
PROPOSED SAMPLE LOCATIONS
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DJR | Checked By: JM | Date: 8/12/2016 | Disk Reference: 1303-001_c.dwg

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

FINAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY WORK PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001

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QUALITY ASSURANCE PROJECT PLAN

GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DRIVE NORTHWEST
GIG HARBOR, WASHINGTON
FACILITY SITE IDENTIFICATION NO. 2566095
AGREED ORDER NO. DE 12803

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 1303-001

For:
Washington State Department of Ecology
Toxics Cleanup Program
300 Desmond Drive SE, Lacey
PO Box 47775
Olympia, Washington 98504-7775

On Behalf of:
Gig Harbor Sportsman's Club
c/o Mr. Clark Davis
Davis Law Office, PLLC
7525 Pioneer Way, Suite 101
Gig Harbor, Washington 98335

August 30, 2016

Prepared by:

Jennifer L. Moore
Associate Scientist

Reviewed by:

Peter Jewett, L.G., L.E.G.
Principal Engineering Geologist

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FIGURES

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Quality Assurance Project Plan (QAPP) on behalf of the Gig Harbor Sportsman's Club (GHSC) in accordance with the requirements of Agreed Order No. DE 12803 entered into by the GHSC and the Washington State Department of Ecology (Ecology) in November 2015, and in accordance with the Washington State Model Toxics Control Act Cleanup Regulation, as established in Chapter 173-340 of the Washington Administrative Code (WAC 173-340). Sampling conducted under this QAPP will also be conducted in accordance with the Washington State Sediment Management Standards, as established in WAC 173-204.

The QAPP identifies the quality assurance/quality control (QA/QC) objectives, protocols, and procedures to be implemented in association with the completion of the Remedial Investigation (RI) scope of work presented in the *Final Remedial Investigation/Feasibility Study Work Plan, Gig Harbor Sportsman's Club, 9721 Burnham Drive Northwest, Gig Harbor, Washington* dated August 30, 2016, prepared by Farallon (RI/FS Work Plan); and the sampling methodology presented in the Sampling and Analysis Plan (SAP) (Appendix B of the RI/FS Work Plan) for the GHSC property at 9721 Burnham Drive Northwest in Gig Harbor, Washington (herein referred to as the GHSC Property) (Figure 1). These criteria include sampling and analytical procedures, data management, QA/QC procedures, performance audits, data assessment, and corrective action procedures. Both quantitative and qualitative measures of data quality are included to ensure that the data quality objectives for the RI are achieved.

2.0 BACKGROUND

The GHSC Property includes an outdoor open firing range, shooting berms, and an office building and a storage building constructed in 1950 (Pierce County Assessor-Treasurer's Office 2015). The GHSC Property comprises approximately 35 acres on Pierce County Parcel Nos. 0222313044 and 0222314016 (Figure 2). The GHSC Property is primarily wooded, with the exceptions of an open grass field that comprises the shotgun firing range, buildings, and a bermed firing range for the use of rifle and pistol on the central and western portions of the GHSC Property. The use of the surrounding area is mixed commercial and residential. GHSC has been in operation since 1947.

An unnamed intermittent stream (herein referred to as the North Creek Tributary) traverses the eastern portion of the GHSC Property (Figure 2). The North Creek Tributary flows into North Creek, south of the GHSC Property. North Creek is a perennial salmon-bearing stream that flows to Gig Harbor in Puget Sound (Ecology 2008).

Current and historical operation of GHSC has resulted in releases to the environment of hazardous substances that may include: the metals lead, arsenic, copper, zinc, and antimony from shot, bullets, and bullet jackets, and polycyclic aromatic hydrocarbons (PAHs) from commonly used clay targets. The nature and extent of these hazardous substances, which have been identified as the constituents of potential concern (COPCs), have not been adequately assessed. The COPCs are further discussed in the RI/FS Work Plan. The purpose of the RI is to characterize the nature and extent of COPCs resulting from current and historical operation of GHSC, and to provide sufficient information to conduct a feasibility study to assess technically feasible cleanup alternatives for the GHSC Property.

3.0 DATA QUALITY OBJECTIVES

The data quality objectives for this project are to develop and implement procedures to ensure that the data are of sufficient quality to accurately document the RI. Observations and measurements will be made and recorded in a manner to yield results representative of the media and conditions observed and/or measured. Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, natural variation at a sampling point, or an environmental condition. Representativeness will be achieved for the RI through strict adherence to the SAP and the QAPP. Goals for representativeness will be met by ensuring that sampling locations are selected properly, a sufficient number of samples are collected, and samples are handled and analyzed in a consistent manner.

The quality of the laboratory data will be assessed using the following parameters: precision, accuracy, representativeness, comparability, and completeness. The definitions of these parameters and applicable quality control procedures are presented below. Quantitative data quality objectives for applicable parameters (i.e., precision, accuracy, completeness) are provided following each definition. Laboratory data quality objectives have been established by the analytical laboratory and are specified in the analytical laboratory Quality Assurance Plan, which is kept on file at the Farallon office.

3.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of two or more measurements compared to their average values. Precision is calculated from the results of duplicate sample analyses, and is quantitatively expressed as the relative percent difference (RPD), calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Where:

C_1 = the larger of the two duplicate results (i.e., the highest detected concentration); and

C_2 = the smaller of the two duplicate results (i.e., the lowest detected concentration).

Quantitative RPD criteria for laboratory duplicate results have been developed by the U.S. Environmental Protection Agency (EPA) for inorganic chemical analysis. The criteria are ±20 percent for water samples, and ±35 percent for soil and/or sediment samples. There are no specific RPD criteria for organic chemical analyses. Laboratory analytical data collected for the RI at the GHSC Property will consist of analyses for organic and inorganic constituents.

Field duplicate samples will be collected and analyzed to assess the variability associated with sample processing through calculation of the RPD. Blind field duplicate samples will be collected at a minimum frequency of 1 for every 20 field samples processed for each sample medium. One field duplicate sample will be collected from each sample medium with fewer than 20 samples.

3.2 ACCURACY

Accuracy is a measure of the closeness (bias) of the measured value of an analytical result to its true value. The accuracy of chemical analytical results is assessed by "spiking" samples in the laboratory with known standards (surrogates or matrix spikes of known concentration) and determining the percent recovery. Accuracy is measured as the percent recovery, calculated as follows:

$$\%R = \frac{(M_{sa} - M_{ua})}{C_{sa}} x\ 100$$

Where:

%R = percent recovery;

M_{sa} = measured concentration in spiked aliquot;

M_{ua} = measured concentration in unspiked aliquot; and

C_{sa} = actual concentration of spike added.

Laboratory matrix spikes and surrogates will be carried out at the analytical laboratory in accordance with EPA SW-846 requirements for organic and inorganic chemical analyses. Quantitative percent recovery criteria have been developed by EPA for laboratory matrix spikes for inorganic analysis. The criteria are 75 to 125 percent when the sample concentration exceeds the spike concentration by a factor of four or more. There are no specific accuracy criteria for organic analyses. Where EPA and Ecology have not provided data validation guidelines, laboratory-derived control limits will be used to assess surrogate recovery and matrix spike results.

The accuracy of sample results can be affected by sample contamination, which can occur because of improperly cleaned sampling equipment, exposure of samples to chemical concentrations in the field or during transport to the laboratory, or chemical concentrations present in the laboratory. To confirm that the samples collected are not contaminated during handling, transport, or analysis, multiple types of blank samples will be analyzed.

3.2.1 Equipment Wipes and Wipe Blanks

Equipment wipe samples will be collected to help identify possible contamination from the sampling environment or from sampling equipment. Equipment wipe samples will consist of clean ashless filter papers supplied by the analytical laboratory, and will be collected at a minimum frequency of 1 for every 20 soil or surface sediment samples processed for each type of reusable non-dedicated equipment in direct contact with the soil and/or surface sediments being collected. Equipment wipes will be prepared by wiping down the decontaminated sampling equipment with the filter paper between sampling stations.

One equipment wipe sample will be prepared for each analysis (e.g., one equipment wipe sample for metals and one for PAHs), because the equipment can be wiped down only once for each piece

of filter paper. This procedure ensures that the filter wipe result represents the most-conservative estimate of cross-contamination for each analysis type. (Note: Filter papers will be stored in pre-cleaned glass jars supplied by the analytical laboratory. Filter papers should not be stored in plastic bags.)

Wipe blanks are submitted to the analytical laboratory for evaluation of potential background concentrations present in the filter papers used for the equipment wipes. Wipe blanks will be collected at a minimum frequency of one for each lot number of filter papers used for collecting the equipment wipes. Wipe blanks will be archived pending receipt of analytical results from the equipment wipe samples.

3.2.2 Equipment Rinsate and Deionized Distilled Water Blanks

One equipment rinsate sample will be collected for the eight surface water samples collected from the GHSC Property. If additional surface water sampling events are conducted, one equipment rinsate sample will be collected at a minimum frequency of one for every surface water sample event. One deionized distilled water blank will be collected for each equipment rinsate sample to evaluate potential background concentrations present in the laboratory-grade deionized distilled water used for the equipment rinsate samples.

3.2.3 Laboratory Method Blanks

The laboratory will run method blanks at a minimum frequency of 5 percent (or one per batch) to assess sample contamination in the laboratory.

3.3 REPRESENTATIVENESS

Representativeness is a qualitative measure of how closely measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sampling collection techniques, sample-handling protocols, sample analysis methods, and data review procedures discussed in the RI/FS Work Plan and the SAP have been developed to ensure that the results obtained are representative of site conditions at the GHSC Property.

3.4 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Use of standard EPA and Ecology methods and procedures for both sample collection and laboratory analysis will make data collected during the RI comparable to data collected during previous investigations conducted by Farallon.

3.5 COMPLETENESS

Completeness is defined as the percentage of measurements judged to be valid. Results will be considered valid if they are not rejected during data validation. Completeness (C) is calculated as follows:

$$C = \frac{(Number\ of\ Valid\ Measurements)}{(Total\ Number\ of\ Measurements)}\ x\ 100$$

The target completeness goal for this work will be 90 percent for a given analysis.

4.0 SAMPLING PROCEDURES

Procedures that will be used to collect, preserve, transport, and store samples are described in the SAP. Sampling protocols will be performed in accordance with generally accepted environmental practices and will meet or exceed current regulatory standards and guidelines. Sampling procedures may be modified if necessary to satisfy amendments to current regulations, methods, or guidelines.

5.0 ANALYTICAL PROCEDURES

Chemical and physical analyses to be conducted during this project are discussed in the SAP. The container types, holding times, analytical methods, practical quantitation limits, and method detection limits will be in accordance with current regulatory guidelines, and will be modified if necessary to satisfy amendments to current regulations, methods, or guidelines.

6.0 DATA MANAGEMENT, REDUCTION, REVIEW, AND REPORTING

This section presents the procedures to be followed for the inventory, control, storage, and retrieval of data collected during the RI. The procedures are designed to ensure that the integrity of the collected data is maintained for subsequent use. In addition, project-tracking data (e.g., schedules, progress reports) will be maintained to monitor, manage, and document the progress of the RI.

Project files and raw data files will be maintained at the Farallon office. Data generated during field activities and by laboratory analysis will be submitted directly to Farallon. Laboratory documentation from the analytical laboratory will be maintained in Farallon's project file for the purpose of validating the analytical data collected during the RI.

6.1 DATA TYPES

A variety of data will be generated by the RI, including sampling and analytical data, progress reports, and calculation results based on mathematical expressions. These data will be scrutinized and maintained in a manner consistent with the procedures described below, and with current and applicable regulatory requirements.

6.2 DATA TRANSFER

Procedures controlling the receipt and distribution of incoming data packages to Farallon and outgoing data and reports from Farallon are described below.

6.2.1 Receipt and Filing of Data and Reports

Incoming documents will be date-stamped. Correspondence and transmittal letters for reports, maps, and data will be filed chronologically. Data packages such as those from field personnel, laboratories, and surveyors (e.g., analytical data, survey data, geologic observations) will be filed by project number, subject heading, and date.

Laboratory analytical data will be transmitted to Farallon as electronic files consisting of full portable document format (PDF) reports and electronic data deliverable (EDD) files. PDF files will be reviewed and filed as described above. EDD files will be uploaded into Farallon's EQuIS database. Farallon uses an EQuIS database to manage large amounts of data, including field measurements and laboratory analytical data. This protocol will facilitate subsequent validation and analysis of these data while avoiding transcription errors that may occur with computer data entry.

6.2.2 Outgoing Data and Reports

A transmittal sheet will be attached to project data and reports sent to outside parties in hard copy form. A copy of each transmittal sheet will be kept in the project file. Delivery receipts will be requested for project data and reports sent to outside parties electronically via Microsoft Outlook. The Project Manager and Project Principal will review outgoing correspondence, reports, maps, data, and other documentation. Original documents will not be distributed to project personnel.

6.3 DATA INVENTORY

Procedures for the filing, storage, and retrieval of project data and reports are discussed below.

6.3.1 Document Filing and Storage

Project files and raw data files will be maintained at the Farallon office. The files will be organized chronologically by subject heading and maintained by the Document Control Clerk at the Farallon office.

6.3.2 Access to Project Files

Access to project files will be controlled by the Document Control Clerk and limited to the GHSC Property owner, authorized representatives of the GHSC Property owner, Ecology, and Farallon personnel. When a file is removed for use, sign-out procedures will be followed by the Document Control Clerk to track custody.

If a document is to be used for an extended period, a copy of the document will be made, and the original will be returned to the project file.

6.4 DATA REDUCTION AND ANALYSIS

The Project Manager and Project Principal are responsible for data review and validation. The type of analysis and the presentation method selected for any given data set will depend on the type, quantity, quality, and prospective use of the data. Analysis of project data likely will require data reduction for preparation of tables, charts, and maps. To ensure that data are accurately transferred during the reduction process, Farallon's EQuIS database will be used, and the Project Principal or designee (someone other than the person who prepared the map, table, or chart) will check the reduced data. An incorrect transfer of data will be highlighted and corrected.

6.4.1 Data Reporting Formats

The physical and chemical characterization information developed during implementation of the RI will be presented in the RI/FS Report, as described below:

- **Summary Tables—**Laboratory analytical data will be exported from Farallon's EQuIS database into summary tables, and sorted according to various parameters to facilitate assimilation and presentation. Sampling and analysis data for each medium will be sorted several ways, including by sample point number, date of sample collection, and constituent. The parameters chosen for sorting will depend on determination of the most-appropriate format and the utility of that format in demonstrating the physical and chemical characteristics of interest.
- **Maps—**Plan maps needed to illustrate results from the RI will be assembled or prepared. These maps may include but are not limited to plan maps of the GHSC Property showing chemical concentrations for individual chemicals and groups of chemicals, and maps depicting other information of interest in surrounding areas.

- **Cross-Sections—**Vertical profiles (or cross-sections) may be generated from field data to display GHSC Property stratigraphy or other aspects of the RI.
- **Environmental Information Management—**Environmental sampling data for the GHSC Property will be submitted in electronic format through Ecology's Environmental Information Management Database consistent with the procedures specified in Ecology Toxic Cleanup Program Policy 840.

6.5 TELEPHONE LOGS, MEETING NOTES, AND FIELD NOTES

The Project Manager will maintain notes from project meetings and telephone conversations in the project file. Project field personnel will submit field notes to the Project Manager throughout the field program for review and filing in the project file.

6.6 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

The QA/QC procedures for the RI include the field, laboratory, and data quality control procedures discussed below.

6.6.1 Field Quality Control

Field quality control samples (e.g., field duplicate samples and equipment wipes and wipe blanks) to be collected for the RI are described in the SAP (Appendix B of the RI/FS Work Plan).

6.6.2 Laboratory Quality Control

Analytical laboratory QA/QC procedures are presented in the laboratory Quality Assurance Plan on file at the Farallon office.

6.6.3 Data Quality Control

The data will undergo two levels of QA/QC evaluation: one by the laboratory for the analytical data, and one by Farallon for both analytical and field data. As specified in the laboratory Quality Assurance Plan, the laboratory will perform initial data reduction, evaluation, and reporting. The analytical data will then be validated by Farallon under the supervision of the Project Principal. The following types of quality control information will be reviewed, as appropriate:

- Method deviations;
- Sample extraction and holding times;
- Method reporting limits;
- Blank samples;
- Duplicate samples;
- Matrix spike/matrix spike duplicate samples (accuracy);
- Surrogate recoveries;

- Percent completeness; and
- RPD (precision).

Farallon will review field records and results from field observations and measurements to ensure that procedures were properly performed and documented. Review of field procedures will apply to:

- The completeness and legibility of field logs and sampling forms;
- The preparation and frequency of field quality control samples;
- Equipment calibration and maintenance; and
- Chain of Custody forms.

7.0 PERFORMANCE AND SYSTEM AUDITS

Performance audits will be completed for both sampling and analysis work. Field performance will be monitored through regular review of Chain of Custody forms, field notebooks, sampling forms, and field duplicate sampling and analysis. The Project Manager and/or Project Principal also may perform periodic on-site review of work in progress.

Accreditations from Ecology received by the analytical laboratory for each analysis performed demonstrate the laboratory's ability to properly perform the requested methods. Therefore, a system audit of the analytical laboratory will not be conducted during the course of this project.

The Project Manager and/or Project Principal will oversee communication with the analytical laboratory on a frequent basis while samples are being processed and analyzed at the laboratory. This process will allow Farallon to assess progress toward obtaining the data quality objectives, and to take corrective measures if a problem is identified.

The analytical laboratory will be responsible for identifying and correcting (as appropriate) deviations from performance standards, as discussed in the laboratory Quality Assurance Plan. The laboratory will communicate to the Project Manager or Project Principal a deviation from performance standards, and appropriate corrective measures taken during sample analysis.

7.1 DATA ASSESSMENT PROCEDURES

The Project Manager and Project Principal are responsible for data review and validation. Upon receipt of each data package from the laboratory, calculations using the equations presented for precision, accuracy, and completeness will be performed. Results will be compared to the qualitative data quality objectives.

7.2 CORRECTIVE ACTION

Corrective action will be the joint responsibility of the Project Manager and Project Principal. Corrective procedures may include:

- Identifying the source of the violation;
- Re-analyzing samples if holding time criteria permit;
- Re-sampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Qualifying data to indicate the level of uncertainty.

During field sampling activities, the Project Manager and field team members will be responsible for identifying and correcting protocols that may compromise data quality. If a situation potentially requiring corrective action is identified, the Project Manager and/or Project Principal will be notified verbally to obtain approval to proceed before a corrective action is implemented. Corrective action taken will be documented in the Field Report form.

8.0 REFERENCES

Pierce County Assessor-Treasurer's Office. 2015. Current Property Appraisal Report for Parcel Nos. 0222313044 and 0222314016. <http://epip.co.pierce.wa.us/cfapps/atr/epip/search.cfm>. (August 11, 2015.)

Washington State Department of Ecology (Ecology). 2008. *Lead and Copper Concentrations In North Creek, Gig Harbor*. Publication No. 08-03-038. December.

9.0 LIMITATIONS

9.1 GENERAL LIMITATIONS

The conclusions contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- **Accuracy of Information.** Farallon obtained, reviewed, and evaluated certain information used in this report/assessment from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy or authenticity. Should the information upon which Farallon relied prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.
- **Reconnaissance and/or Characterization.** Farallon performed a reconnaissance and/or characterization of the GHSC Property that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions. Contamination may exist in other areas of the GHSC Property that were not investigated or were inaccessible. Activities at the GHSC Property beyond Farallon's control could change at any time after the completion of this report/assessment.

For the foregoing reasons, Farallon cannot and does not warrant or guarantee that the GHSC Property is free of hazardous or potentially hazardous substances or conditions, or that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions can be considered valid only as of the date of the report hereof.

This report/assessment has been prepared in accordance with the contract for services between Farallon and the Gig Harbor Sportsman's Club, and currently accepted industry standards. No other warranties, representations, or certifications are made.

9.2 LIMITATION ON RELIANCE BY THIRD PARTIES

Reliance by third parties is prohibited. This report/assessment has been prepared for the exclusive use of the Gig Harbor Sportsman's Club to address the unique needs of Gig Harbor Sportsman's Club at the GHSC Property at a specific point in time. Services have been provided to the Gig Harbor Sportsman's Club in accordance with a contract for services between Farallon and the Gig Harbor Sportsman's Club, and generally accepted environmental practices for the subject matter at the time this report was prepared.

No other party may rely on this report unless Farallon agrees in advance to such reliance in writing. Any use, interpretation, or reliance upon this report/assessment by anyone other than the Gig Harbor Sportsman's Club is at the sole risk of that party, and Farallon will have no liability for such unauthorized use, interpretation, or reliance.

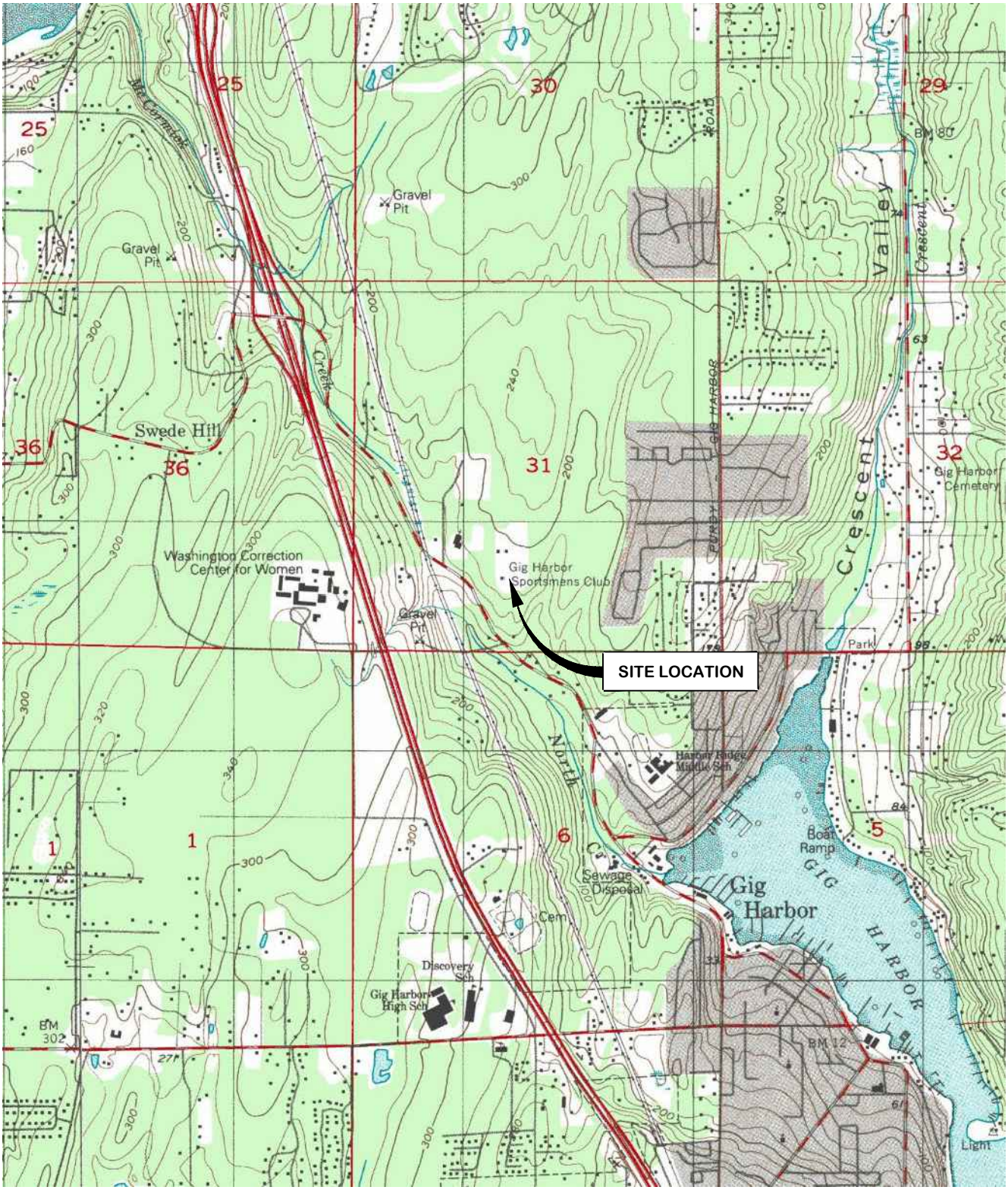
Do not rely on this report/assessment if:

- It was not prepared for you;
- It was not prepared for your project;
- It was not prepared for your specific property; or
- It was not prepared under an approved scope of work for which you are under contract with Farallon.

FIGURES

QUALITY ASSURANCE PROJECT PLAN
Gig Harbor Sportsman's Club
9721 Burnham Drive Northwest
Gig Harbor, Washington

Farallon PN: 1303-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE GIG HARBOR, WASHINGTON. DATED 1996

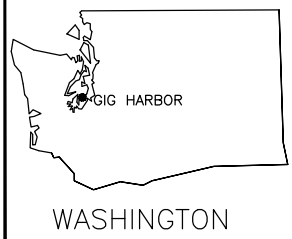


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FIGURE 1

SITE VICINITY MAP
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DEW Checked By: JM Date: 11/12/2015 Disk Reference: 1303-001

4002470041
0222312013
4002470030
STORMWATER RETENTION PONDS
4002470080
4003100790
4003100840
4003100780
4003100770
4003100760
4003100850
4003100750
4003100740
4003100730
4003100690
4003100700
4003100710
0222313023
4003100430
4003100420
4003100440
4003100870
4003100410
4003100450
0222313069
4003100400
4003100460
STORMWATER RETENTION POND
STORMWATER RETENTION PONDS
PARCEL NUMBER: 0222314016
4003100390
4003100470
4003100380
4003100480
4003100830
4003100490
SOCCER FIELD
0222313070
RIFLE AND PISTOL RANGE
4003100360
4003100330
4003100510
4003100530
4003100340
4003100880
COMMUNITY THEATER
0222313012
SHOTGUN RANGE
4003100320
4003100280
4003100820
SHOT CURTAIN
4001020141
4001020121
0222313024
PARCEL NUMBER: 0222313044
BUSINESS PARK
4001020200
BURNHAM DRIVE NORTHWEST
4348100430
0222313020
4001020161
4001020101
NORTH CREEK TRIBUTARY
4001020190
0222313072
4001020010
BUSINESS PARK
4001020052
COMMERCIAL PROPERTIES
4348100150
NORTH CREEK
0222313027
4001020061
0222313052
4001020020
4001020031
4348100140
97th ST NW
COMMERCIAL PROPERTIES
0222313018
0222313063
STORAGE UNITS
ELECTRICAL SUBSTATION
0222313016
0222313050
0222314036
0222314037
0222313053
0222313049
0222313066
RESIDENTIAL
0221062006
STORAGE UNITS
0221062070
0221062064
0221061094
0221061093
0221062010
0221066010
RESIDENTIAL
0221066009
0221065014
0221061050
0221062059
0221062063
0221065013
0221061028

LEGEND

- PARCEL BOUNDARY
- CREEK
- INTERMITTENT CREEK
- PROPOSED LOCATION OF SOIL/SEDIMENT AND SURFACE WATER SAMPLES
- PROPOSED BORING LOCATIONS
- PROPOSED BACKGROUND BORING LOCATIONS
- PROPOSED MONITORING WELL LOCATIONS

ALL LOCATIONS ARE APPROXIMATE

0 250
SCALE IN FEET

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FIGURE 2

SITE PLAN SHOWING
PROPOSED SAMPLE LOCATIONS
GIG HARBOR SPORTSMAN'S CLUB
9721 BURNHAM DR NW
GIG HARBOR, WASHINGTON

FARALLON PN: 1303-001

Drawn By: DJR | Checked By: JM | Date: 8/12/2016 | Disk Reference: 1303-001_c.dwg