Draft
Project Startup Summary Report
Bellevue Airfield Park Development
(Former Eastgate Landfill)
Bellevue, Washington

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Prepared for

Walker Macy
Portland, Oregon

LANDAU ASSOCIATES

130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

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LIST OF ABBREVIATIONS AND ACRONYMS

AO ..... Agreed Order
BMC ..... Bellevue Municipal Code
Boeing ..... The Boeing Company
City ..... City of Bellevue
COC ..... chain-of-custody
COD ..... chemical oxygen demand
DNS ..... Determination of Nonsignificance
Ecology ..... Washington State Department of Ecology
EPA ..... U.S. Environmental Protection Agency
HPA ..... hydraulic project approval
IP ..... induced polarization
LTCA ..... Local Toxic Controls Account
LUC ..... City Land Use Code
mg/L ..... milligrams per liter
µg/L ..... micrograms per liter
MTCA ..... Model Toxics Control Act
NFA ..... no further action
PLPs ..... potentially liable persons
Ppb ..... parts per billion
PVC ..... polyvinylchloride
RCW ..... Revised Code of Washington
SEPA ..... State Environmental Policy Act
TOC ..... total organic carbon
USACE ..... U.S. Army Corps of Engineers
VCP ..... Voluntary Cleanup Program
VOC ..... volatile organic compound
WAC ..... Washington Administrative Code
WDFW ..... Washington State Department of Fish and Wildlife

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1.0 INTRODUCTION

This report summarizes Landau Associates' project startup (Task 1) evaluations and recommendations related to the proposed Bellevue Airfield Park (Park) development at the site of the former Eastgate Landfill in Bellevue, Washington (Figure 1-1). The proposed Park will include two synthetic turf athletic fields, concessions and restroom facilities, play and picnic areas, pedestrian trails, a spray deck, expansion and improvements to existing stormwater management facilities, and lighting and parking improvements.

A portion of the Park site overlies the closed Eastgate Landfill, which has environmental restrictions and ongoing monitoring requirements under the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) voluntary cleanup program (VCP) and an environmental covenant for the site dated November 12, 2008.

Landau Associates, under subcontract to Walker Macy, is assisting the design team and the City of Bellevue (City) by providing environmental engineering, permitting support, geotechnical engineering, and landfill cover design services for Phase 1 of the Park development. Evaluations and recommendations related to stormwater management, utilities, civil engineering design, landfill gas management, and air quality monitoring will be provided separately by other members of the Walker Macy design team.

Improvements associated with Phase 1 of the Park development include the Park entry, southern athletic field, concessions and restroom building, stormwater facilities and detention pond expansion, trails, and certain modifications to the groundwater monitoring and landfill gas control systems.

1.1 Site Description

The proposed Bellevue Airfield Park is located adjacent to the I-90 Business Park in Bellevue, Washington (Figure 1-1). A master plan for the Park, entitled "Bellevue Airfield Park, Eastgate Area Properties Master Plan," was prepared in 2012 for the City of Bellevue Parks & Community Services Department by The Portico Group (The Portico Group 2012). The Eastgate Area Properties are comprised of three parcels totaling 27.9 acres within the Phantom Lake watershed. The City previously purchased portions of these properties from The Boeing Company (Boeing) and the Bellevue School District with the intent of developing an active-use community park. An access road (SE 30th PL, also referred to as the "Shared Entrance Road") has already been constructed along the southern side of the proposed Park as part of the Advanta Office Commons development.

The proposed Park site includes the former Eastgate Landfill, which was operated by King County as a municipal solid waste landfill and accepted household and demolition wastes from 1951 until it was closed and covered in 1964. The Bellevue Airfield runway was subsequently extended over the former landfill, and operated until 1983. After landfill closure, Cabot, Cabot & Forbes purchased property, including most of the landfill, and developed the I-90 Business Park. Boeing acquired portions of the

former Eastgate Landfill property and adjacent properties in 1980 and 1983. The Boeing-owned property was partially developed by Boeing in the mid to late 1980s; however, no buildings have been constructed directly over the former landfill to date. Closure activities performed at the landfill by King County; Cabot, Cabot & Forbes; the City of Bellevue; or Boeing include landfill capping with a soil cover, groundwater monitoring, stormwater management, leachate collection, and landfill gas migration control (Landau Associates 2000). Leachate is collected on the north side of the landfill in a French drain that discharges to the King County sanitary sewer. Groundwater monitoring wells and landfill gas extraction and monitoring wells are located around the perimeter of the landfill. Monitoring well locations, the gas extraction system, the leachate collection system, and the approximate landfill area are shown on Figure 1-2.

In 2007 to 2008, the Advanta Office Commons development (including three buildings designated buildings A, B, and C, a parking garage, and a shared entrance road) was constructed by Schnitzer Northwest LLC (Schnitzer) adjacent to the southern end of the landfill. This resulted in construction of relatively low-permeability hardscape surfaces (asphalt roadways and parking areas) over a portion of the southern extent of the landfill.

1.2 Report Organization

This report summarizes the project startup (Task 1) activities conducted by Landau Associates. It is divided into sections relating to specific subtasks. Section 2 presents the Wetland/Waterway Delineation and Classification; Section 3 presents the Geotechnical Analysis; Section 4 presents the Groundwater Monitoring and Leachate Collection Systems Assessment; Section 5 presents the Model Toxics Cleanup Act (MTCA) Compliance Analysis; and Section 6 presents a summary table of our recommended Task 2 action items.

2.0 WETLAND/WATERWAY DELINEATION AND CLASSIFICATION

Landau Associates conducted a wetland/waterway investigation to assist the City in determining potential impacts to wetlands and other "waters of the U.S.," and other critical areas regulated by the City. The results of Landau Associates' wetland delineation are presented in Appendix A and summarized below.

2.1 Regulatory Background

The Clean Water Act requires authorization for the discharge of dredged or fill material into the "waters of the U.S." under Section 404. The City Land Use Code (LUC) contains requirements for establishing wetland and stream buffer widths and building setbacks, and for any alteration, including fill, of wetlands, streams, and their buffers. Ecology requires compliance with the State Water Pollution Control Act [Revised Code of Washington (RCW) 90.48], and it has administrative oversight of Section 401 of the Clean Water Act for water quality certification in the case of impacts to U.S. Army Corps of Engineers (USACE) jurisdictional "waters of the U.S." Any work that will use, divert, obstruct, or change the bed or flow of state waters, including streams and rivers, must do so under the terms of Hydraulic Project Approval (HPA) issued by the Washington Department of Fish and Wildlife (WDFW). WDFW HPA is administered under RCW 77.55 and rules set forth in Washington Administrative Code (WAC) 220-110. Wetlands and certain waterways are regulated by federal, state, and local governmental agencies, and compliance with one agency does not necessarily fulfill permitting requirements of any other agencies.

All wetlands and waterways described in this report are subject to verification by the USACE. The USACE determines the jurisdiction of a wetland based on the connection, more commonly referred to as adjacency, to other "waters of the U.S." Those wetlands determined to be "isolated" do not fall under the jurisdiction of the USACE. If identified "waters of the U.S." are determined to be adjacent rather than isolated; any filling or dredging of onsite wetlands/streams would require compliance with Section 404 and 401 of the Clean Water Act and the Endangered Species Act. Only the USACE can make the determination if a "waters of the U.S." is adjacent or isolated. If wetlands are determined to be isolated, they may still be subject to regulation by Ecology under the State Water Pollution Control Act (RCW 90.48).

2.2 Methodology

Landau Associates conducted this wetland delineation in accordance with the USACE Wetland Delineation Manual (USACE 1987) and USACE Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010). The investigation of waterways was based on the methodology provided by Ecology's Determining the Ordinary High Water Mark on Streams in Washington State (Olson 2010) and City of Bellevue Critical Areas code (Part 20.25H) of the LUC.

"Difficult wetland situations" may occur in which one or more of the required criteria have been disturbed by human or natural events (atypical situations) or are absent due to natural variability

(problem areas). In cases of difficult wetland situations, a wetland determination can be based on the best available information of the site, knowledge of the ecology of wetlands in the region, and/or other undisturbed or present criteria at the time of the evaluation. At the time of the field investigation, a statewide drought emergency had been declared due to low snowpack (Ecology 2015), and methodology for "difficult wetland situations" may apply.

2.3 Field Investigation

Detailed information on soils, vegetation, and hydrology was recorded at three sampling points, and the boundaries of one wetland was delineated. No regulated waterways were identified in the study area.

2.3.1 Wetland A/A1

Wetland A/A1 is approximately 600 square feet (subject to survey verification), and is located on the north facing slope south of stormwater Pond A (Figure 2-1). This wetland is in the vicinity of wetland identified in the 2002 *Wetland, Stream, and Wildlife Habitat Study, Bellevue Airport Site* (The Watershed Company 2002). The wetland consists of two relatively small areas on the slope separated by a narrow rise in elevation parallel to the slope.

The dominant plant species and their indicator status in the wetland include reed canarygrass (*Phalaris arundinacea*, FACW) and Himalayan blackberry (*Rubus armeniacus*, FACU). Additional species found in Wetland A/A1 include but are not limited to soft rush (*Juncus effusus*, FACW) and evergreen blackberry (*Rubus lacineiatus*, FACU). Following the prevalence index for determining dominance of hydrophytic vegetation, the wetland includes areas containing both reed canary grass and soft rush.

The soil in Wetland A/A1 is characterized as sandy redox, which satisfies USACE hydric soils parameter. No primary indicator of wetland hydrology was observed at the time of the field investigation. However, previous investigation of the site reference observation of saturation and ground seeps from the adjacent landfill. Drought conditions and years with unusually low winter snowpack are identified as a "difficult wetland situation" in the USACE Regional Supplement. In these instances, if wetland hydrology indicators appear to be absent on a site that has hydrophytic vegetation and hydric soils, no significant hydrologic manipulation (e.g., no dams, levees, water diversions, land grading, etc., and the site is not within the zone of influence of any drainage ditches or subsurface drains), the area should be identified as a wetland. The site may be re-visited and checked again for wetland hydrology indicators during normal periods.

Using the Ecology wetland rating form, Wetland A is rated as a Category 4 wetland, In accordance with Chapter 20.25H.095 Bellevue Municipal Code (BMC), Category 4 wetlands under 2,500 square feet are not designated critical areas, and no buffer is assigned.

2.3.2 Stormwater Pond A

A three-cell stormwater detention pond (Pond A) was observed within the north central portion of the project area. Pond A is designed as a wet pond, and contained standing water in each cell at the time of the field investigation. Pond A was initially constructed in the early 1980s and was modified to a three-cell configuration in 1983 to improve its water quality treatment capability. Pond A is reportedly dredged every 5 to 10 years (City of Bellevue Staff, 2015, personal communication). Pond A is bordered by walking trails and drains via underground piping to Phantom Lake. The Pond A stormwater detention cells appear to be excavations and are presumed to have been constructed in uplands.

2.4 Regulatory Assessment

As indicated in the City of Bellevue Municipal Code, and in accordance with the Growth Management Act, wetlands are "…areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands." As mentioned above, Category 4 wetlands less than 2,500 square feet are not designated critical areas in accordance with the BMC. As a result, Wetland A/A1 and the stormwater detention ponds are not considered critical area features regulated by the City.

Based on guidance developed by the U.S. Environmental Protection Agency (EPA) and USACE (EPA; USACE 2007), the agencies assert jurisdiction based on adjacency and significant nexus to traditional navigable waters. In accordance with current definition of "waters of the United States" (effective August 28, 2015), stormwater control features created in dry land are not waters of the U.S. As a result, the stormwater detention ponds are not jurisdictional waters of the U.S. Wetland A/A1 may be a jurisdictional "waters of the U.S." due to possible connectivity to Phantom Lake, which drains to Lake Sammamish. However, the wetland is located immediately upslope of the existing landfill leachate French drain, which discharges to the King County sanitary sewer. The purpose of the French drain is to intercept landfill leachate and protect water quality in the downgradient stormwater pond. Drainage from Wetland A/A1 is likely intercepted by the French drain.

3.0 GEOTECHNICAL ANALYSIS

This section summarizes our initial evaluation of subsurface conditions at the site as documented in previous studies, and our initial recommendations for Task 2 geotechnical investigations for the Phase 1 improvements for the proposed Park development.

3.1 General Geologic Conditions

General geologic information for the project site was obtained from the Geologic Map of King County, Washington (Booth, Troost, and Wisher 2006), published by the University of Washington. According to this geologic map, near-surface deposits in the vicinity of the project site consist of alluvial soils, recessional outwash, glacial till, and advance outwash. Soil defined as alluvium is characterized as a loose to medium dense, moderately sorted mixture of gravel and sand with varying amount of silt and clay and silty fine sand with clayey silt interbeds. Recessional outwash soils are typically described as loose to medium dense, stratified sand and gravel deposits and/or well bedded silty sand and silty clay. Soil defined as glacial till typically consists of a dense to very dense, unsorted mixture of subrounded boulders, cobbles, gravel, and sand in a matrix of silt and clay. Advance outwash deposits typically include dense to very dense well bedded sand and gravel.

3.2 Surface Conditions

The surface of the existing soil cap layer over the former Eastgate Landfill exhibits a generally hummocky topography with depressions and ridges that appear to promote surface drainage toward the north. Elevations across the upper portions of the soil cap over the landfill range from 350 to about 335 ft (NAVD 1988). Vegetation across the former landfill typically consists of maintained grass and gravel pathways, with asphalt paved surfaces over the southern portion of the landfill associated with the shared entrance road, parking areas, and the former helicopter pad that is currently used as a basketball court. Along the northern face of the landfill, the site slopes moderately down to the north toward Pond A (the existing three cell stormwater detention pond), with elevations ranging from 340 to about 300 ft. A gravel path circles Pond A, which is located near the bottom of a generally flat north-south trending valley. Moderate to steep slopes covered with heavy vegetation bound the east and west side of the valley where Pond A is located. Existing site topography is illustrated on Figure 3-1.

3.3 Subsurface Soil Conditions

To evaluate the subsurface conditions, we reviewed the following reports and exploration logs:

- Groundwater Investigation, Former Eastgate Landfill, Bellevue, Washington, dated September 26, 2000, prepared by Landau Associates.
- Annual Groundwater Monitoring and Well Construction Detail Report, Former Eastgate Landfill, Bellevue, Washington, dated May 23, 2008, prepared by Landau Associates.
- Groundwater Monitoring Well Logs, dated 2007, prepared by SCS Engineers.
- Gas Probe Monitoring Well Logs, dated 2007, prepared by SCS Engineers.

- Closing Report, Geotechnical Services during Construction, Eastgate Landfill, Landfill Gas Collection System, Bellevue, Washington, dated October 29, 1986, prepared by GeoEngineers.
- Geotechnical and Environmental Studies, Bellevue Airport Site, Bellevue, Washington, dated May 28, 2002, prepared by AMEC Earth & Environmental.
- Report on Site Characterization Study, Portion of Boeing Eastgate Property, Bellevue, Washington, dated December 21, 2004, prepared by Golder Associates.
- Report, Geotechnical Engineering Services, Duct Bank Relocation, Boeing Eastgate Landfill, Bellevue, Washington, dated June 28, 2004, prepared by GeoEngineers.
- Eastgate Landfill Interim Status Report, dated April 22, 1986, prepared by Sweet, Edwards, & Associates.
- Eastgate Landfill Phase II Report, dated June 30, 1986, prepared by Sweet, Edwards, & Associates.
- Eastgate Landfill Summary Report, dated January 17, 1986, prepared by Sweet, Edwards, & Associates.
- Geotechnical Report, Parking Lot Subsidence Investigation, Boeing Computer Center, Bellevue, Washington, dated November 4, 1994, prepared by Converse Consultants NW.

Five geologic units have been identified at the site, in addition to the landfill solid waste materials. Previous reports have included borings for a variety of project and site features and have also included figures that show the relative position of the identified units. Approximate locations of selected borings from past studies and site work are shown on Figure 3-1. The geologic units and landfill solid waste are summarized below in order of increasing depth from the ground surface.

- Soil Fill - soil fill overlies most of the developed areas of the site and also is present as the soil cap layer over the underlying landfill area. The soil fill generally consists of silty, fine to medium sand with occasional fine gravel. The thickness of the soil fill over the landfill solid waste was typically reported to vary from about 2 to 19 ft across the site.
- Landfill Solid Waste - the solid waste fill material below the surficial soil fill generally consists of a mixture of soil and municipal solid waste including brick, timber, asphalt, wood, paper, metal, plastic, glass and concrete. The solid waste was landfilled between 1951 and 1964 (Landau Associates 2000), so the putrescible portions of the waste would likely be in an advanced state of decay or not present. The solid waste material varies in thickness and was generally encountered to depths of about 2 to 42 ft below ground surface (BGS) across the site.
- Alluvium – alluvium underlies the fill materials, and is typically an unconsolidated silty fine sand with clayey silt interbeds that underlies the northern area and forms the upper side slopes of the former landfill. The maximum identified thickness of alluvium was 12 ft. The top of the alluvium is interpreted to be the pre-development ground surface.
- Glacial till – the glacial till is typically a very dense, silty sand containing variable amounts of fine to medium gravel and scattered cobbles. Glacial till was observed to be discontinuous at the site, generally below the southern bottom and side slopes of the landfill and, where

encountered in borings, ranged from about 9 to 42 ft thick. It was not interpreted to be present in the vicinity of detention Pond A.

- Advance Outwash – advance outwash encountered below the glacial till and alluvium is typically a dense, slightly silty to silty, fine to medium sand with minor amounts of gravel. Silt lenses were commonly encountered within the advance outwash deposits. The maximum encountered thickness of advance outwash was greater than 37 ft.
- Lacustrine deposits – lacustrine deposits underlie the advance outwash unit and apparently becomes finer-grained with depth. The upper portion consists of interbedded sand and silt and the lower portion consists of silt interbedded with thinly laminated sand and silty sand. The lower limit of this unit is below the depth of exploratory borings advanced at the site to date.

3.4 Other subsurface information

Golder Associates (Golder) carried out a geophysical study in 2004 on the southern boundary of the landfill area along the shared entrance road for the Advanta Office Commons development located to the south of the project site (Golder 2004). Golder Associates conducted six induced polarization (IP) surveys and 10 electromagnetic (EM-31) surveys to define the limits of the landfill in this area. The approximate locations of the surveys are shown on Figures 3-1 and 3.2. Based on the results of their geophysical surveys, Golder reported that the landfill cap in the study area varied in thickness from 2 ft to 15 ft with a typical thickness of about 10 ft. Golder also reported that the landfill deposits extended to depths of up to 40 ft BGS and provided their interpretation of the landfill boundary along the southern portion of the site. Golder's finding generally confirmed the subsurface soil conditions described in previous reports along the southern portion of the site.

Figures 3-3 through 3-6 present a site plan and three geologic cross sections presented in the 2007 Annual Groundwater Monitoring Report (Landau Associates 2008). These figures indicate the locations where glacial till is known to be present and where glacial till is known not to be present in the site vicinity, based on prior investigations and subsurface information obtained during installation of piezometer EL-107 and installation of replacement monitoring wells EL-101R and EL-106R. Figures 3-4 through 3-6 also show interpretations of the location and depth of the landfill solid waste and the soil units at the three cross section locations. These interpretations will be revised and updated as part of the Task 2 geotechnical investigation.

Groundwater conditions at the site have been studied as part of environmental compliance monitoring for the landfill. A summary of the groundwater conditions in the vicinity of the landfill is provided in Section 4.0.

3.5 Recommendations

Figures 3-1 and 3-2 were developed to show the locations of selected subsurface explorations and geophysical surveys conducted at the site. These figures, along with our preliminary evaluation of

subsurface conditions near the landfill area, were used to help identify certain data gaps and determine the need and extent for additional exploratory borings, test pits and geophysical surveys.

Based on our review of available data, we recommend a slightly modified approach to complete the geotechnical investigation under Task 2.3 for the Phase 1 improvements, as described below.

- Perform an additional geophysical investigation including IP and EM-31 surveys at the locations shown on Figure 3-2. It is our opinion that, with the data from the proposed geophysical survey lines and the existing exploration information, we will likely have adequate information to refine the limits and depths of the underlying landfill solid waste materials.
- After specific locations and preliminary details of the proposed Phase 1 Park development features and structures are established, Landau Associates will develop and conduct the exploratory program that includes additional borings and test pits, and develop geotechnical recommendations for the Phase 1 improvements.

4.0 GROUNDWATER MONITORING AND LEACHATE COLLECTION SYSTEMS

This section summarizes our evaluation and recommendations related to the existing groundwater monitoring and leachate collection systems at the former Eastgate Landfill.

4.1 Background

The landfill is located within a glacially carved valley that trends north-south, and a glacial till layer underlies most of the former landfill. Two groundwater aquifers have been identifies below the Site: a shallow perched aquifer in the solid waste and alluvial materials, and a deeper intermediate aquifer encountered in the advance outwash (advance outwash aquifer). Where the glacial till is present, it forms a confining layer above the advance outwash aquifer. The base of the advance outwash aquifer is likely confined by the lacustrine deposits. Groundwater in the advance outwash aquifer has a generally easterly flow in the vicinity of the landfill area. Groundwater in the perched aquifer generally follows the slope of the glacial till below the landfill along the base of the valley, which slopes to the north. Because the glacial till is not very permeable, perched groundwater likely flows north along the upper surface of the glacial till. The absence of the glacial till in some areas (i.e., at the northern portion and the southeast corner of the former landfill) may allow the groundwater in the shallow perched aquifer to migrate downward to the advance outwash aquifer (Landau Associates 2006, 2007).

Water that infiltrates into the landfill waste becomes leachate, which generally follows the northerly flow direction of the perched aquifer as described above. This flow is intercepted by a French drain, which serves as the leachate collection system for the landfill. The French drain was installed along the base of the northern side slope of the landfill in 1983, and currently discharges to the King County sanitary sewer system.

Annual groundwater monitoring has been conducted within the deeper advance outwash aquifer since 2001. This monitoring includes measurement of groundwater levels and interpretation of flow direction. Leachate quality (representing the shallow perched aquifer) is also monitored annually, although water levels and flow direction are not able to be measured. Section 4.2 describes the current groundwater monitoring system, and Section 4.3 describes the leachate collection system.

4.2 Groundwater Monitoring System

In April 2003, the City purchased approximately 16 acres of the undeveloped portion of the I-90 Business Park property from Boeing, including a majority of the 9.6-acre landfill. Under the purchase and sale agreement for the property between Boeing and the City, Boeing agreed to retain responsibility for continued groundwater monitoring activities at the site. Although some of the groundwater monitoring wells are located on a parcel currently owned by a third party (Advanta), Boeing continues to be responsible for groundwater monitoring at the site.

In preparation for the property sale, Boeing requested that Ecology make a no further action (NFA) determination for the Boeing-owned portion of the landfill. Prior to making that determination, Ecology requested that Boeing conduct additional groundwater monitoring. In July 2000, six monitoring wells (EL-101 through EL-106) were installed around the perimeter of the landfill. Based on the results of the first four quarterly groundwater monitoring events conducted in 2000-2001, Ecology agreed to an interim groundwater monitoring program that included semiannual monitoring during the year 2002 and annual groundwater monitoring thereafter. Ecology also agreed that the number of wells and lists of constituents could be reduced for the interim groundwater monitoring if a constituent or group of constituents was not detected or was detected at concentrations less than or equal to the groundwater screening levels for four consecutive sampling events at a particular well. A work plan for the interim groundwater monitoring was prepared and submitted to Ecology in March 2002. In 2003, Ecology issued a NFA determination for soil and groundwater, and included requirements for continued monitoring. Continued monitoring includes interim groundwater monitoring and confirmational groundwater compliance monitoring. Annual groundwater monitoring activities and results are documented in reports submitted to Ecology.

In 2006, when the Schnitzer development was proposed near the southern portion of the site, Ecology determined that further action was required to refine the conceptual model of groundwater flow beneath the site and to monitor the impacts on groundwater, if any, due to the new development. A further action work plan was prepared, which included installation of a piezometer north of the landfill (EL-107) and modification to the frequency and locations of groundwater elevation monitoring. Also, due to construction activities related to the Schnitzer development, wells EL-101 and EL-106 were abandoned and replaced with wells EL-101R and EL-106R in 2007. The current groundwater monitoring locations are shown on Figures 1-2 and 4-1.

4.2.1 Groundwater Monitoring Activities and Analysis

Since 2001, Landau Associates has prepared annual reports for Boeing summarizing the results of the interim groundwater monitoring performed each year at the landfill. Each monitoring report includes an evaluation of the data and recommendations for continued interim groundwater monitoring. This section summarizes the site background and groundwater monitoring program based on the most recent annual report (Landau Associates 2015).

Groundwater monitoring is generally conducted in accordance with the Further Action Groundwater Monitoring Work Plan (Landau Associates 2006), subsequent scope reductions described in the 2009 and 2010 Annual Groundwater Monitoring reports, and the Confirmational Groundwater Monitoring Work Plan (Landau Associates 2002). Any exceptions to the procedures in the approved work plans are noted in each annual report.

Each annual monitoring event includes measurements of static water levels at each of the six wells (EL-101R, EL-102, EL-103, EL-104, EL-105, and EL-106R); at piezometer EL-107; and a staff gauge

installed in Pond A. The calculated groundwater and surface water elevations are used to prepare elevation contours of the groundwater surface.

Groundwater samples are currently collected from wells EL-103, EL-105, and EL-106R, and a surface water sample is collected from the French drain (as described in Section 4.3). In accordance with the current approved scope of interim groundwater monitoring and the scope reductions described in the 2010 Annual Groundwater Monitoring Report, chemical analysis of the groundwater samples collected at the three monitoring wells currently consists of the following:

- Volatile Organic Compounds (VOCs) by EPA Method 8260C at well EL-103.
- Dissolved metals (iron and manganese) by EPA Method 6010B at wells EL-103, EL-105, and EL-106R.
- Dissolved metals (arsenic) by EPA Method 200.8 at wells EL-103 and EL-105.

4.2.2 Groundwater Levels

As described above, previous investigations at the site identified two aquifers below the site: a shallow perched aquifer and a deeper advance outwash aquifer. The shallow perched aquifer is encountered in the solid waste and alluvial materials and, in some locations, the glacial till underlying the fill and alluvial materials. The advance outwash aquifer is encountered below the glacial till layer that underlies most of the landfill area. The site monitoring wells and piezometer are screened in the advance outwash. Groundwater elevations calculated using water level measurements collected from each monitoring well and piezometer and a surface water level measurement at the staff gauge in Pond A are used to evaluate groundwater flow direction in the advance outwash aquifer. Groundwater elevation contours are plotted for each monitoring event using the measured groundwater elevations. The 2015 groundwater contours are shown on Figure 4-1. The contours indicate the groundwater within the advance outwash aquifer has a generally easterly flow, which is consistent with flow direction that has been observed at the landfill since Landau Associates began monitoring activities in 2001. This differs from the flow within the perched aquifer in the landfill, which generally flows to the north.

4.2.3 Groundwater Quality

A certified analytical laboratory conducts the analyses of the groundwater samples. Following receipt of the analytical results, the data are validated as described in Section 4.2 of the Confirmational Groundwater Monitoring Work Plan (Landau Associates 2002). A summary of the analytical results (with data qualifiers added as appropriate) for each annual sampling event and historical events at each well are provided in tabular format. Each annual monitoring report also includes laboratory data reports and a data quality evaluation.

The groundwater analytical results for the 2015 annual sampling event indicated the presence of dissolved arsenic, dissolved iron, and dissolved manganese at concentrations above screening levels [0.004 milligrams per liter (mg/L), 0.3 mg/L, and 0.05 mg/L, respectively] at downgradient wells

EL-103 and EL-105. The concentration of 1,4-dichlorobenzene [2.2 micrograms per liter (µg/L)] at well EL-103 was also above the screening level (1.8 µg/L). These results are consistent with previous results at these locations. At crossgradient/downgradient well EL-106R, dissolved iron and dissolved manganese concentrations were above the screening levels.

4.2.4 Continued Interim Groundwater Monitoring

Dissolved metals (arsenic, iron, and manganese) have routinely been detected above the screening level at wells EL-103, EL-105, and EL-106R). At well EL-103, 1,4-dichlorobenzene has also routinely been detected above the screening level. As of 2015, these results suggest that achieving confirmational groundwater screening levels is unlikely in the near future. As a result, groundwater monitoring at the landfill will continue as an interim program for 2016, and no change to the analyte list is planned for 2016.

Prior to initiating the final eight confirmational groundwater sampling events at some future date (which include analysis for a larger list of constituents), interim groundwater monitoring will need to be conducted on an annual schedule. Analytical results from interim monitoring will be used to evaluate the likelihood of achieving the confirmational groundwater screening levels, and to adjust the scope of continued interim monitoring, as needed. The scope of groundwater monitoring will be re-evaluated following each annual sampling event.

4.2.5 Recommendations

Interim groundwater monitoring should continue to be conducted on an annual schedule during the design phase for the Phase 1 Park development. Ecology needs to be consulted regarding site redevelopment plans that affect the existing landfill management systems, including the groundwater monitoring well network.

During the design phase of the Park project, a determination will need to be made regarding any necessary modifications to the existing groundwater monitoring wells and piezometers to accommodate planned construction and avoid accidental damage/destruction during construction. This may involve decommissioning and replacement of one or more of the existing groundwater monitoring wells and piezometers in the vicinity of the landfill.

Ecology should also be consulted regarding the scope of interim groundwater monitoring to be conducted directly before and after Park construction activities to help determine the changes, if any, in groundwater quality as a result of modifications/improvements to the existing landfill management systems.

4.3 Leachate Collection System

The former Eastgate Landfill was not originally constructed with a leachate collection system. As noted above, the existing leachate collection system consists of a French drain, which was installed in 1983 between the north edge of the landfill and the south edge of Pond A. The French drain was

originally installed to capture seeps that were breaking out on the northern slope of the closed landfill. The purpose of the French drain is to intercept water in the shallow perched aquifer that is impacted by landfill leachate and protect water quality in Pond A. The French drain originally discharged to a surface stream or drainage ditch. However, chlordane, an insecticide used during the 1960s, was detected at a concentration of 6.3 parts per billion (ppb) in a sample collected during a 1985 leachate study, and the French drain was subsequently connected to the King County sanitary sewer system in 1987 or 1988 (Landau Associates 2000).

Based on the results of an investigation conducted in July 2001, the French drain is about 196 ft long (as measured from the French drain catch basin at the southeast end of Pond A), and extends about 4 to 5 ft below the existing ground surface. For at least the eastern 105 ft, the French drain is constructed with 8-inch diameter perforated PVC pipe. It is likely that the remainder of the French drain is constructed of similar material; however a break in the pipe about 105 ft west of the catch basin access point prevented a video camera survey of the pipe beyond the break point. The remainder of the French drain was surveyed with a 33 kHz sonde, which indicated that the drain pipe extends south of a manhole for the 36-inch storm sewer pipe and extends to a point just south of landfill gas monitoring well MW-10, as general indicated on Figure 1-2.

As previously noted, the French drain primarily intercepts groundwater from a perched aquifer within the landfill, which generally flows to the north (Landau Associates 2006). Recent flow data in the French drain are not available.

Surface water samples are collected from the French drain catch basin during the annual groundwater sampling events. Dissolved metals and VOCs in water samples collected from the French drain indicate that the system is capturing a portion of the leachate generated within the landfill.

A 2011 evaluation of water quality data in the vicinity of Pond A conducted for the City by Associated Earth Sciences, Inc. (Associated Earth Sciences) concluded that based on water quality samples collected at the landfill monitoring wells, French drain, a surface seep, and at the Pond A inlet and outlet, there was no evidence of landfill contaminants entering Phantom Lake via the surface water collection system, and it was unlikely that contaminants could reach the lake via groundwater flow. Water quality data at the Pond A inlet showed detectable levels of some VOCs and dissolved metals, but samples at the pond outlet did not show any of these constituents above State water quality standards. Therefore, Associated Earth Sciences concluded that Pond A was performing its water quality treatment function (Associated Earth Sciences 2011).

4.3.1 Leachate Collection System Sampling and Analysis

Surface water samples are collected on an annual schedule from the French drain catch basin prior to entering the discharge pipe to the King County sanitary sewer.

The surface water sample collected from the French drain is analyzed at a certified analytical laboratory for the following compounds:

- VOCs by EPA Method 8260C
- Dissolved metals (iron, manganese) by EPA Method 6010B
- Chloride by EPA Method 300.0
- N-Ammonia by Standard Method SM20 4500D
- N-Nitrate calculated
- N-Nitrite by EPA Method 353.2
- Nitrate + Nitrite by EPA Method 353.2
- Sulfate by EPA Method 300.0
- Total Organic Carbon (TOC) by Standard Method SM20 5310C
- Chemical Oxygen Demand (COD) by EPA Method 410.4.

4.3.2 Leachate Collection System Water Quality

In 2015, water samples collected from the French drain had dissolved iron, dissolved manganese, and 1,4-dichlorobenzene concentrations above screening levels. These results are consistent with previous results for water samples obtained from the leachate collection system.

The existing leachate collection system appears to be adequately fulfilling its intended function. Water in the shallow perched aquifer that has been impacted by the landfill waste is being captured and discharged to the sanitary sewer. The leachate collection system, along with Pond A, is functioning to protect downstream water quality. No exceedances of State surface water standards have been observed downstream of Pond A.

4.3.3 Recommendations

Sampling and analysis of surface water from the leachate collection system should continue to be conducted on an annual schedule during the design phase for the Phase 1 Park development. Ecology needs to be consulted regarding site redevelopment plans that affect the existing landfill management systems, including the landfill cap and leachate collection systems.

The 2012 Park Master Plan anticipates preloading and placement of structural fill, installation of a synthetic cap over the landfill, and creation of walking paths on the side slope where the French drain is currently located. It is anticipated that installing an impervious cap over the landfill will reduce precipitation infiltrating into the landfill waste and thus reduce leachate generation. During the design phase of the Park project, a determination will need to be made regarding modifications to the existing leachate collection system to accommodate planned construction. This may involve demolition of the existing French drain system and replacement with a geosynthetic drainage layer or

a side slope trench drain to capture any subsurface flows that intercept the side slope beneath the landfill cap and discharging the water to the King County sanitary sewer line.

Ecology should also be consulted regarding the scope of surface water quality monitoring to be conducted before and after Park construction activities to help determine the changes, if any, in surface water quality as a result of modifications/improvements to the existing landfill management systems.

5.0 MTCA COMPLIANCE ANALYSIS

5.1 Introduction

This section provides a summary of select regulatory administrative options for cleanup activities at the former Eastgate Landfill. Landau Associates understands that the City proposes to develop the Site into Bellevue Airfield Park and is considering regulatory options for additional remedial actions that may be conducted at the Site. The Site was enrolled in the Ecology Voluntary Cleanup Program (VCP) in 2000, and is identified as VCP NO. NW0471.

The following subsections present an overview of the current regulatory status of the Site; a brief description of administrative options; a comparison of three administrative options for the site, the VCP and an Agreed Order (AO) or Consent Decree (CD); and our recommendation.

5.2 Regulatory Status

A general description of the Site is provided in Section 1.1. As noted above, the Site is currently enrolled in the VCP. Cleanup activities were initiated at the Site in the 1980s, and groundwater monitoring and landfill gas monitoring are currently being conducted. Cleanup activities at the Site included capping, groundwater monitoring, stormwater infiltration control, leachate collection, landfill gas migration control, and an environmental covenant. Interim groundwater monitoring activities are currently conducted by Landau Associates and landfill gas monitoring is performed by SCS Engineers. Details regarding the groundwater monitoring program and leachate collection system are presented in Section 4.0.

In accordance with the MTCA Regulation (Chapter 173-340 WAC), Ecology provides four administrative options for completing the cleanup process at contaminated sites. Under each option, a potentially liable person (PLP) is required to meet MTCA requirements. Each option, including some of the advantages and disadvantages, is described below.

1) Independent – Under this option, cleanup is performed independently without any Ecology involvement, either formal supervision or informal consultations. A report is submitted to Ecology after completion of cleanup activities other than long-term monitoring; however, Ecology does not provide an opinion on the sufficiency of the cleanup. There is no Ecology involvement in the cleanup; therefore, this option provides the PLPs the most flexibility in scope and schedule. No MTCA grant funding is available.

2) VCP – Under this option, cleanup is performed independently with technical assistance and opinions available from Ecology and a decision on the sufficiency of the cleanup provided by Ecology after completion of the cleanup. If Ecology determines that a completed cleanup is sufficient, their No Further Action determination can be used to demonstrate to the public and other interested parties that the cleanup was adequate. As under the independent option, the PLPs have control over the scope and schedule of remedial activities although Ecology review of plans may result in increases in scope over that initially planned. MTCA grant funding may be available to local governments for up to 50 percent of eligible costs; grant funds are capped at $200,000.

3) AO – Under this option, remedial activities are supervised by Ecology under an AO, an enforceable agreement between Ecology and the PLPs that includes a schedule for completing required activities. No settlement of liability with the state or protection from third-party contribution claims is provided. Documents must be approved by Ecology and are also subject to public review. This option provides PLPs with less flexibility in scope and schedule because activities must be conducted in accordance with AO requirements and all documents, including work plans and reports, must be approved by Ecology. The cost for cleanup under an AO is typically greater than for an independent or VCP cleanup. AOs are often used for remedial actions leading up to a decision on the appropriate cleanup for a site (i.e., site investigation and evaluation of cleanup alternatives). MTCA grant funding may be available to local governments for up to 50 percent of eligible costs; grant funds are not capped.

4) CD – Under this option, cleanup is supervised by Ecology under a CD, an enforceable agreement between Ecology and the PLPs filed in court that includes settlement of liability to the state and provides protection from third-party contribution claims. As with an AO, a schedule for completing required activities is included and documents are subject to public review and must be approved by Ecology. The cost for cleanup under a CD is typically greater than for an independent or VCP cleanup and similar to the cost for cleanup under an AO. CDs are often used for implementation of final cleanup activities. MTCA grant funding may be available to local governments for up to 50 percent of eligible costs; grant funds are not capped.

Table 5-1 provides a summary of what each option provides and how they differ.

The following subsections present four key considerations for comparing the feasible administrative options for the Site (i.e., VCP and an AO or CD). Conducting activities independently outside of the VCP does not present any advantages for this site over conducting activities in the VCP and does not provide an opportunity for pursuing MTCA grant funding later if desired. Table 5-2 presents a summary of these considerations.

5.3 Legal Agreements

Legal agreements are a key consideration because they influence the scope, schedule, and overall cost of the cleanup activities. The VCP does not include a legal agreement. A Site can be withdrawn from the VCP at any time. In contrast, an AO or a CD are legal documents which formalize an agreement between Ecology and the PLPs for the actions needed at a site.

5.4 MTCA Process and Technical Requirements

The technical requirements of the MTCA process are the same under each of the options. The MTCA process includes the following phases/steps; as indicated below, some of these steps have already been completed at the site:

- Site Discovery – this step is already complete.
- Initial Investigation –this step is already complete.
- Site Hazard Assessment – this step is already complete.
- Hazard Ranking/Hazardous Sites List – this step is already complete.

- Remedial Investigation and Feasibility Study (RI/FS) – although a RI/FS has already been completed for the site, additional information will be developed as part of site redevelopment. Additional investigation over what is necessary to support redevelopment is likely to be required under an AO or CD. Under the VCP, information describing the City's planned activities at the site, including the results of any investigation and any changes to the existing landfill management systems (i.e., soil cap layer and hardscape areas; stormwater infiltration control; leachate collection; landfill gas migration control; and groundwater monitoring well network) would be submitted to Ecology.
- Cleanup Action Selection – a cleanup action (capping, groundwater monitoring, stormwater infiltration control, leachate collection, landfill gas migration control, and an environmental covenant) has already been selected and implemented at the site. An Environmental Engineering Design Report (EEDR) and other documents will be prepared and submitted to Ecology as part of Park development to document planned changes to the current remedy, including proposed modifications to the existing landfill management systems.
- Cleanup - a cleanup action (capping, groundwater monitoring, stormwater infiltration control, leachate collection, landfill gas migration control, and an environmental covenant) is being implemented at the site; landfill gas monitoring and venting and groundwater monitoring are continuing. It is anticipated that the Park development construction documents and record drawings/as-built documents will be prepared and submitted to Ecology to document changes to the existing remedy, including modifications to the existing landfill management systems.
- Delisting – delisting will be proposed after MTCA cleanup levels are met.

All cleanups must meet the substantive requirements of MTCA; however, the AO and CD options often require additional effort (and cost) to meet the requirements of the legal agreement.

5.5 Schedule

Schedule is a key consideration because it impacts the cost of cleanup and redevelopment. Schedules are set independently under the VCP option allowing for more PLP control over actions, as well as the pace of steps along the MTCA process. No permit exemptions are provided by the VCP option.

In contrast, schedules for each step of the MTCA process are set in an AO or CD. Additional considerations for the AO and CD options include Ecology review and approval of all documents and public comment periods at various steps of the MTCA process. The AO or CD are also subject to a public comment period. It is likely that additional investigation would be required under an AO or CD, increasing the time required for completion of the redevelopment. Exemptions from the administrative requirements of some permits are provided under the AO and CD options.

5.6 Funding Options for Cleanup

Funding sources are a key consideration because the proposed Bellevue Airfield Park development will be funded by the City, and Ecology has MTCA grant funding programs for local governments aimed to encourage and expedite remedial actions and to lessen the impact of the cost of such actions on tax payers.

Grant and loan funding from Ecology for cleanup is funded by a tax on hazardous substances (e.g., petroleum). MTCA directs about 44 percent of that tax revenue into the Local Toxics Control Account (LTCA). Each biennium, the Legislature appropriates a portion of the funds in the LTCA for remedial action grants and loans. Grant and loan appropriations are then prioritized for certain types of large, multi-biennial projects, extended grant agreements, and sites with a high hazard ranking.

For the 2013-2015 fiscal biennium, the Washington State Legislature appropriated $62,537,000 for the Remedial Action Grants and Loans Program. Of this amount, Ecology allocated $3 million total for Integrated Planning Grants and Independent Remedial Action Grants. Additionally, Ecology allocated $56,043,426 for Oversight Remedial Action Grants and Loans.

Independent Remedial Action Grants and Loans can be provided to local governments that investigate and clean up hazardous waste sites independently under the VCP; the maximum grant amount is 50 percent of eligible cleanup costs, up to $200,000. In contrast, Oversight Remedial Action Grants and Loans can be provided to local governments that investigate and clean up hazardous waste sites under the supervision of Ecology under an AO or CD; there is no maximum grant amount. Under an AO or CD, grants are limited to 50 percent of eligible costs except in special circumstances that would not be applicable to the Site.

It is uncertain what amount of grant funding will be available for the 2015-2017 fiscal biennium and subsequent years; therefore, it is also uncertain what grant funding might be appropriated by Ecology for either of the grant programs applicable to the VCP and AO or CD options. Based on Landau Associates' understanding of the funding landscape, it seems unlikely that in the face of reduced tax revenues on hazardous substances and the ongoing cleanup projects throughout the state, the City's proposed Park development at the Site would be a high enough priority candidate project to receive Ecology grant funding under either program.

5.7 Recommendation

We recommend that the Site remain in the VCP based on the following considerations:

- Legally – The VCP provides more flexibility with regard to the schedule of activities and may avoid added costs associated with adhering to the legal requirements of an AO or CD. In order to demonstrate to Ecology and the Attorney General's office that negotiation of an AO or CD is worth their time, it is likely that further investigation or cleanup would be required in addition to that which has already been completed.
- Technical Requirements – The technical requirements of the MTCA process are the same under the VCP and AO or CD options. The process has already been initiated under the VCP, and the technical elements associated with changes to the existing landfill management systems (i.e., soil cap layer and hardscape areas; stormwater infiltration control; leachate collection; landfill gas migration control; and groundwater monitoring well network) due to the proposed Park development can be adequately addressed by the redevelopment planning effort currently underway.

- Schedule – As previously noted, the VCP provides more flexibility with regard to the schedule of activities than does the AO or CD option. Public comment periods under an AO or CD may add to the schedule complexities and overall costs. Although exemptions from the administrative requirements of some permits are provided under the AO and CD option, we expect that the City's support for the project will assist in expediting permit review and approval when necessary.
- Funding – Based on the current status of the Site and the uncertainty regarding availability of grant funding during the 2015-2017 fiscal biennium and subsequent years, it is unlikely that the City's proposed Park development would be a high enough priority candidate project to receive Ecology grant funding.

6.0 SUMMARY OF RECOMMENDED TASK 2 ACTIONS

The following table briefly summarizes our current understanding of each item/system described in this Task 1 summary report, and lists the recommended Task 2 actions.

Item/System	Current Understanding	Recommended Task 2 Action
Wetland Delineation	• Delineation completed in September 2015; small wetland areas on northern slope above Pond A • Wetland size falls below City regulatory threshold • Permits may be required from USACE for filling/grading of wetland areas	• Assess proposed cut/fill plan for northern slope, and proposed limit of landfill cap modification, to determine if wetland filling will occur • Contact USACE if impacts to wetland areas will occur
Geotechnical Analysis	• Previous investigations and studies provide a good basis for characterizing subsurface conditions at the site • General extent of the landfill solid waste and the five geologic units at the site have been identified	• Conduct the geophysical investigation and review additional data prior to advancing exploratory borings/test pits • After locations/details of Phase 1 Park features are better established, develop and conduct the geotechnical investigation that includes exploratory borings and test pits
Groundwater Monitoring	• Site has two aquifers, shallow (perched in landfill) and deeper intermediate (in advance outwash below landfill) • Water seeps from shallow perched aquifer are managed by the French Drain leachate collection system • Groundwater quality in deep aquifer has been monitored annually since 2001. Certain dissolved metals and VOCs are detected above screening levels • Annual monitoring is likely to be required into the future	• Assess current monitoring well locations compared to proposed site grading/features to determine whether any groundwater monitoring wells need to be modified/replaced/relocated • Coordinate with Ecology to discuss the proposed Park development plans and potential modifications to the existing landfill management systems
Leachate Collection	• French drain captures leachate from perched aquifer within landfill, and discharges to King County sanitary sewer • Water quality is monitored annually. Dissolved metals and VOCs are typically detected. • Installation of impervious cap expected to reduce leachate generation, but need to	• Evaluate proposed cut/fill plan for northern slope to determine options for maintaining the existing leachate collection function • Develop preliminary cap design and determine how leachate collection can be integrated into the cap • Coordinate with Ecology to discuss the proposed Park development plans and potential

Item/System	Current Understanding	Recommended Task 2 Action
	maintain leachate collection function	modifications to the existing landfill management systems
MTCA Compliance Analysis	• Site is currently under Ecology's Voluntary Cleanup Program. • Currently considered unlikely that project would be a priority candidate to receive any significant grant funding from Ecology • Recommend maintaining site under Voluntary Cleanup Program	• Coordinate with Ecology to discuss the proposed Park development plans and potential modifications to the existing landfill management systems • Consider re-evaluating the potential for grant funding after the legislature finalizes the 2015-2017 biennium budget

7.0 USE OF THIS REPORT

This project startup summary report has been prepared for the exclusive use of Walker Macy and the City of Bellevue for specific application to the proposed Bellevue Airfield Park development at the site of the former Eastgate Landfill in Bellevue, Washington. No other party is entitled to rely on the information included in this document without the express written consent of Landau Associates. Further, the reuse of information provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Steven J. Quarterman
Associate Ecologist

Kent W. Wiken, PE
Senior Associate Engineer

David A. Pischer, PE
Principal

8.0 REFERENCES

Associated Earth Sciences, Inc. 2011. *Evaluation of Water Quality Data, Pond A, Bellevue, Washington.* October 17.

Bellevue, City of, Staff. 2015. Personal communication with Steven Quarterman, Landau Associates. Project Kickoff Meeting. August 17.

Booth, D.B., Troost, K, A., and Wisher, A.P. 2006. Geologic Map of King County, University of Washington Department of Earth and Space Sciences

GeoEngineers. 2004. *Geotechnical Engineering Services Report for the Duct Bank Relocation.*

Golder Associates, Inc. 2004. *Report on Site Characterization Study, Portion of Boeing Eastgate Property, Bellevue, Washington.* December 21.

JGM Landscape Architects. 2002. *Bellevue Airport Site Feasibility Study.*

Landau Associates. 2015. *Annual Groundwater Monitoring Report, Former Eastgate Landfill, Bellevue, Washington.* July 30.

Landau Associates. 2008. *Annual Groundwater Monitoring and Well Construction Detail Report, Former Eastgate Landfill, Bellevue, Washington.* Prepared for The Boeing Company. May 23.

Landau Associates. 2006. *Further Action Groundwater Monitoring Work Plan.* December 14.

Landau Associates. 2002. *Work Plan, Confirmational Groundwater Monitoring, Former Eastgate Landfill, Bellevue, Washington.* March 13.

Landau Associates. 2000. *Engineered Systems Report, Former Eastgate Landfill, Bellevue, Washington*. September 26.

Olson, P. and E. Stockdale. 2010. *Second Review Draft: Determining the Ordinary High Water Mark on Streams in Washington State*. Publication No. 08-06-001. Washington State Department of Ecology. http://www.ecy.wa.gov/biblio/0806001.html.

The Portico Group. 2012. *Bellevue Airfield Park, Eastgate Area Properties Master Plan.*

The Watershed Company. 2002. *Wetland, Stream, and Wildlife Habitat Study Bellevue Airport Site.*

USACE. 1987. *Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1.* Vicksburg, Mississippi: U.S. Army Corps of Engineers Waterways Experiment Station.

USACE. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region. Technical Report ERDC/EL TR-10-3.* Vicksburg, Mississippi: U.S. Army Corps of Engineer Research and Development Center Environmental Laboratory.

Data Source: Esri 2012

G:\Projects\154801\010\011\Project Startup\F011 VicinityMap.mxd 10/9/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

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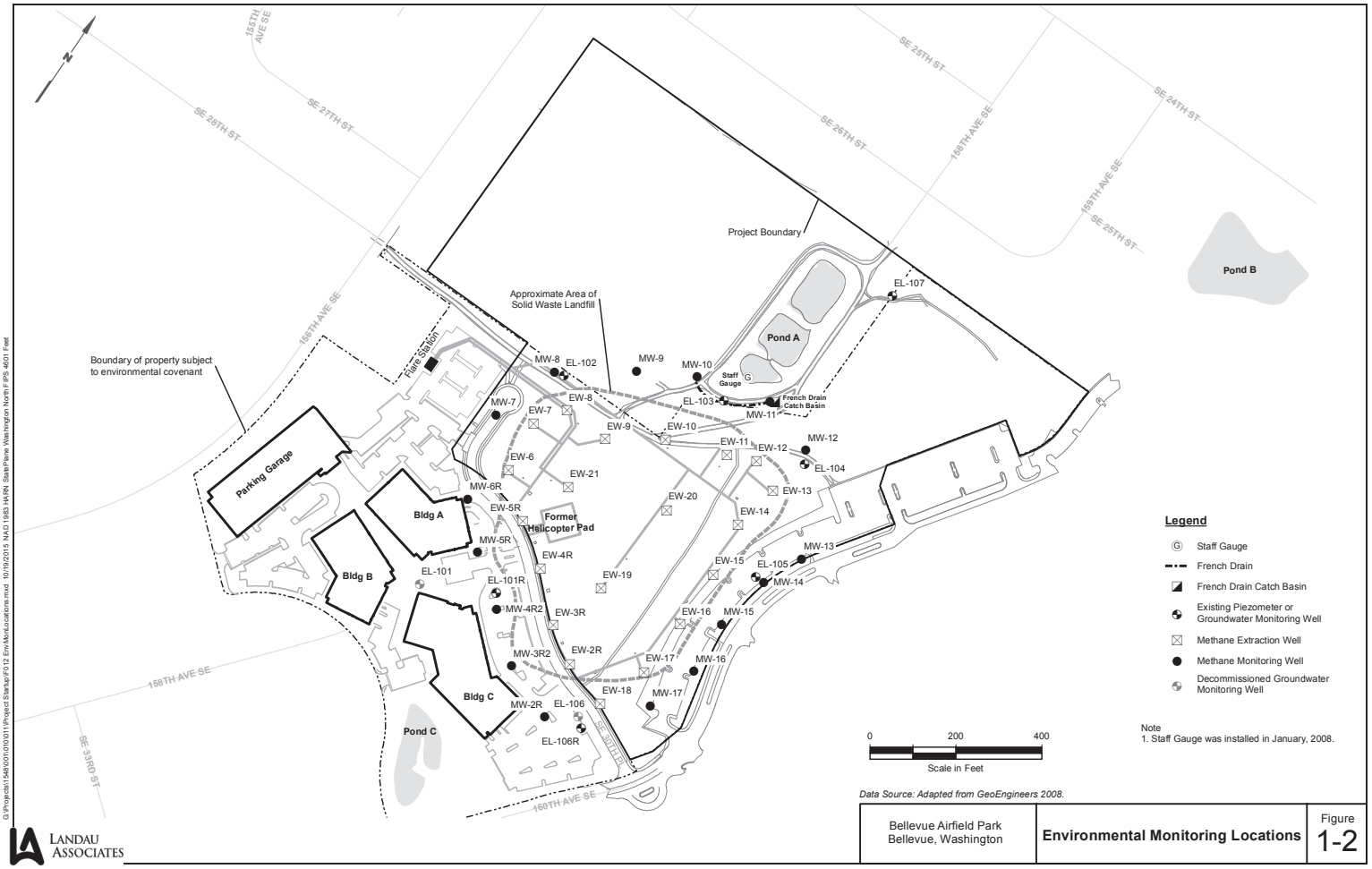
Bellevue Airfield Park Bellevue, Washington	**Vicinity Map**	Figure 1-1



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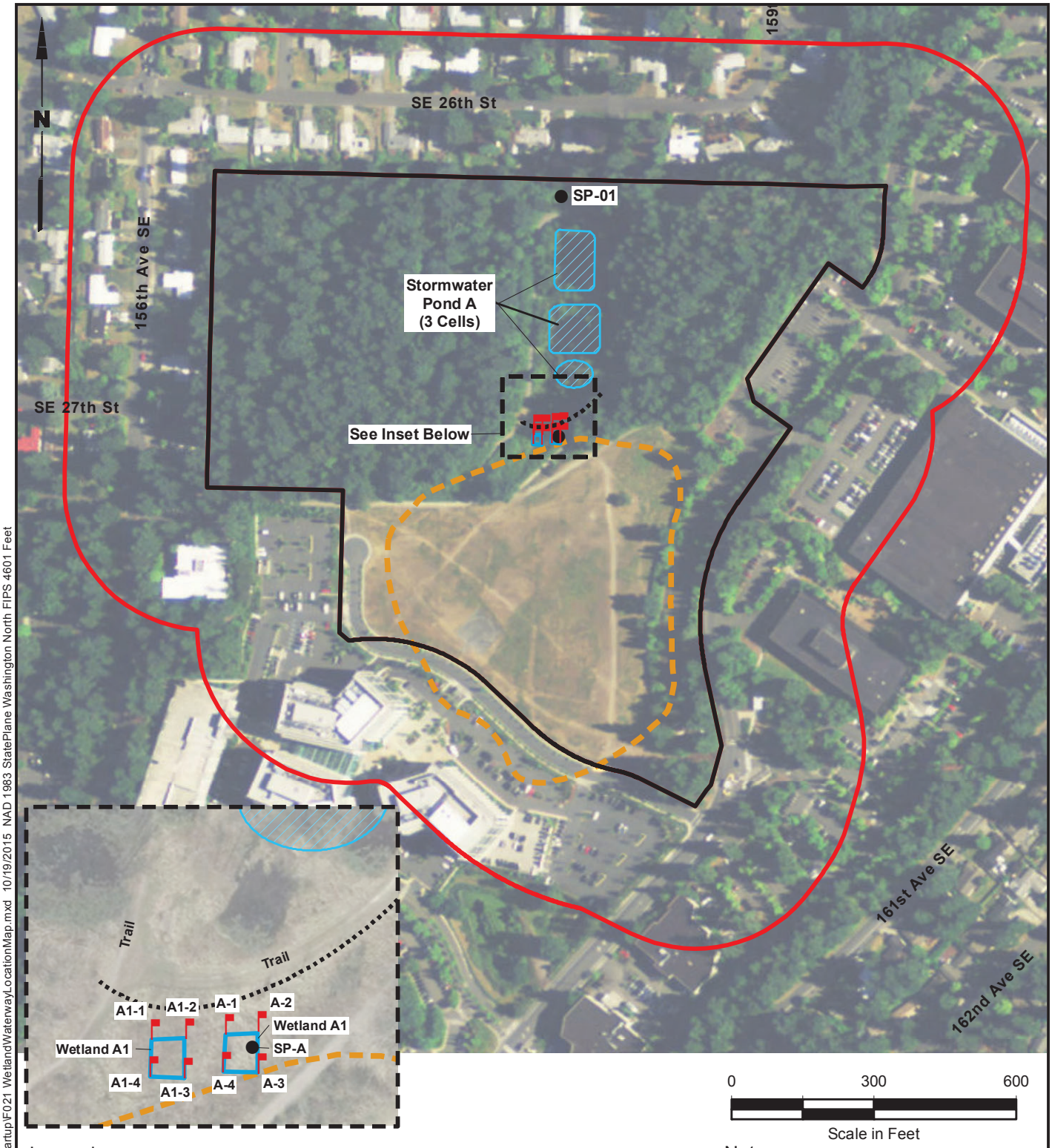
Bellevue Airfield Park Bellevue, Washington	**Environmental Monitoring Locations**	Figure 1-2



Legend

- Sample Point
- Wetland Flag
- Wetland A
- Stormwater Ponds
- Project Area
- Study Area
- Approximate Area of Solid Waste Landfill
- Approximate Location of French Drain

Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: King County GIS; Esri World Imagery.

G:\Projects\154801\010\011\Project Startup\F021 WetlandWaterwayLocationMap.mxd 10/19/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

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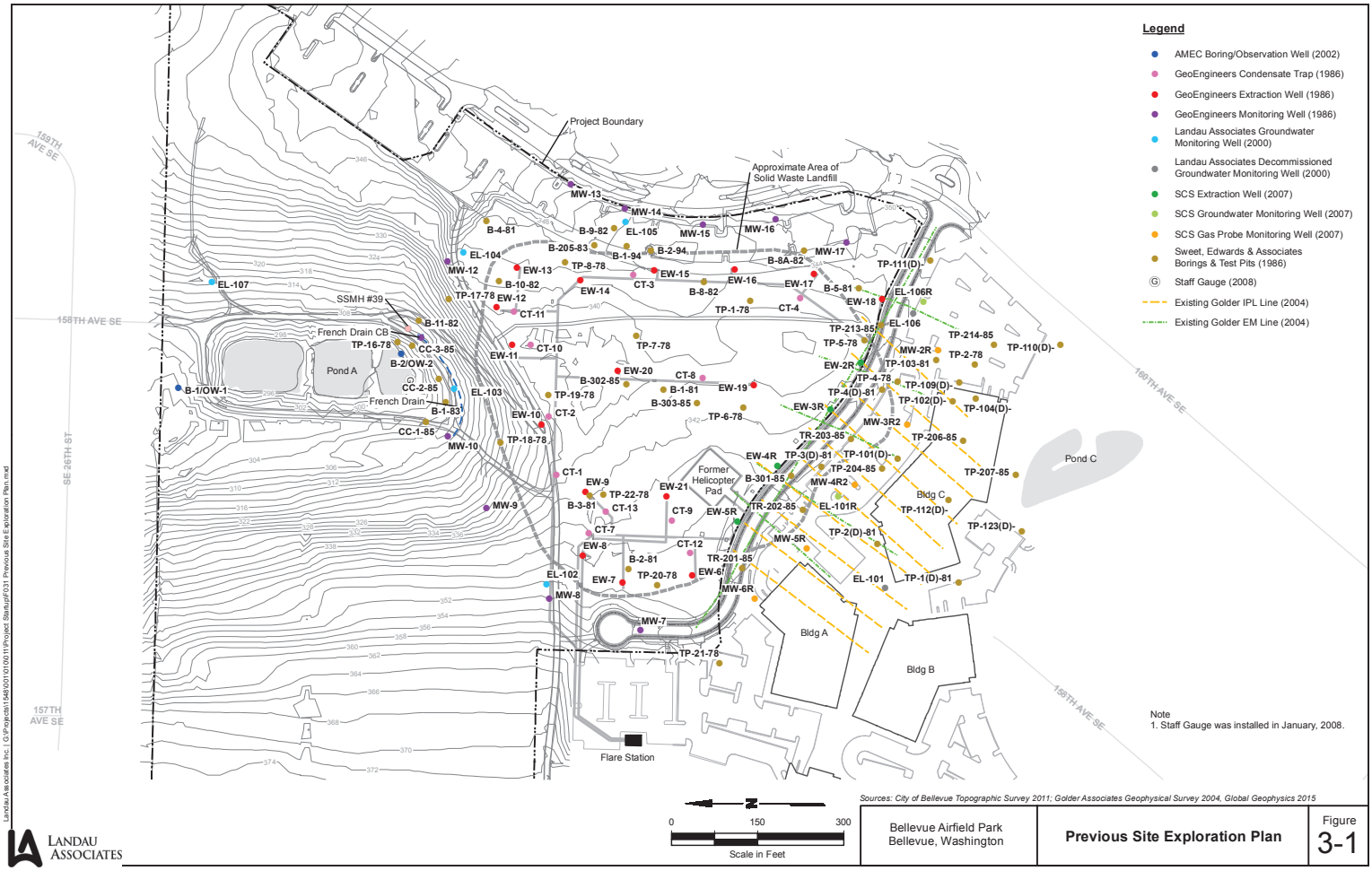
Bellevue Airfield Park
Bellevue, Washington

Wetland/Waterway Location Map

Figure
2-1



Sources: City of Bellevue Topographic Survey 2011; Golder Associates Geophysical Survey 2004, Global Geophysics 2015

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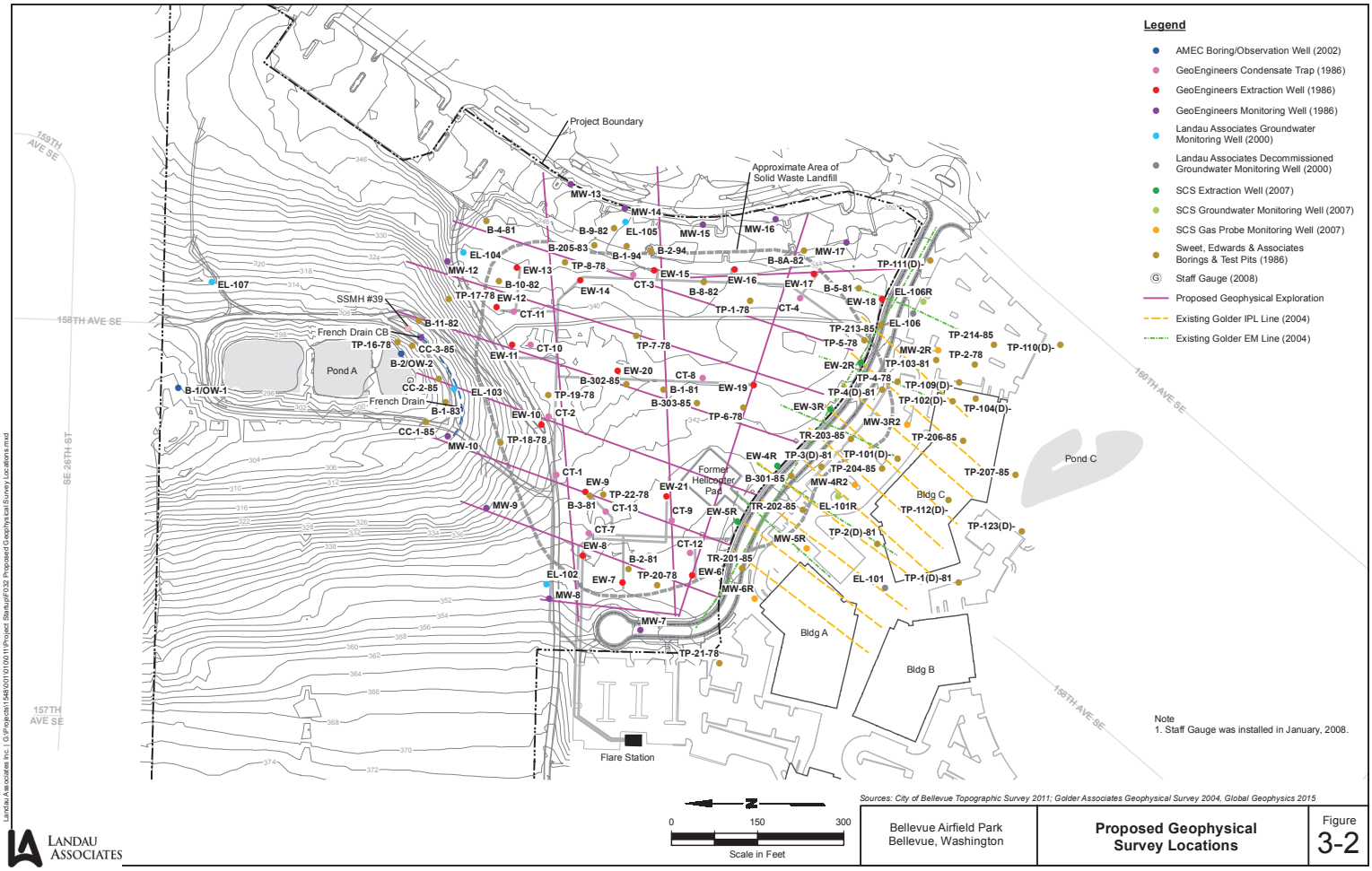
Bellevue Airfield Park Bellevue, Washington	**Previous Site Exploration Plan**	Figure 3-1

Landau Associates Inc. | G:\Projects\1548\001\01\001\11\Project Start up\F031 Previous Site Exploration Plan.mxd



Sources: City of Bellevue Topographic Survey 2011; Golder Associates Geophysical Survey 2004, Global Geophysics 2015

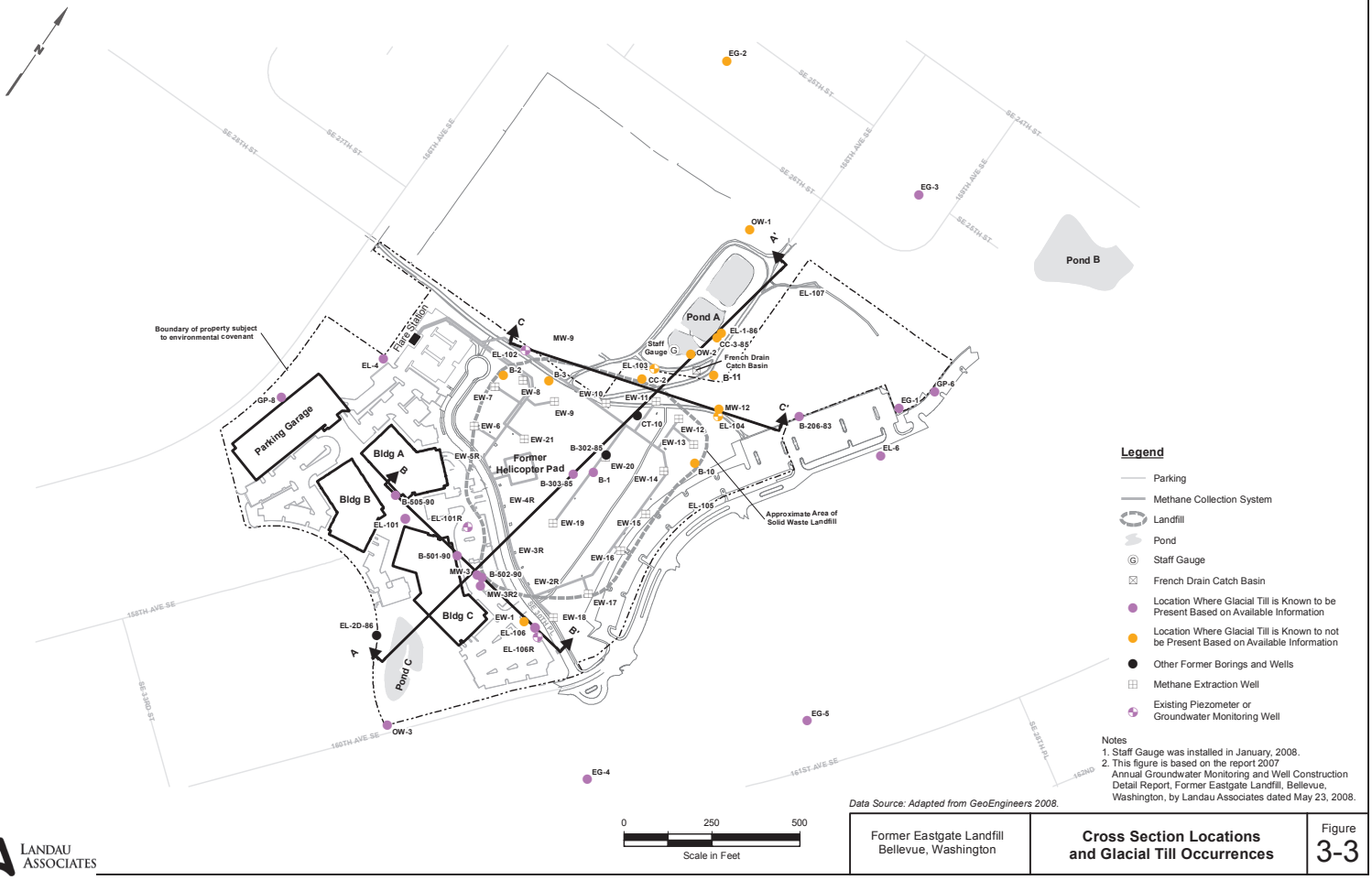
LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Proposed Geophysical Survey Locations

Figure 3-2

Landau Associates Inc. | G:\Projects\1548\001\01\001\11\Project Startup\F032 Proposed Geophysical Survey Locations.mxd



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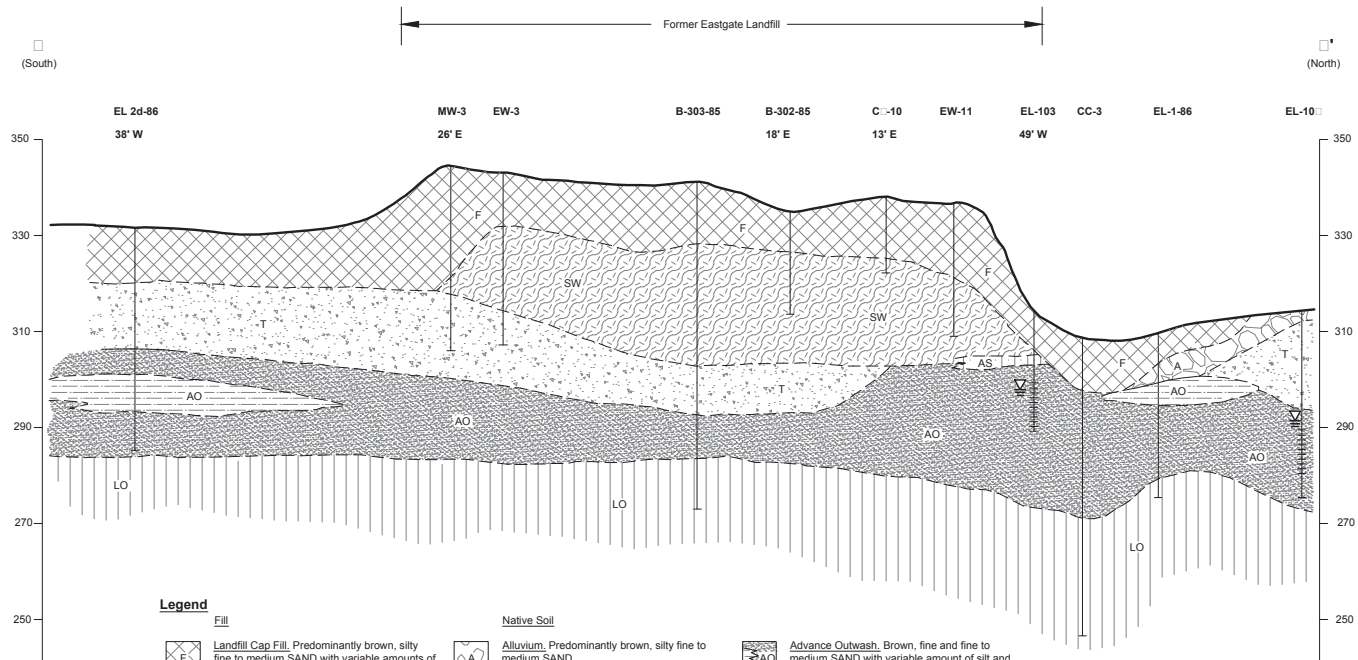
Former Eastgate Landfill Bellevue, Washington	**Cross Section Locations and Glacial Till Occurrences**	Figure 3-3



Legend

Fill

F — Landfill Cap Fill. Predominantly brown, silty fine to medium SAND with variable amounts of gravel and organics (wood or root material) in upper 2 to 6 feet. Below 5 to 6 feet variable amounts of brick, concrete, asphalt, and metal debris. Other fill highly variable amounts of silt, sand, and gravel

SW — Landfill Solid Waste. Predominantly brown, silty fine to medium SAND with gravel and variable amounts of construction debris (concrete, wood, and asphalt) and domestic refuse (metal, plastics, cloth, glass, and paper). With clayey SILT to fine sandy SILT layers.

Native Soil

A — Alluvium. Predominantly brown, silty fine to medium SAND.

AS — Alluvium Silts. Light brown to gray-green, clayey SILT and thinly bedded.

T — Till. Light brown to gray, fine and fine to medium SAND with variable amounts of silt and gravel, and occasional cobbles.

AO — Advance Outwash. Brown, fine and fine to medium SAND with variable amount of silt and gravel and interbedded fine sandy SILT.

LO — Lacustrine Outwash. Predominantly light brown to gray SILT with clay and fine sand, and thinly bedded.

Groundwater Level at Time of Drilling

Monitoring Well and Screen Interval

Notes
1. This cross section approximates geologic conditions based on interpretations from borings and well log information.
2. This figure was reproduced from the 2007 Annual Groundwater Monitoring and Well Construction Detail Report, Former Eastgate Landfill, Bellevue, Washington, by Landau Associates dated May 23, 2008.

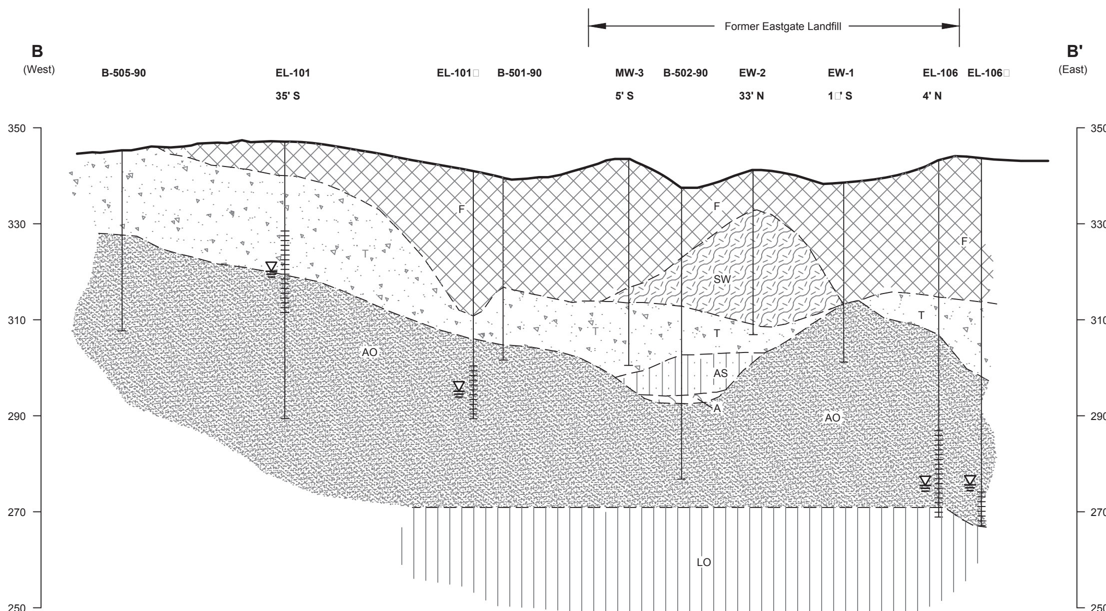
0 150 300
Horizontal Scale in Feet
Vertical Exaggeration = 7.5x

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Geologic Cross Section □-□'

Figure 3-4



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Fill

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Groundwater Level at Time of Drilling

Monitoring Well and Screen Interval

Notes

1. This cross section approximates geologic conditions based on interpretations from borings and well log information.
2. This figure was reproduced from the 2007 Annual Groundwater Monitoring and Well Construction Detail Report, Former Eastgate Landfill, Bellevue, Washington, by Landau Associates dated May 23, 2008.

0 150 300

Horizontal Scale in Feet
Vertical Exaggeration = 7.5x

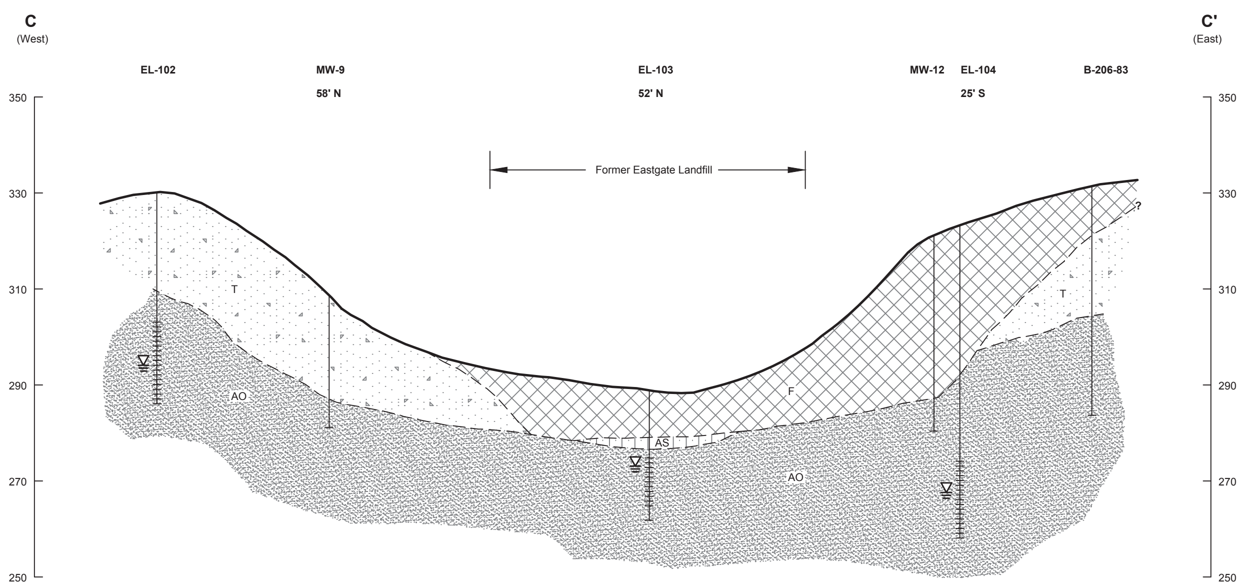
Landau Associates

Bellevue Airfield Park
Bellevue, Washington

Geologic Cross Section B-B'

Figure 3-5

Boeing/Eastgate Landfill | G:\Projects\1548\001\010\011\Project Startup\F035 Xsection BB.dwg (A) "Figure 3-5" 10/19/2015



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Fill

F — Landfill Cap Fill. Predominantly brown, silty fine to medium SAND with variable amounts of gravel and organics (wood or root material) in upper 2 to 6 feet. Below 5 to 6 feet variable amounts of brick, concrete, asphalt, and metal debris. Other fill highly variable amounts of silt, sand, and gravel

SW — Landfill Solid Waste. Predominantly brown, silty fine to medium SAND with gravel and variable amounts of construction debris (concrete, wood, and asphalt) and domestic refuse (metal, plastics, cloth, glass, and paper). With clayey SILT to fine sandy SILT layers.

Native Soil

A — Alluvium. Predominantly brown, silty fine to medium SAND.

AS — Alluvium Silts. Light brown to gray-green, clayey SILT and thinly bedded.

T — Till. Light brown to gray, fine and fine to medium SAND with variable amounts of silt and gravel, and occasional cobbles.

AO — Advance Outwash. Brown, fine and fine to medium SAND with variable amount of silt and gravel and interbedded fine sandy SILT.

LO — Lacustrine Outwash. Predominantly light brown to gray SILT with clay and fine sand, and thinly bedded.

Groundwater Level at Time of Drilling

Monitoring Well and Screen Interval

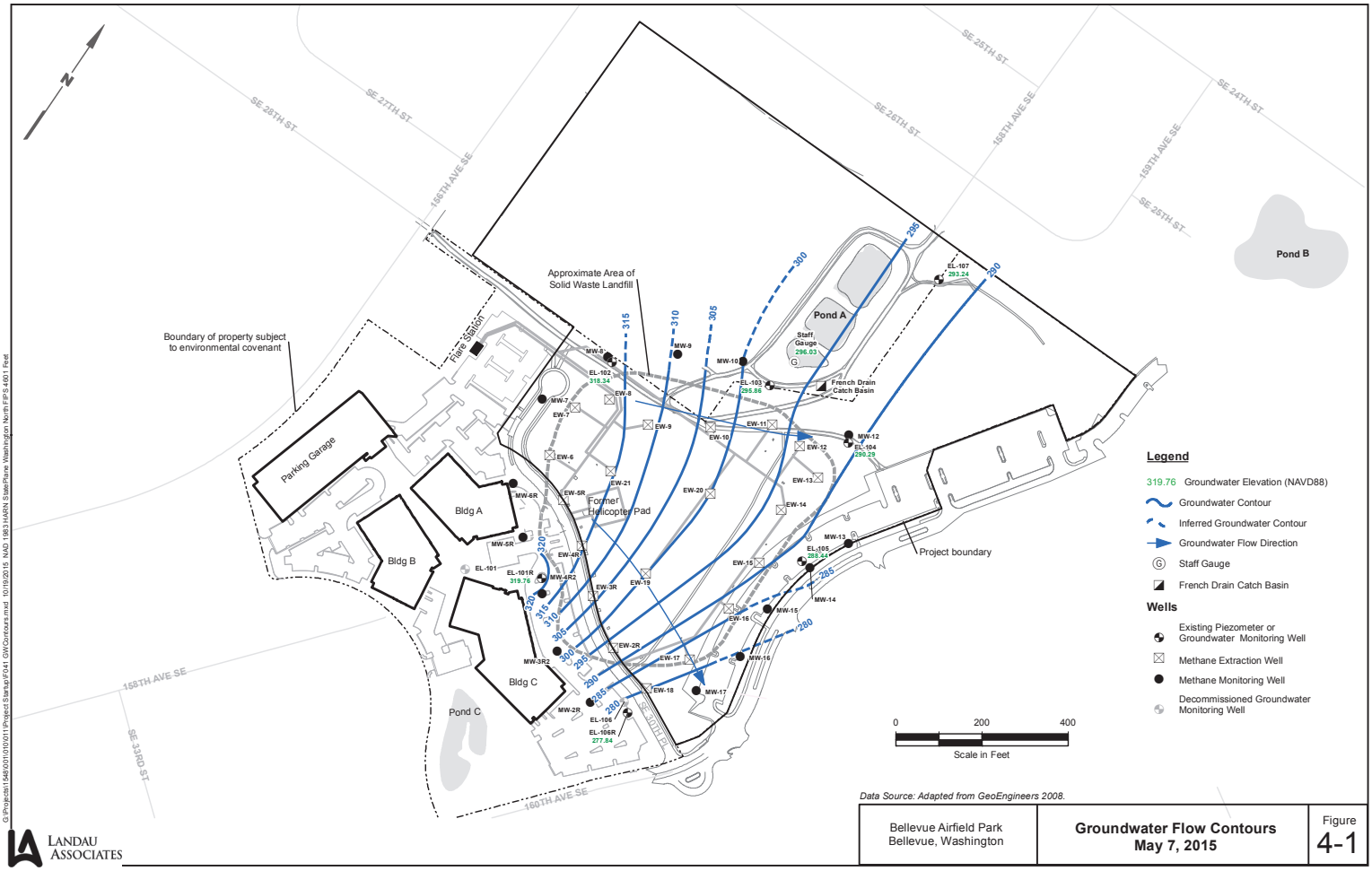
Notes
1. This cross section approximates geologic conditions based on interpretations from borings and well log information.
2. This figure was reproduced from the 2007 Annual Groundwater Monitoring and Well Construction Detail Report, Former Eastgate Landfill, Bellevue, Washington, by Landau Associates dated May 23, 2008.

0 150 300
Horizontal Scale in Feet
Vertical Exaggeration = 7.5x

Boeing/Eastgate Landfill | G:\Projects\1548\001\010\011\Project Startup\F036 Xsection CC.dwg (A) "Figure 3-6" 10/19/2015

LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**Geologic Cross Section C-C'**	Figure 3-6



Data Source: Adapted from GeoEngineers 2008.

G:\Projects\1548\001\010\011\Project Startup\F041 GWContours.mxd 10/19/2015 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**Groundwater Flow Contours May 7, 2015**	Figure 4-1

Table 5-1
Adminstrative Options for Cleanup
Eastgate Landfill

	Description	Opinion on Cleanup From Ecology	Supervision of Cleanup by Ecology	Public Involvement	Settlement of Liability with State	Contribution Protection from State
Independent	Independent	No	No	No	No	No
Voluntary Cleanup Program	Independent	Yes	No	No	No	No
Agreed Order	Ecology-supervised	Yes	Yes	Yes	No	No
Consent Decree	Ecology-supervised	Yes	Yes	Yes	Yes	Yes

Table 5-2
Adminstrative Option Comparison
Eastgate Landfill

Key Considerations	Voluntary Cleanup Program (VCP)	Agreed Order (AO) or Consent Decree (CD)
Legal Agreements	The VCP does not include a legal agreement. A site can be withdrawn from the VCP at any time.	An AO or a CD is a legal document which formalizes an agreement between Ecology and potentially liable persons (PLPs) for the actions needed at a site. A CD also includes settlement of liability to the state and provides protection from third-party contribution claims.
MTCA Process and Technical Requirements	Technical requirements of the MTCA process (i.e., from site discovery to remedial investigation and feasibility study through cleanup and delisting) are the same under the VCP, AO, and CD options. All cleanups must meet the substantive requirements of MTCA; however, the AO or CD option often requires additional effort to meet the requirements of the legal agreement.	
Schedule	Schedules are set independently allowing for more control over actions. No permit exemptions are provided.	Schedules are set in the AO or CD. The overall timeline may be longer compared to the VCP due to public comment periods, Ecology review/approval of documents, and additional investigations based on Ecology or public comments. However, exemptions from the administrative requirements of some permits are provided.
Funding Options for Cleanup	Overall cost may be lower compared to an AO or CD. MTCA grant funding (Independent Remedial Action Grants) may be available fpr up to 50% of eligible project costs; the maximum grant amount is $200,000.	Overall costs may be higher compared to the VCP. MTCA grant funding (Oversight Remedial Action Grants) may be available for up to 50% of eligible project costs; there is no maximum grant amount. Applications for grant funding are prioritized for certain types of large, multi-biennial projects, extended grant agreements, and sites with a high hazard ranking.

APPENDIX A

Draft Wetland Delineation Report

Draft
Wetland Delineation Report
Bellevue Airfield Park Development
(Former Eastgate Landfill)
Bellevue, Washington

October 19, 2015

Prepared for

Walker Macy
Portland, Oregon

LANDAU ASSOCIATES

EXECUTIVE SUMMARY

The City of Bellevue (City) is proposing development of Bellevue Airfield Park (Park) located adjacent to the I-90 Business Park in Bellevue, Washington. The proposed Park will include two synthetic turf athletic fields, concessions and restroom facilities, play and picnic areas, pedestrian trails, a spray deck, expansion and improvements to existing stormwater management facilities, and lighting and parking improvements. A portion of the Park site overlies the closed Eastgate Landfill, which has environmental restrictions and ongoing monitoring requirements under the Washington State Department of Ecology's (Ecology) Model Toxics Control Act (MTCA) voluntary cleanup program (VCP) and an environmental covenant for the site dated November 12, 2008.

Wetlands, waterways, and/or their buffers can fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act, Ecology under the State Water Pollution Control Act, and the City under the Critical Areas regulations of the City of Bellevue Municipal Code (BMC).

This report provides results of the critical areas delineation limited to wetlands and waterways in compliance with both the City's critical areas regulations and USACE requirements for compliance with Section 404 of the Clean Water Act.

Site Information

Location	Wetland Impact & Mitigation Sites (same)
Site Names	Bellevue Airfield Park
County	King
City	Bellevue
Township, Range, Section	Township 24N, Range 5E, Section 11
Latitude, Longitude	47° 35.124'N; 122° 7.745'W
Watershed	Cedar - Sammamish
WRIA	8

Summary of Wetland(s) and Waterway(s)

System	Classification	Ecology Rating (Score 1-100)	Ecology Category	Buffer Width (in feet)
Wetland A/A-1	PEM/Slope	23	Category 4	Not applicable (wetland less than 2.500 square feet and is not a designated critical area per the City Land Use Code)

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FIGURES

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APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

BGS	Below Ground Surface
BMC	City of Bellevue Municipal Code
City	City of Bellevue
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FAC	facultative
FACU	facultative upland
FACW	facultative wetland
FEMA	Federal Emergency Management Act
ft	feet
HGM	hydrogeomorphic
HPA	hydraulic project approval
LUC	Land Use Code
MHW	mean high water
NRCS	Natural Resources Conservation Service
NI	no indicator
NWI	National Wetlands Inventory
OBL	obligate
OHWM	ordinary high water mark
Park	proposed Bellevue Airfield Park
RCW	Revised Code of Washington
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area

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INTRODUCTION

The City of Bellevue (City) is proposing development of Bellevue Airfield Park (Park) located adjacent to the I-90 Business Park in Bellevue, Washington, King County, Washington (Figure 1). The proposed Park will include two synthetic turf athletic fields, concessions and restroom facilities, play and picnic areas, pedestrian trails, a spray deck, expansion and improvements to existing stormwater management facilities, and lighting and parking improvements. A portion of the Park site overlies the closed Eastgate Landfill, which has environmental restrictions and ongoing monitoring requirements under the Washington State Department of Ecology's (Ecology) Model Toxics Control Act (MTCA) voluntary cleanup program (VCP) and an environmental covenant for the site dated November 12, 2008.

Landau Associates, under contract to Walker Macy, conducted this investigation to assist the City in determining potential impacts to wetlands and other "waters of the U.S.," and other critical areas regulated by the City. The results of Landau Associates' wetland delineation are presented in this report, which identified one wetland within the project area.

SITE DESCRIPTION

The project area is approximately 27 acres consisting of three contiguous parcels (King County Parcels 1124059060, 11240569105, and 1124059123), and is generally located between 156th Avenue SE, SE 26th Street, and 160th Avenue SE, in the City of Bellevue, (Figure 2). The project is within the Cedar-Sammamish River watershed [Water Resource Inventory Area (WRIA) 8] in Township 24 North, Range 5 East, Section 11. Current land use in the project vicinity is primarily commercial and residential. The topography of the project area consists of relatively steep slopes in forested areas and relatively level areas of the former landfill.

The study area consists of the surrounding areas within 300 feet (ft) of the project area (Figure 2). Critical area delineation was limited to accessible areas within the project area. Wetland/waterway habitat that extends beyond the project footprint, and within 300 ft was, estimated both visually and using public domain resources to assess wetland/waterway extent.

The proposed Park site includes the former Eastgate Landfill, which was a municipal solid waste landfill operated by King County that accepted household and demolition wastes from 1951 until it was closed and covered in 1964. Bellevue Airfield runway was subsequently extended over the former landfill and operated until 1983. After landfill closure, Cabot, Cabot & Forbes purchased the property, including most of the landfill, and developed the I-90 Business Park. Boeing acquired portions of the former Eastgate Landfill property and adjacent properties in 1980 and 1983. The Boeing-owned property was partially developed by Boeing in the mid to late 1980s; however, no buildings have been constructed

directly over the former landfill to date. Landfill leachate is collected by a French drain located on the north side of the landfill and south of stormwater detention Pond A and is discharged to the King County sanitary sewer.

REGULATORY BACKGROUND

The Clean Water Act requires authorization for the discharge of dredged or fill material into the "waters of the U.S." under Section 404. The City Land Use Code (LUC) contains requirements for establishing wetland and stream buffer widths and building setbacks, and for any alteration, including fill, of wetlands, streams, and their buffers. Ecology requires compliance with the State Water Pollution Control Act [Revised Code of Washington (RCW) 90.48], and it has administrative oversight of Section 401 of the Clean Water Act for water quality certification in the case of impacts to U.S. Army Corps of Engineers (USACE) jurisdictional "waters of the U.S." Any work that will use, divert, obstruct, or change the bed or flow of state waters, including streams and rivers, must do so under the terms of an Hydraulic Project Approval (HPA) issued by the Washington Department of Fish and Wildlife (WDFW). WDFW HPA is administered under RCW 77.55 and rules set forth in Washington Administrative Code (WAC) 220-110. Wetlands and certain waterways are regulated by federal, state, and local governmental agencies, and compliance with one agency does not necessarily fulfill permitting requirements of any other agencies.

All wetlands and waterways described in this report are subject to verification by the USACE. The USACE determines the jurisdiction of a wetland based on the connection, more commonly referred to as adjacency, to other "waters of the U.S." Those wetlands determined to be "isolated" do not fall under the jurisdiction of the USACE. If identified "waters of the U.S." are determined to be adjacent rather than isolated, any filling or dredging of onsite wetlands/streams would require compliance with Section 404 and 401 of the Clean Water Act and the Endangered Species Act. Only the USACE can make the determination if a "waters of the U.S." is adjacent or isolated. If wetlands are determined to be isolated, they may still be subject to regulation by Ecology under the State Water Pollution Control Act (RCW 90.48).

METHODOLOGY

Landau Associates conducted an information review and onsite delineation of wetlands and surface waters associated with the proposed project according to the methods described below.

WETLAND/WATERWAY INVESTIGATION

Landau Associates conducted this wetland delineation in accordance with the USACE *Wetland Delineation Manual* (USACE 1987); and the USACE *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010). The investigation of waterways was based on the methodology provided by Ecology's *Determining the Ordinary High Water Mark (OHWM) on Streams in Washington State* (Olson and Stockdale 2010) and City Critical Areas code (Part 20.25H) of the LUC.

In general, the USACE and Ecology recommend preliminary data gathering and a synthesis of available background information, followed by a field investigation to determine the presence of "waters of the U.S," including wetlands and streams.

BACKGROUND INFORMATION REVIEW

Landau Associates reviewed the following public domain resources to determine existing conditions, potential wetlands/other "waters of the U.S.," and other critical areas within the study area:

- U.S. Geological Survey (USGS) topographic map [ESRI 2013; Appendix A, Figure A-1]
- Aerial photography (ESRI 2015; Figure 2)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) map (USFWS 1981 to present; Appendix A, Figure A-2)
- (USDANRCS Soil Survey database (USDA, NRCS website 2006; Appendix A, Figure A-3; Appendix B)
- USDA, NRCS National Hydric Soils List (USDA, NRCS website 2014a)
- City Critical Areas map (City of Bellevue website 2009)
- Floodplains database [Federal Emergency Management Act (FEMA) 1996; Appendix A, Figure A-4]
- *Wetland, Stream, and Wildlife Habitat Study, Bellevue Airport Site* (The Watershed Company 2002)
- WDFW SalmonScape (WDFW website 2015a)
- WDFW PHS on the Web (WDFW website 2015b).

WETLAND DELINEATION

Both USACE and Ecology outline a three-parameter approach to determine the presence or absence of wetlands that requires evaluating vegetation, soil, and hydrology (Table 1). Landau Associates' biologists completed the field delineation using the routine onsite method, where data are collected at locations representative of typical wetlands and/or uplands within the study area. Following this method, an area is determined to be wetland if each of the following three criteria are met (also see Table 1):

- The dominant vegetation is hydrophytic.
- Soils are hydric.
- Wetland hydrology is present.

"Difficult wetland situations" may occur in which one or more of the required criteria have been disturbed by human or natural events (atypical situations) or are absent due to natural variability (problem areas). In cases of difficult wetland situations, a wetland determination can be based on the best available information of the site, knowledge of the ecology of wetlands in the region, and/or other undisturbed or present criteria at the time of the evaluation.

The wetland boundaries were delineated using numbered flagging where accessible.

WETLAND AND STREAM CLASSIFICATION, RATING, AND BUFFER WIDTH

Any wetlands identified as part of this project were classified according to the USFWS's Cowardin classification system (Cowardin et al. 1979) and the USACE's hydrogeomorphic (HGM) classification system (Brinson 1993).

Wetlands were rated according to the *Washington State Wetlands Rating System for Western Washington* (Hruby 2004), which is accepted practice by the City pursuant to LUC 20.25H.095. This system categorizes wetlands based on their existing functions, including water quality, hydrology, and habitat, as well as the wetland's rarity, sensitivity to disturbance, or irreplaceability. The wetland categories range from 1 to 4, and are defined in Part 20.25H.095 of the LUC as follows:

- Category I wetlands are those that (a) represent a unique or rare wetland type; or (b) are more sensitive to disturbance than most wetlands; or (c) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or (d) provide a high level of functions.
- Category II wetlands are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection. Category II wetlands in western Washington include wetlands scoring between 51 to 69 points (out of 100) on the questions related to the functions present. Wetlands scoring 51 to 69 points were judged to perform most functions

relatively well, or performed one group of functions very well and the other two moderately well.

- Category III wetlands are wetlands with a moderate level of functions (scores between 30 to 50 points). Wetlands scoring between 30 to 50 points generally have been disturbed in some way, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- Category IV wetlands have the lowest levels of functions (scores less than 30 points) and are often heavily disturbed. These are wetlands that we should be able to replace, and, in some cases, be able to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and also need to be protected.

Wetland buffers were determined according to Part 20.25H.095(B) of the LUC.

WATERWAY DELINEATION

Where accessible, the OHWM of waterways was identified in accordance with methodology developed by Ecology (Olson and Stockdale 2010). The methodology focuses on examining existing hydrologic data and observation of field indicators including hydrology, soil and sediments, vegetation, marks of scouring, etc.

CRITICAL AREAS INVESTIGATION RESULTS

This section provides the results of the background information review and onsite field delineation.

BACKGROUND INFORMATION REVIEW

This section provides a summary of topographic mapping, soil survey information, NWI mapping, and other sources documenting conditions in and adjacent to the project area.

WATERWAYS

The topographic map appears to identify an unnamed tributary to Squibbs Creek originating in the southeast corner of the project area (Appendix A, Figure A-1). City of Bellevue Critical Areas mapping, Salmonscape, and Priority Habitat and Species (PHS) on the Web do not identify this waterway. The waterway mapped on the USGS topographic map is in the area of former landfill.

WETLANDS

The NWI map (USFWS 1981 to present) does not identify any additional wetlands intersecting the study area (Appendix A, Figure A-2). City of Bellevue Critical Area Mapping (City of Bellevue website 2009) identifies a "Type B" wetland in the project area. The area of the wetland is a three-cell stormwater detention pond (Pond A).

The 2002 *Wetland, Stream, and Wildlife Habitat Study, Bellevue Airport Site* (The Watershed Company 2002) also identifies the stormwater pond and two additional wetlands in the project area. A freshwater marsh/wet meadow is described on the north facing slope south of the stormwater pond, and a deciduous forested wetland is described east of a drainage channel and north of the berm on the north side of the stormwater pond.

SOIL

The *Soil Survey Geographic Database for King County Area, Washington* (USDA, NRCS website 2006) identifies four soil series within the study area (Appendix A, Figure A-3; complete soil profile reports are provided in Appendix B):

- Arents (AmC, An) is soil that has been modified by plowing, spading, or other methods of moving by humans (USDA NRCS 1999). Arents is not listed in the National Hydric Soils List (USDA NRCS website 2014a).
- Alderwood (AmC) consists of moderately deep to a densic contact, moderately well drained soils formed in glacial drift and outwash over dense glaciomarine deposits (USDA NRCS

2014b). A perched water table is at its highest from January through March. The Arents, Alderwood soil series is not listed in the National Hydric Soils List (USDA, NRCS website 2014a).

- Everett (EvC) consists of very deep, somewhat excessively drained soil that formed in gravelly and sandy glacial outwash. (USDA, NRCS website 2014c). The Everett gravelly sandy loam series is not listed in the National Hydric Soils List (USDA, NRCS website 2014a).
- Kitsap (KpB) consists of very deep, moderately well drained soil formed in lacustrine sediments (USDA, NRCS website 2000). The Kitsap silt loam is classified as hydric in the National Hydric Soils List (USDA, NRCS website 2014a) in depressions that contain components of the Bellingham, Seattle, or Tukwila soil series.

FLOODPLAIN

The Q3 flood data (FEMA 1996) identifies the study area is outside the limits of a 100-year floodplain. The nearest 100-year floodplain to the project area is located approximately 800 ft to the north, associated with Phantom Lake.

LAND USE

Aerial photographs of the study area show developments (i.e., residential and/or commercial), open space (former landfill area), and forest in the study area (Figure 2).

PRECIPITATION

Precipitation data for the Puget Sound Lowlands during the 3-month period prior to the field investigations (National Climatic Data Center website 2015) indicate recorded precipitation levels were within the normal range listed in NRCS WETS tables (USDA, NRCS website 2002; Appendix C). However, a statewide drought emergency has been declared due to low snowpack (Ecology website 2015).

FIELD INVESTIGATION

Landau Associates' ecologists Steven Quarterman and Jamie Sloan conducted a field investigation on September 21, 2015; the weather during the investigation was sunny and warm.

Detailed information on soil, vegetation, and hydrology was recorded at two sampling points, and the boundaries of one wetland was delineated (Figure 3). No regulated waterways were identified in the study area. The completed data sheets describing the sample points, rating form, and site photographs are provided in Appendix D, Appendix E, and Appendix F, respectively.

WETLAND A/A1

Wetland A/A1 is approximately 600 square feet (subject to survey verification), and is located on the north facing slope south of the stormwater pond (see Figure 3), in the vicinity of wetland delineation in 2002 (The Watershed Company 2002). The wetland consists of two relatively small areas on the slope (flags A-1 to A-4 and A1-1 to A1-4) separated by a relatively narrow rise in elevation parallel to the slope.

Sampling Point SP-A was recorded to characterize the vegetation, hydrology, and soils of Wetland A, and Sampling Point SP-01 was recorded to describe the adjacent upland area (Appendix D).

VEGETATION

Wetland A/A1 satisfies the hydrophytic vegetation parameter by the prevalence index indicator. The dominant plant species and their indicator status at Sampling Point SP-A include:

- Reed canarygrass [*Phalaris arundinacea*, Facultative Wetland (FACW)]
- Himalayan blackberry [*Rubus armeniacus*, Facultative Upland (FACU)].

Additional species found in Wetland A/A1 include, but are not limited to, soft rush (*Juncus effusus*, FACW) and evergreen blackberry (*Rubus laciniatus*, FACU). Hydrophytic vegetation is considered present based on the prevalence index, as the wetland includes areas containing both reed canary grass and soft rush.

Soil

The soil at Sampling Point SP-A is characterized as sandy redox, which satisfies USACE hydric soil parameter. From 0 to 6 inches below ground surface (BGS), the soil matrix is a very dark gray-brown (10YR 3/2) loamy sand, underlain by a dark gray-brown (2.5Y 4/2) loamy sand with dark brown (7.5YR 3/4) and strong brown (7.5YR 4/6) redox features from 6 to 12 inches BGS. Gravel refusal was encountered at 12 inches BGS.

Hydrology

No primary indicator of wetland hydrology was observed at the time of the field investigation. However, previous investigation of the site references observation of saturation and ground seeps from the adjacent landfill. Drought conditions and years with unusually low winter snowpack are identified as a "difficult wetland situation" in the USACE Regional Supplement. In these instances, if wetland hydrology indicators appear to be absent on a site that has hydrophytic vegetation and hydric soil; no significant hydrologic manipulation (e.g., no dams, levees, water diversions, land grading, etc.); and the site is not within the zone of influence of any drainage ditches or subsurface drains), the area should be

identified as a wetland. The site may be re-visited and verified for wetland hydrology indicators during normal climatic periods.

Wetland Determination

All three mandatory wetland criteria are satisfied for Wetland A/A1. Landau Associates classified Wetland A as a palustrine emergent (PEM)/slope (Cowardin/HGM classification) wetland. The wetland is located immediately upslope of the existing landfill leachate French drain, which was installed in approximately 1983, and discharges to the King County sanitary sewer. The purpose of the French drain is to intercept landfill leachate and protect water quality in the downgradient stormwater pond. Hydrology from Wetland A/A1 is likely intercepted by the French drain.

Using the Ecology wetland rating form, Wetland A is rated as a Category 4 wetland, with a total score of 22. Wetland A/A1 scored highest for water quality functions, receiving a score of 12; hydrologic and habitat functions were rated with a score of 6 and 5, respectively. In accordance with Chapter 20.25H.095 BMC, Category 4 wetlands under 2,500 square feet are not designated critical areas, and no buffer is assigned.

Upland Characterization

The upland area of the project area is represented by Sampling Point SP-01, which satisfies only one of the three mandatory wetland criteria. Sampling Point SP-01 is located north of the stormwater detention ponds in an area described as wetland (The Watershed Company 2002). The area of Sampling Point SP-01 is a low topographic depression near the end of a riprap drainage swale adjacent to the walking trail west of the stormwater ponds.

Vegetation in Sampling Point SP-01 is dominated by:

- Pacific willow (*Salix lucida*, FACW)
- Red alder (*Alnus rubra*, FAC)
- Salmonberry (*Rubus spectabilis*, FAC)
- Ornamental cherry species (*Prunus* sp., No Indicator [NI])
- Yellow archangel (*Lamiastrum galeobdolon*, NI).

Additional species in Sampling Point SP-01 include Indian plum (*Oemleria cerasiformis*, FACU).

Areas upslope from Sampling Point SP-01 may contribute surface flow, but no hydrology indicators were observed. During the field investigation, the soil in Sampling Point SP-01 was dry. The soil from 0 to 4 ft BGS was a black fibrous sandy loam, underlain by a black (7.5YR 2.5/1) sandy loam with dark brown (7.5YR 3/4) and dark yellowish brown (10YR 3/6) features from 4 to 22 inches BGS. The features observed were hard nodules that appear to be relict features. Nodules and concretions that

are actively forming often have gradual or diffuse boundaries, whereas relict or degrading nodules and concretions have sharp boundaries (Vepraskas 1992 in USACE 2010). Additionally, nodules are generally not considered to be redox concentrations under the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010).

The former landfill area within the project area is dominated by unidentified grasses and herbaceous species. Grasses were unidentifiable at the time of the field investigation due to the lack of distinguishable features (as conditions were dry and the site is mowed); other herbaceous vegetation includes, but is not limited to, Queen Anne's lace (*Daucus carota*, FACU) and bird's-foot trefoil (*Lotus corniculatus*, FAC). A grass-lined swale was observed in this section of the study area, and vegetation in the swale was typical of the area.

Forest stands in the project area are dominated by Douglas-fir (*Pseudotsuga menziesii*, FACU). Western red cedar (*Thuja plicata*, FAC) and big leaf maple (*Acer macrophyllum*, FACU) are also present within the stand. Understory species include, but are not limited to:

- Salal (*Gaultheria shallon*, FACU)
- Vine maple (*Acer circinatum*, FAC)
- European mountain ash (*Sorbus aucuparia*, NI)
- Red huckleberry (*Vaccinium parvifolium*, FACU)
- English ivy (*Hedera helix*, FACU)
- Beaked hazelnut (*Corylus cornuta*, FACU)
- Oceanspray (*Holodiscus discolor*, FACU)
- Himalyan blackberry (FACU)
- Evergreen blackberry (FACU)
- Sword fern (*Polystichum munitum*, FACU)
- Indian plum (FACU)
- Red elderberry (*Sambucus racemosa*, FACU)
- Thimbleberry (*Rubus parviflorus*, FACU)
- Snowberry (*Symphoricarpos albus*, FACU)

Soil in the forested areas were generally similar to those seen in Sampling Point SP-01, but lacked nodules, and no hydrology indicators were observed.

STORMWATER DETENTION POND A

A three-cell stormwater detention pond (Pond A) was observed within the north-central portion of the project area. Pond A is designed as a wet pond, and contained standing water in each cell at the time of the field investigation. Pond A was initially constructed in the early 1980s and was modified to a three-cell configuration in 1983 to improve its water quality treatment capability. Pond A is reportedly dredged every 5 to 10 years (city of Bellevue Staff personal communication 2015). Pond A is bordered by walking trails and drains via underground piping to Phantom Lake.

Vegetation adjacent to the Pond A cells include, but is not limited to:

- Pacific willow (FACW)

- Scouler's willow (*Salix scouleriana*, FAC)
- Sedges [*Carex spp*.; species of this genus are generally FACW or obligate (OBL)]
- Reed canary grass (FACW).

The Pond A stormwater detention cells appear to be excavations and are presumed to have been constructed in uplands.

REGULATORY ASSESSMENT

As indicated in the BMC, and in accordance with the Growth Management Act, wetlands are "…areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands." As mentioned above, Category 4 wetlands less than 2,500 square feet are not designated critical areas in accordance with the BMC. As a result, Wetland A/A1 and the stormwater detention ponds are not considered critical area features regulated by the City.

Based on guidance developed by the U.S. Environmental Protection Agency (EPA) and USACE (EPA, USACE 2007), the agencies assert jurisdiction based on adjacency and significant nexus to traditional navigable waters. In accordance with current definition of "waters of the United States" (effective August 28, 2015), stormwater control features created in dry land are not "waters of the U.S." As a result, the stormwater detention ponds are not jurisdictional "waters of the U.S."

Wetland A/A1 may be a jurisdictional "waters of the U.S." due to possible connectivity to Phantom Lake, which drains to Lake Sammamish. However, the wetland is located immediately upslope of the existing landfill leachate French drain, which discharges to the King County sanitary sewer. The purpose of the French drain is to intercept landfill leachate and protect water quality in the downgradient stormwater pond. Hydrology from Wetland A/A1 is likely intercepted by the French drain. To make its jurisdictional determination, the USACE will evaluate the indicators of the relative permanence of flow and significant nexus of the wetlands and waterways identified in this report.

The information provided in this report is presented to assist the agencies that are ultimately responsible for determining jurisdiction. The jurisdictional determinations made by the City/USACE can be amended to this report or documented in another agreed-upon format.

USE OF THIS REPORT

The findings presented herein are based on our understanding of the City of Bellevue Municipal Code, the U.S. Army Corps of Engineers wetland delineation methodology, and on our interpretation of the vegetative, soil, and hydrological conditions observed during the site visit on September 21, 2015. Within the limitations of scope, schedule, and budget, the findings presented in this report were prepared in accordance with generally accepted sensitive area investigation principles and practices in this locality at the time the report was prepared. We make no other warranty, either express or implied.

This report was prepared for the use of Walker Macy, City of Bellevue, and applicable regulatory agencies. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk.

Wetland areas delineated by Landau Associates are considered preliminary until the USACE and/or local jurisdictional agencies validate the wetland boundaries. Because wetlands are dynamic communities, wetland boundaries may change over time. The agencies typically recognize wetland delineations for a period of 5 years following an approved jurisdictional determination. In addition, changes in government code, regulations, and/or laws may occur.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Steven J. Quarterman
Associate Ecologist

SJQ/tam

REFERENCES

Bellevue, city of, Staff. 2015. Personal communication with Steven Quarterman, Landau Associates. Project Kickoff Meeting. August 17.

Bellevue, City of, website. 2009. *Critical Areas by Storm Drainage Basin*. http://www.bellevuewa.gov/phantomcreekbasin.htm. . July 28.

Brinson, M. 1993. Final Report: *A Hydrogeomorphic Classification for Wetlands*. Wetlands Research Program Technical Report WRP-DE-4. East Carolina University, Biology Department. Greenville, North Carolina. Prepared for U.S. Army Corps of Engineers. August.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. Government Printing Office. Washington, D.C.

Ecology. 2015. 2015 *Drought Declaration Process and Timeline*. http://www.ecy.wa.gov/drought/2015DeclarationProcess.html#05152015.

EPA, USACE. 2007. *Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States*. U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. June 5.

ESRI 2013. USA Topo Maps. http://services.arcgisonline.com/ArcGIS/services/USA_Topo_Maps/MapServer?wsdl.

ESRI. 2015. World Imagery. https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9.

FEMA. 1996. Q3 Flood Data, King, Washington. ARC/INFO Coverage. Federal Emergency Management Agency. Washington, D.C.

Greytag Macbeth. 1994. *Munsell Soil Color Charts*. New Windsor, New York.

Hruby, T. 2004. *Washington State Wetland Rating System for Western Washington – Revised*. Publication No. 04-06-025. Washington State Department of Ecology. Olympia, Washington.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. *The National Wetland Plant List: 2014 Update of Wetland Ratings*. Phytoneuron 2014-41: 1-42.

National Climatic Data Center website. 2015. *Divisional Data*. http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#. Accessed September 23.

Olson, P. and E. Stockdale. 2010. Second Review Draft: *Determining the Ordinary High Water Mark on Streams in Washington State*. Publication No. 08-06-001. Washington State Department of Ecology. Olympia, Washington. Available at http://www.ecy.wa.gov/biblio/0806001.html. March.

USACE. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. Technical Report ERDC/EL TR-10-3. U.S. Army Corps of Engineer Research and Development Center Environmental Laboratory. Vicksburg, Mississippi. May.

USACE. 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station. Vicksburg, Mississippi. March.

USDA, NRCS. 2011. *Field Indicators of Hydric Soils in the United States*. Version 7.0. Available at http://soils.usda.gov/use/hydric/. G.W. Hurt and L.M. Vasilas, eds. U.S. Department of Agriculture, Natural Resources Conservation Service in cooperation with the National Technical Committee for Hydric Soils.

USDA, NRCS website. 2014a. *National Hydric Soils List*. http://soils.usda.gov/use/hydric/. U.S. Department of Agriculture, Natural Resources Conservation Service. Accessed February 10.

USDA, NRCS website. 2014b. *Alderwood Series*. http://www2.ftw.nrcs.usda.gov/osd/dat/A/ Alderwood.html. U.S. Department of Agriculture, Natural Resources Conservation Service.

USDA, NRCS website. 2014c. *Everett Series*. http://www2.ftw.nrcs.usda.gov/osd/dat/E/ EVERETT.html. U.S. Department of Agriculture, Natural Resources Conservation Service.

USDA, NRCS website. 2006. *Soil Survey Geographic Database for King County Area., Washington*. http://SoilDataMart.nrcs.usda.gov/. Accessed November 6, 2007.

USDA, NRCS website. 2002. *Climate Information – Wetlands Retrieval for Washington*. http://www.wcc.nrcs.usda.gov/cgibin/getwetco.pl?state=wa. Accessed September 23, 2015.

USDA, NRCS website. 2000. *Kitsap Series*. http://www2.ftw.nrcs.usda.gov/osd/dat/K/KITSAP.html. U.S. Department of Agriculture, Natural Resources Conservation Service.

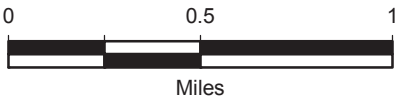
USDA, NRCS website. 1999. *Soil Taxonomy; A Basic System of Soil Classification for Making and Interpreting Soil Surveys*. Second Edition. Agriculture Handbook 436.

USFWS. 1981 to present. *National Wetlands Inventory Map*. U.S. Fish and Wildlife Service. St. Petersburg, Florida.

The Watershed Company. 2002. Wetland, Stream, and Wildlife Habitat Study Bellevue Airport Site. June. Prepared for City of Bellevue Parks and Community Services Department

WDFW website. 2015a. *Salmonscape*. http://wdfw.wa.gov/mapping/salmonscape/index.html. Washington Department of Fish and Wildlife.

WDFW website. 2015b. *Priority Habitats and Species*. http://wdfw.wa.gov/mapping/phs/ Washington Department of Fish and Wildlife.

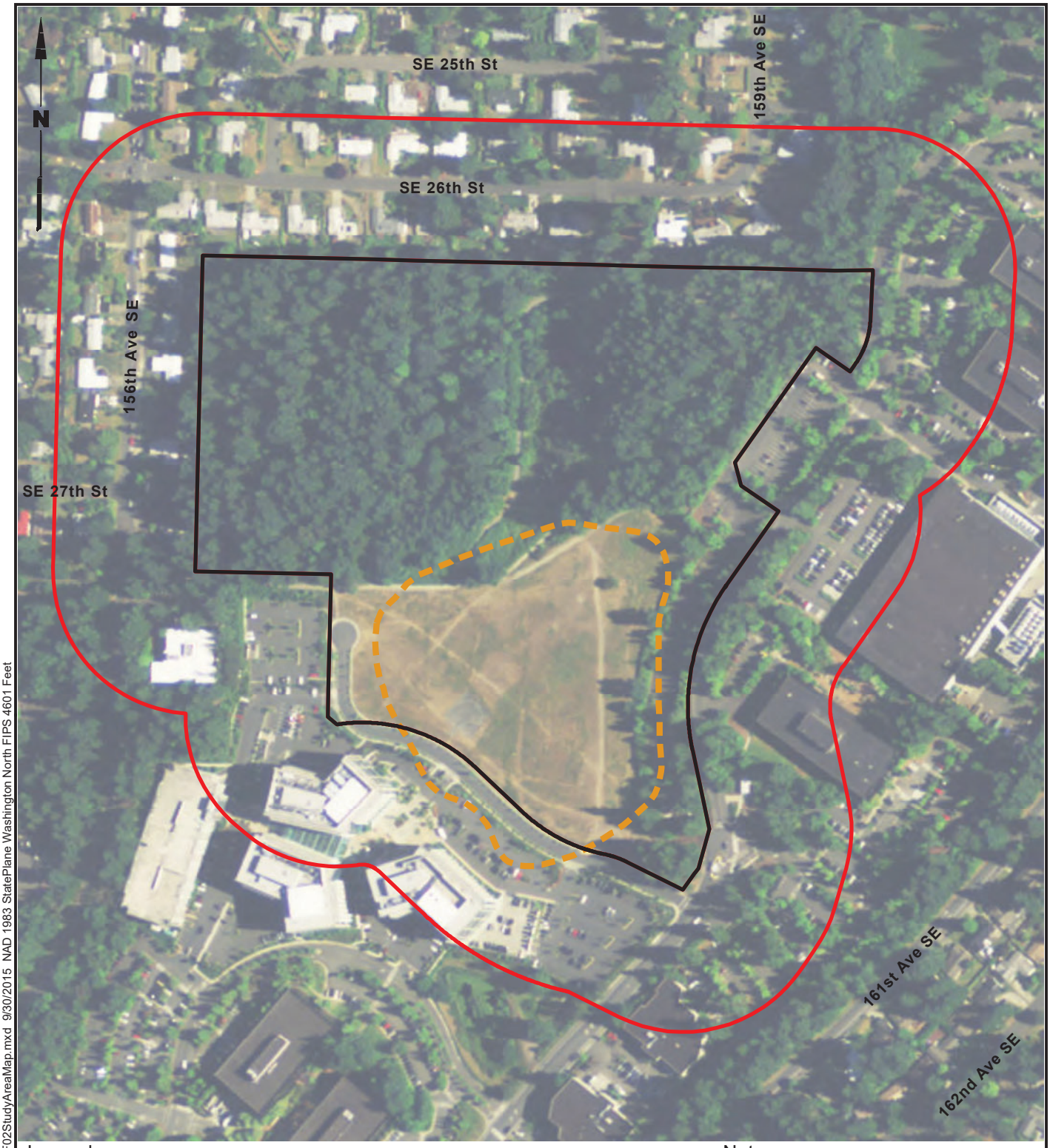


Data Source: Esri 2012

G:\Projects\1548\001\010\011\Wetland\F01VicinityMap.mxd 9/24/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**Vicinity Map**	Figure 1



Legend

- Project Area
- Study Area
- Approximate Area of Solid Waste Landfill

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 300 600

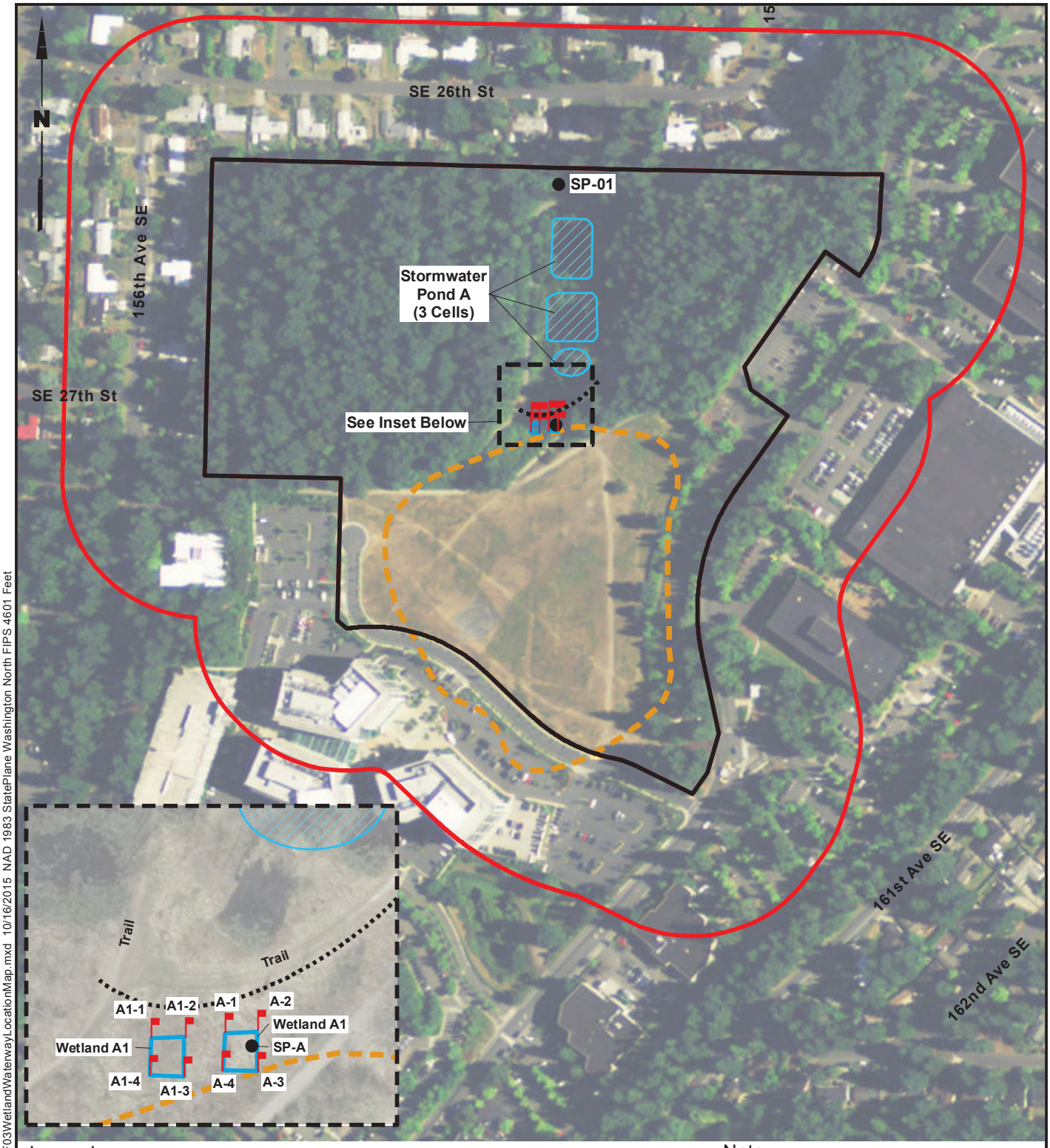
Scale in Feet

Data Sources: King County GIS; Esri World Imagery.

G:\Projects\1548\001\010\011\Wetland\F02StudyAreaMap.mxd 9/30/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**Study Area Map**	Figure 2



Legend

- Sampling Point
- Wetland Flag
- Wetland A
- Stormwater Ponds
- Project Area
- Study Area
- Approximate Area of Solid Waste Landfill
- Approximate Location of French Drain

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 300 600

Scale in Feet

Data Sources: King County GIS; Esri World Imagery.

G:\Projects\154800\010\011\Wetland\F03WetlandWaterwayLocationMap.mxd 10/16/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Wetland/Waterway Location Map

Figure 3

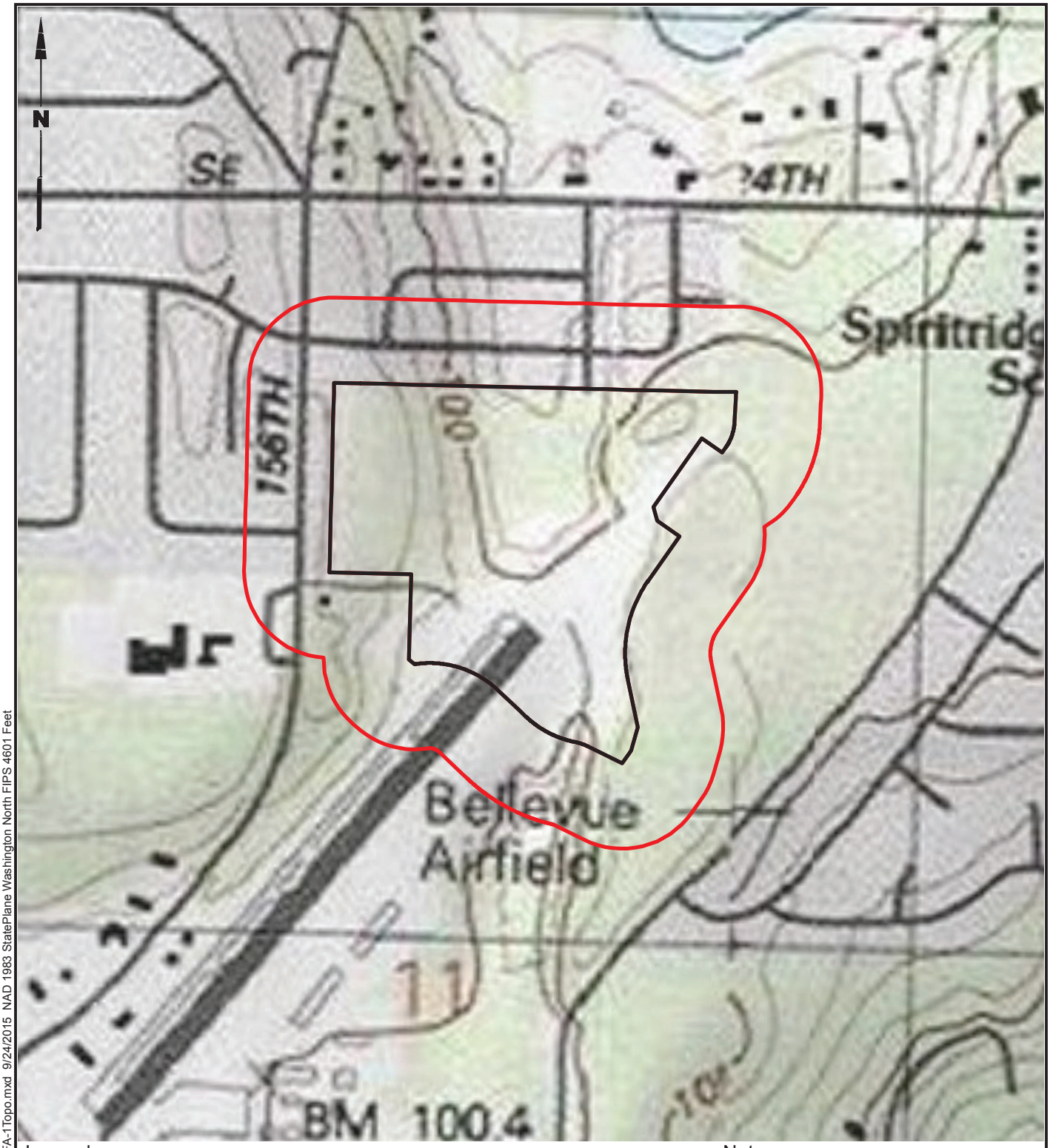
TABLE 1
METHODS FOR WETLAND DETERMINATION
AIRFIELD PARK
BELLEVUE, WASHINGTON

Parameter	Definition	Field Indicators	Field Assessment
Wetland Vegetation	Wetland vegetation is adapted to saturated soil conditions. The U.S. Army Corps of Engineers (USACE) has assigned a wetland indicator to each plant species that denotes its frequency of occurrence within wetlands (Lichvar et al 2014). These are: • Obligate (OBL) wetland plants usually occur in wetlands under natural conditions (more than 99 percent of the time). • Facultative wetland (FACW) plants usually occur in wetlands (67 to 99 percent of the time), but are occasionally found in non-wetlands. • Facultative (FAC) plants are equally likely to occur in wetlands or non-wetlands (34 to 66 percent of the time). • Facultative upland (FACU) plants usually occur in non-wetlands, but are occasionally found in wetlands (1 to 33 percent of the time). • Obligate upland (UPL) plants usually occur in uplands (more than 99 percent of the time).	More than 50 percent of the dominant plants totaled from all vegetation strata are hydrophytic, i.e., those species with indicators of OBL, FACW, or FAC (regardless of modifier), or A plant community has a visually estimated cover percentage of OBL and FACW species that exceeds the coverage of FACU and UPL species. If dominance is not met, the Prevalence Index is calculated, or consideration is given to morphological adaptations and/or non-vascular plants observed.	Dominance: The dominant plants and their wetland indicator status are evaluated quantitatively within data plots and visually throughout the study area. If the test for dominance fails, and indicators of wetland soil and hydrology are present, the Prevalence Index is calculated. Prevalence Index: A weighted average of the percent cover for each indicator status is calculated (see data sheets in Attachment 4 of this report). An index of 3 or less is considered meeting the hydrophytic vegetation criterion. If the Prevalence Index is not met, then consideration is given to morphological adaptations and/or non-vascular plants. Morphological Adaptations/Non-Vascular Plants: Some plants develop recognizable morphological adaptations when occurring in wetland areas. These features must be observed on >50 percent of the individuals of the FACU listed species living in an area where indicators of hydric soil and wetland hydrology are present. Wetland non-vascular plants can include bryophytes (mosses, liverworts, hornworts). The cover of wetland bryophytes must be >50 percent of the total bryophyte cover in a plot in coastal Washington forested wetlands
Wetland Soil (a)	Soil are classified as hydric, or they possess characteristics that are associated with reducing soil conditions. A hydric soil is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil.	Hydric soil has an identifiable color pattern, which occurs if the soil is saturated, flooded, or ponded for a long period of time. Faint or washed-out colors typically form in the soil, and mottles of bright color, such as rust (known as redoxymorphic features) form. Accumulations of organic matter at the surface, a sulfur odor, and organic matter stains may also be present.	A shovel is used to dig holes at least 20 inches below ground surface (BGS) at multiple locations in the study area. Direct observation of the soil is made at multiple locations in both wetlands and uplands, as applicable. Soil organic content is determined visually and texturally, and soil color is determined using the Munsell soil color chart (Greytag Macbeth 1994). Depth to water saturation and/or inundation is also observed. The characteristics observed are compared to the hydric soil indicators for “all soils,” “sandy soils,” and “loamy clayey soils,” as described in the USACE Regional Supplement (USACE 2010).
Wetland Hydrology (b)	The area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet, or The soil is inundated or saturated to the surface for at least 14 consecutive days during the growing season (c).	Primary indicators of wetland hydrology include surface inundation (standing water), saturated soil, watermarks, drift lines, sediment deposits, and drainage patterns. Secondary indicators of hydrology include water-stained leaves, oxidized root channels, or local soil survey data for identified soil. In the absence of any primary indicators, at least two secondary indicators are required to meet the wetland hydrology criterion.	During soil investigation, soil pits are allowed to stand for up to 20 minutes to allow percolation of any groundwater into the pit to determine groundwater level for the soil profile. Additional digging may occur to 24 inches BGS during the dry season to investigate groundwater levels. In addition, the extent of soil saturation and presence/absence of oxidation are determined in the soil removed as part of the soil sample. Other indicators of wetland hydrology are observed at ground surface.

(a) USACE 1987, 2010; U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) 2011.
(b) USACE 1987, 2010.
(c) The growing season is the time during which two or more non-evergreen vascular plant species growing in a wetland or surrounding area exhibit biological activity, such as new growth. Growing season can also be determined by soil temperature. The growing season identified on project area WETS table is February 7 to December 8.

APPENDIX A

Background Information Review Figures



Legend

- Project Area
- Study Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 500 1,000

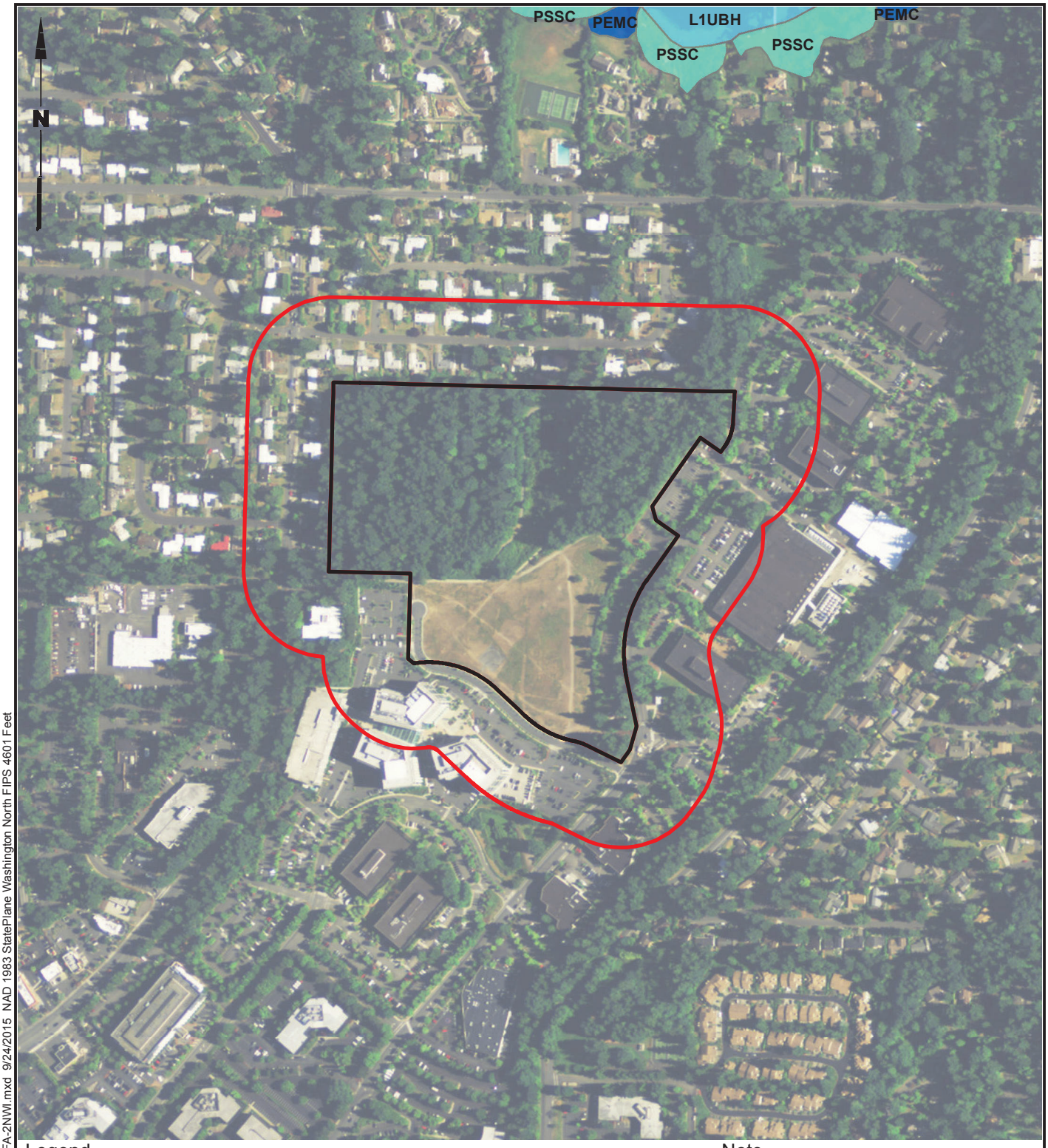
Scale in Feet

Data Sources: King County GIS; USGS.

G:\Projects\1548\001\010\011\Wetland\FA-1Topo.mxd 9/24/2015 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**USGS Topographic Map**	Figure A-1



Legend

- L1UBH - Lake
- PEMC - Freshwater Emergent Wetland
- PSSC - Freshwater Forested/Shrub Wetland
- Project Area
- Study Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 500 1,000

Scale in Feet

Data Sources: King County GIS; USFWS; Esri World Imagery.

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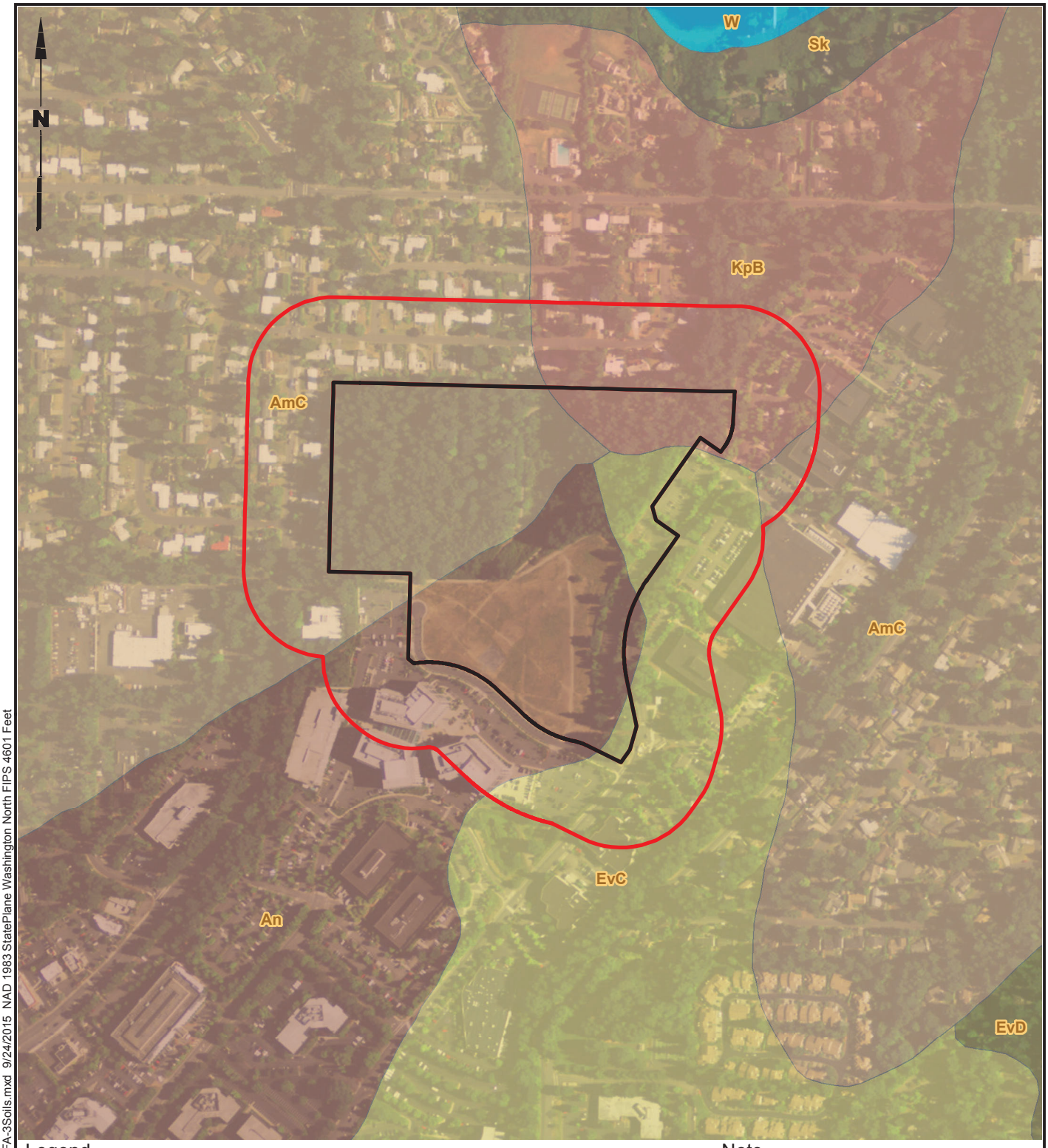
LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**U.S. Fish and Wildlife Service National Wetlands Inventory Map**	Figure A-2



Legend

- AmC - Arents, Alderwood Material, 6-15% Slopes
- An - Arents, Everett Material
- EvC - Everett Gravelly Sandy Loam, 5-15% Slopes
- EvD - Everett Gravelly Sandy Loam, 15-30% Slopes
- KpB - Kitsap Silt Loam, 2-8% Slopes
- Sk - Seattle Muck
- W - Water
- Project Area
- Study Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 500 1,000

Scale in Feet

Data Sources: King County GIS; USDA NRCS; Esri World Imagery.

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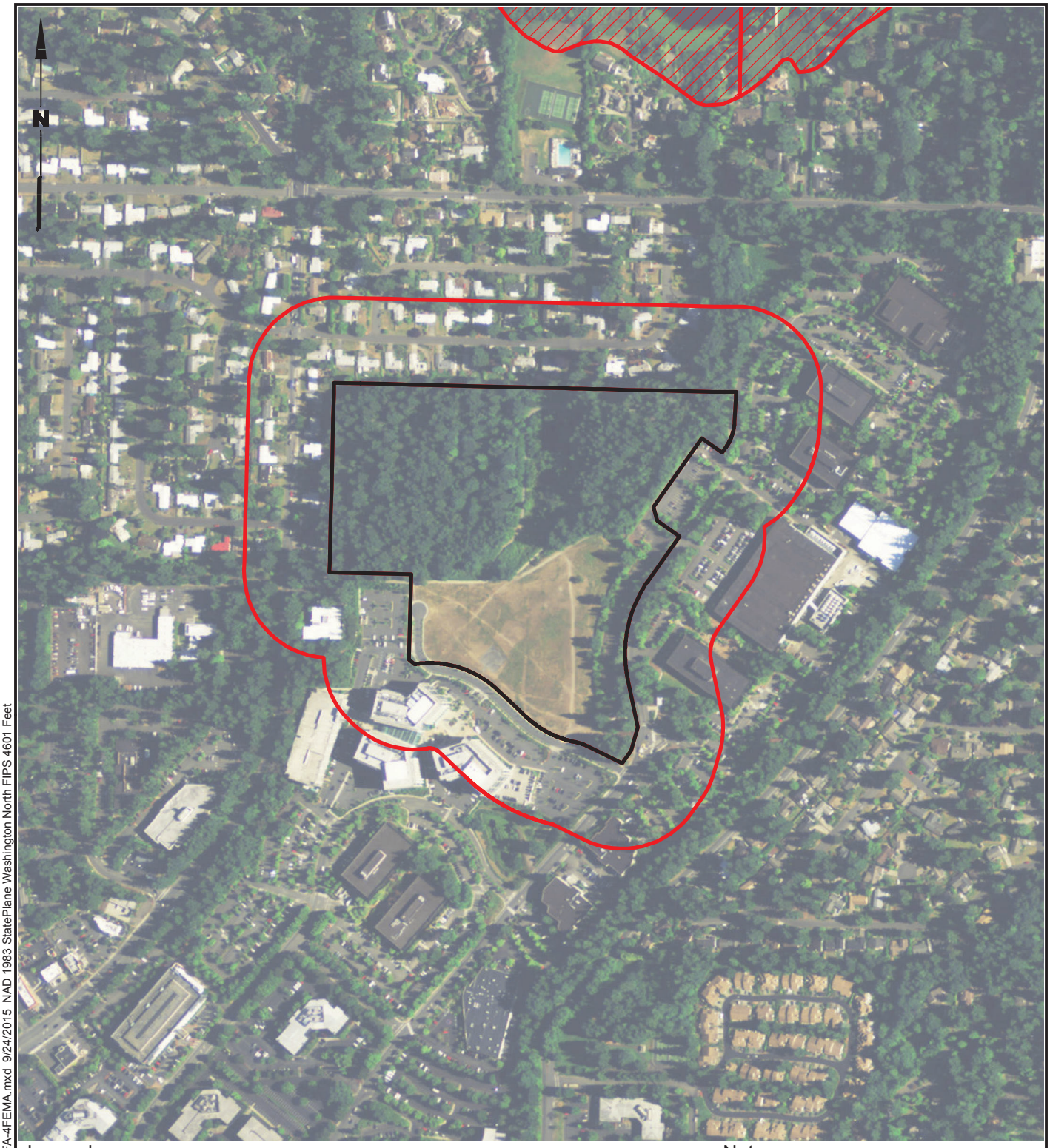
LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**Soils Map**	Figure A-3



Legend

- 100-Year Floodplain
- Project Area
- Study Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 500 1,000

Scale in Feet

Data Sources: King County GIS; FEMA; Esri World Imagery.

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LANDAU ASSOCIATES

Bellevue Airfield Park Bellevue, Washington	**FEMA 100-Year Floodplain Map**	Figure A-4

APPENDIX B

Soil Profile Reports

LOCATION ALDERWOOD WA

Established Series
Rev. AD/BAL/KMS
11/2014

ALDERWOOD SERIES

The Alderwood series consists of moderately deep to a densic contact, moderately well drained soils formed in glacial drift and outwash over dense glaciomarine deposits. Alderwood soils are on glacially modified hills and ridges on glacial drift plains and have slopes of 0 to 65 percent. The mean annual precipitation is about 1,000 mm and the mean annual temperature is about 10 degrees C.

TAXONOMIC CLASS: Loamy-skeletal, isotic, mesic Aquic Dystroxerepts

TYPICAL PEDON: Alderwood gravelly sandy loam - forested. (Colors are for moist soil unless otherwise noted.)

A--0 to 18 cm; very dark grayish brown (10YR 3/2) gravelly sandy loam, brown (10YR 5/3) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; few fine irregular pores; 20 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary. (7 to 18 cm thick)

Bw1--18 to 53 cm; dark yellowish brown (10YR 4/4) very gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular and irregular pores; 35 percent gravel; gradual smooth boundary; moderately acid (pH 5.8).

Bw2--53 to 75 cm; brown (10YR 4/3) very gravelly sandy loam, pale brown (10YR 6/3); dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few very fine tubular pores; 40 percent gravel; moderately acid (pH 5.8); clear wavy boundary. (Combined Bw1 and Bw2 horizons is 35 to 67cm thick)

Bg--75 to 89 cm; 50 percent olive brown (2.5Y 4/4) very gravelly sandy loam, light yellowish brown (2.5Y 6/4) dry and 50 percent dark grayish brown (2.5Y 4/2) iron-manganese nodules with strong brown (7.5YR 5/6) coatings on fragments, light brownish gray (2.5Y 6/2) and reddish yellow (7.5YR 6/6) dry; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine tubular and interstitial pores; 45 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary. (8 to 38 cm thick)

2Cd1--89 to 109 cm; dark grayish brown (2.5Y 4/2) very gravelly sandy loam, light brownish gray (2.5Y 6/2) dry; dark yellowish brown (10YR 4/4), olive (5Y 4/4), yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) coatings in cracks; massive; extremely hard; extremely firm, nonsticky and nonplastic; few fine roots; few fine tubular pores; 40 percent gravel; moderately acid (pH 6.0); abrupt irregular boundary. (13 to 51 cm thick)

2Cd2--109 to 150 cm; grayish brown (2.5Y 5/2) dense glacial till that breaks to very gravelly sandy loam, light gray (2.5Y 7/2) dry; massive; extremely hard, extremely firm, nonsticky and nonplastic; 40 percent gravel; moderately acid (pH 6.0).

TYPE LOCATION: Snohomish County, Washington; about 8 km east of Lynnwood on Maltby road; 61meters south and 122 meters east of the center of section 28, T. 27 N., R. 5 E. Willamette Meridian;
Latitude: 47.7980000
Longitude: -122.1760000
Datum: WGS84.

RANGE IN CHARACTERISTICS:
Depth to densic contact: 50 to 100 cm
Mean annual soil temperature: 8 to 13 degrees C.
Moisture control section: dry 60 to 75 consecutive days following the summer solstice
Reaction: strongly acid to slightly acid
Depth to redox features with chroma of 2 or less: 45 to 75 cm
Particle-size control section (weighted average):
> Clay content: 5 to 15 percent
> Rock fragments: 35 to 65 percent

A horizon
Hue: 10YR or 7.5YR
Value: 2 or 3 moist, 3 to 5 dry
Chroma: 2 to 4, moist or dry
Total fragments: 15 to 65 percent
Grave content: 15 to 65 percent
Cobble content: 0 to 5 percent
Stone content: 0 to 5 percent

Bw horizons
Hue: 10YR or 7.5YR
Value: 2 to 6, dry or moist
Chroma: 2 to 6, dry or moist
Fine earth texture: sandy loam, coarse sandy loam, or loam
Total fragments: 15 to 65 percent
Grave content: 15 to 65 percent
Cobble content: 0 to 5 percent
Stone content: 0 to 5 percent

Bg horizon
Hue: 10YR or 2.5Y
Value: 5 to 7 dry
Chroma: 2 to 4, moist or dry
Fine earth texture: sandy loam, coarse sandy loam, or loam
Redox concentrations - beginning within 75 cm of the surface
Total fragments: 35 to 85 percent
Grave content: 35 to 85 percent

Cobble content: 0 to 25 percent
Stone content: 0 to 5 percent

2Cd horizons
Hues: 10YR or 2.5Y
Value: 4 to 8 dry
Chroma:1 to 3, moist or dry
Fine earth texture: sandy loam, fine sandy loam, coarse sandy loam, or loamy sand
Total fragments: 15 to 45 percent
Grave content: 15 to 45 percent
Cobble content: 0 to 10 percent
Stone content: 0 to 5 percent

An E horizon less than 3 cm thick is sometimes present.

COMPETING SERIES: This is the Whidbey series. Whidbey soils are dry 75 to 90 consecutive days following the summer solstices.

GEOGRAPHIC SETTING: These soils are on glacial drift plains at elevations of 0 to about 245 meters. Slope is 0 to 65 percent. The soils formed in glacial till. Alderwood soils are in a cool marine climate. The summers are cool and dry, and the winters are mild and wet. Mean annual precipitation is 406 to 1524 millimeters, most of which falls as rain from November through March. Mean January temperature is 3 degrees C, mean July temperature is 16 degrees C, and mean annual temperature is 10 degrees C. The growing season (-2 degrees C) is about 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the, , Everett, , Indianola, , McChord, and Whidbey series. Everett and Indianola soils lack a densic layer. McChord soils have a densic horizon at 100 to 150 cm.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained; high saturated hydraulic conductivity above the densic layer and low saturated hydraulic conductivity in the densic material. A perched water table is at its highest from January through March.

USE AND VEGETATION: Used mostly for woodland, field crops, hay and pasture, orchards, vineyards, wildlife habitat, watershed, and non-farm uses. The natural vegetation is Douglas-fir, western hemlock, western redcedar, and red alder with an understory of salal, Oregon-grape, western brackenfern, western swordfern, Pacific rhododendron, red huckleberry, evergreen huckleberry, and Orange honeysuckle.

DISTRIBUTION AND EXTENT: Northwestern Washington; MLRA 2. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Snohomish County, Washington 1936.

REMARKS: Diagnostic horizons and features recognized in this soil:
Ochric epipedon - from 0 to 18 cm
Cambic horizon - from 18 to 89 cm
Densic contact - from 89 to 150 cm

Aquic feature - redox depletions with chroma of 2 or less at 75cm.
Particle-size control section - 25 to 89 cm.
Zone of episaturation - 68 to 89 cm.

9/2013 The OSD was revised as part of the SDJR harmonization project. The Alderwood soils is mapped extensively in MLRA 2 and the map units need to be redesigned to more accurately reflect the landforms and series complexity.

2011 The TL was moved and the current typical pedon is borderline in meeting the Aquic subgroup criteria and is also borderline in meeting Humic subgroup criteria. Based on the range of characteristics, the present classification is marginal to being Aquic subgroup and marginal to not meeting Humic subgroup criteria. It is recommended a new typical pedon be selected to represent the series concept and classification.

The series has had a long history in classification, much of it involves the cementation or not of the upper part of the glacial till. The series in 1978 started as a loamy-skeletal, mixed, mesic Dystric Entic Durochrepts, then in 1988 to a loamy-skeletal, mixed, mesic, ortstein Aquic Haplorthods, then in 1994 to a loamy-skeletal, mixed, mesic Vitrandic Durochrepts, then in 2000 to a loamy-skeletal, isotic, mesic Vitrandic Dystroxerepts and in 2011 to a loamy-skeletal, isotic, mesic Aquic Dystroxerepts. The 89 to 109 cm horizon is the horizon in question as to cementation or not, and if cemented, what is the cementing agent. The material was studied in the late 1960's and early 1970's and it was though at that time to be cemented, but the cementing agent was not easily identifiable. The strength of Vitrandic properties in the upper part of the solum is very weak. Given all this change in classification the typical pedon has remained the same and the concept of a moderately deep and moderately well drained soil has remained the same.
An in depth study of the glacial till is needed throughout the Puget Sound foothills on several similar soil series.

ADDITIONAL DATA: Partial data available for this series. Sample # S71WA033002, 71WA033003, S04WA-061-002, and S09WA053098.

National Cooperative Soil Survey
U.S.A.

LOCATION EVERETT WA

Established Series
Rev. CAB/BAL/KMS
11/2014

EVERETT SERIES

The Everett series consists of very deep, somewhat excessively drained soils that formed in gravelly and sandy glacial outwash. Slopes are 0 to 65 percent. They occur on kames, moraines, and eskers on glacial outwash plains and glacial drift plains. The mean annual precipitation is about 1,050 millimeters and the mean annual temperature is about 10 degrees C.

TAXONOMIC CLASS: Sandy-skeletal, isotic, mesic Humic Dystroxerepts

TYPICAL PEDON: Everett very gravelly sandy loam - on a north-facing slope of 3 percent at 150 meters elevation in forest. When described on October 21, 2009, the soil was slightly moist throughout. (Colors are for moist soil unless otherwise noted.)

Oi --0 to 3 centimeters; slightly decomposed plant material consisting of leaves, needles, and twigs.

A--3 to 8 centimeters; very dark brown (7.5YR 2.5/2) very gravelly sandy loam, brown (7.5YR 4/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common medium and fine tubular pores; 35 percent gravel, 10 percent cobbles; strongly acid (pH 5.3); clear smooth boundary. (3 to 15 centimeters thick)

Bw--8 to 60 centimeters; dark brown (7.5YR 3/4) very gravelly sandy loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine through medium roots; common fine tubular pores; 35 percent gravel, 10 percent cobbles; strongly acid (pH 5.5); clear wavy boundary. (15 to 55 centimeters thick)

C1--60 to 90 centimeters; dark yellowish brown (10YR 4/4) very gravelly loamy sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic, common medium and few coarse roots; many very fine interstitial pores; 40 percent gravel, 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary. (15 to 50 centimeters thick)

C2--90 to 152 centimeters; dark yellowish brown (10YR 4/4) extremely cobbly sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; few coarse; roots; many very fine interstitial; 40 percent gravel, 35 percent cobbles; moderately acid (pH 5.6)

TYPE LOCATION: Thurston County, Washington; Joint Base Lewis-McChord; 629 meters east and 566 meters south of NW corner of sec.3, T. 17 N., R. 1 E. USGS Tenalquot Prairie Quadrangle; Latitude - 46 degrees, 59 minutes, 28 seconds N and Longitude - 122 degrees, 40 minutes, 1 second W, NAD 83.
Lattitude: 46.99097

Longitude: -122.66686
Datum: WGS84

RANGE IN CHARACTERISTICS:
Mean annual soil temperature: 9 to 12 degrees C.
Moisture control section: dry 60 to 75 days following the summer solstice
Reaction: moderately acid to very strongly acid
Particle size control section:
> Clay content: 2 to 10 percent
> Rock fragments:
>> Total: 35 to 85 percent
>> Gravel: 35 to 85 percent
>> Cobble: 0 to 40 percent
>> Stone: 0 to 5 percent

A horizon
Hue: 10YR, 7.5YR, or 5YR
Value: 2 or 3 moist, 4 or 5 dry
Chroma: 1 to 3, moist or dry.
Total fragments: 0 to 65 percent
Gravel content: 0 to 45 percent
Cobble content: 0 to 15 percent
Stone content: 0 to 5 percent

Bw horizons
Hue: 10YR or 7.5YR
Value: 3 to 6, moist or dry
Chroma: 2 to 6, moist or dry
Fine-earth texture: silt loam in the upper part ranging to coarse sand, loamy sand, or loamy coarse sand in the lower part
Total fragments: 35 to 55 percent
Gravel content: 35 to 85 percent
Cobble content: 0 to 40 percent
Stone content: 0 to 5 percent

C horizons
Hue: 7.5YR to 5Y
Value: 3 or 6 moist, 4 to 6 dry
Chroma: 1 to 6, moist or dry
Fine-earth texture: coarse sandy loam, loamy sand, or loamy coarse sand in the lower part
Total fragments: 35 to 55 percent
Gravel content: 35 to 85 percent
Cobble content: 0 to 40 percent
Stone content: 0 to 5 percent

COMPETING SERIES: There are no competing series in this family.

GEOGRAPHIC SETTING: The Everett soils occur on kames, eskers and moraines on glacial outwash plains and drift plains with at elevations of 10 to 275 meters. Slopes are 0 to 65 percent. The climate consists of cool and dry summers and mild and wet winters. Mean annual precipitation is generally 900 to 1800 millimeters, but ranges as high as 2300 millimeters in Mason County, WA. Mean January temperature is 2 degrees C; mean July temperature is 17 degrees C; and the mean annual temperature is 10 degrees C. The frost-free season is 180 to 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Alderwood, Baldhill, Indianola, and Kapowsin soils. Alderwood soils have a densic contact at a depth of 50 to 100 cm and are on drift plains and moraines. Indianola soils are sandy throughout on hills, terrace escarpments, eskers, and kames. Kapowsin soils are coarse-loamy and on glacial drift plains. Baldhill soils are loamy-skeletal and on terminal moraines.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat excessively drained; high to very high saturated hydraulic conductivity.

USE AND VEGETATION: Everett soils are mainly used for pasture, timber production, urban development, and a source of sand and gravel. Potential natural vegetation includes bigleaf maple, red alder, Douglas-fir, western redcedar, western hemlock, salal, hairy brackenfern, red huckleberry, Nootka rose, oceanspray, and Cascade Oregongrape and orange honeysuckle

DISTRIBUTION AND EXTENT: Northwest Washington MLRA 2, Puget Sound Area. Series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: 1910 Reconnaissance Survey of Eastern Puget Sound Basin, Washington.

REMARKS: Diagnostic horizons and features recognized in this soil:
Ochric epipedon - 0 to 18 cm
Cambic horizon - 8 to 60 cm (Bw horizon)

In 1974 Everett was classified as a Dytric Xerochrepts. In 1994 it was changed to Vitrandic Dystrochrept but lab analyses did not support the Vitrandic sub group so it was changed to Typic Dystroxerpts in 2010. The Everett series does contain some volcanic ash but not enough to meet the Vitrandic subgroup criteria. In 2011 it was changed to Humic Dystroxerepts. In 2014 Everett was harmonized with the SDJR initiative and minor edits were made to the OSD.

ADDITIONAL DATA: Laboratory data is available for this series. National Soil Survey Laboratory S09WA067069, S09WA053124, S09WA-053-001

National Cooperative Soil Survey
U.S.A.

LOCATION KITSAP WA

Established Series
Rev. JPE/AZ/RJE
01/2000

KITSAP SERIES

The Kitsap series consists of very deep, moderately well drained soils formed in lacustrine sediments. Kitsap soils are on terraces and terrace escarpments and have slopes of 0 to 70 percent. The mean annual precipitation is about 37 inches. The mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Fine-silty, isotic, mesic Aquandic Dystroxerepts

TYPICAL PEDON: Kitsap silt loam - pasture. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 6 inches; very dark grayish brown (l0YR 3/2) silt loam, grayish brown (l0YR 5/2) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; moderately acid (pH 5.8); abrupt smooth boundary. (3 to 6 inches thick)

Bwl--6 to l0 inches; dark brown (l0YR 4/3) silt loam, pale brown (l0YR 6/3) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine pores; many 2 to 5 mm light brown (7.5YR 6/4) concretions; moderately acid (pH 6.0); clear wavy boundary. (3 to l2 inches thick)

Bw2--l0 to l7 inches; brown (l0YR 4/3) silty clay loam, pale brown (l0YR 6/3) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine roots; common very fine pores about 3 percent fine pebbles; few 2 to 5 mm light brown (7.5YR 6/4) concretions; few silt balls; few krotovinas; slightly acid (pH 6.4); clear wavy boundary. (4 to 22 inches thick)

BC--l7 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (2.5Y 7/2) dry; many large prominent strong brown (7.5YR 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine roots; common very fine pores; slightly acid (pH 6.5); clear irregular boundary. (0 to 35 inches thick)

C--32 to 60 inches; light olive brown (2.5Y 5/4) silt loam and silty clay loam, light brownish gray (2.5Y 6/2) dry; very fine and fine stratification; hard, firm, moderately sticky and moderately plastic; few roots; few very fine pores; tongues of grayish brown (2.5Y 5/2) material like the B3 horizon; neutral; (pH 6.6).

TYPE LOCATION: Pierce County, Washington; l00 feet north of corner of l04th St. and 80th Ave.; 2,050 feet west and 2,750 feet south of the northeast corner of sec. 5, T. l9 N., R. 4 E.

RANGE IN CHARACTERISTICS: These soils are usually moist but are dry in the moisture control section for 45 to 60 consecutive days following summer solstice. The mean annual soil temperature is estimated to range from 50 to about 53 degrees F. These soils range from moderately acid to neutral

throughout. Coarse fragments in the control section average 0 to 5 percent by volume. Depth to redoximorphic features with a chroma of 2 or less is 5 to 24 inches.

The A horizon has value of 2, 3 or 4 moist, 4, 5 or 6 dry, and chroma of 2 or 3 moist or dry. It is silt loam or loam.

The Bw horizon has value of 3 through 5 moist, 5 through 7 dry, and chroma of 3 or 4 moist or dry. It is silt loam or silty clay loam, and has weak or moderate blocky structure. The BC horizon has hue of l0YR or 2.5Y, value of 4 through 6 moist, 6 through 8 dry and is prominently mottled. It has blocky or prismatic structure or is massive.

The C horizon has hue of l0YR, 5Y or 2.5Y, value of 5 or 6 moist, 6 through 8 dry, chroma of 2 through 4 moist and dry and is mottled. In some pedons bluish gray (5B 5/l) gleying is prominent in root channels. This horizon is stratified silt, silt loam and silty clay loam. Some pedons contain thin strata of silty clay, silt, or fine sand.

COMPETING SERIES: This is the Aloha series and the similar Giles and Saxon series. Aloha soils have an average soil temperature of 54 to 56oF and lack strata of silty clay loam in the lower part of the particle- size control section. Giles and Saxon soils lack grayish colors or mottles in the subsoil and are well drained. Also, Saxon soils have a dense laminated silt, clay, or silty clay loam B horizon.

GEOGRAPHIC SETTING: Kitsap soils are on terraces and terrace escarpments at elevations ranging from near sea level to about 500 feet. Slopes are 0 to 70 percent. The soils formed in lacustrine sediments. These soils occur in a mild marine climate. Summers are cool and dry and winters are mild and wet. The mean annual precipitation ranges from 30 to 45 inches. The mean January temperature is 39 degrees F., mean July temperature is 6l degrees F., and mean annual temperature is 50 degrees F. The frost-free season is l60 to 200 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Alderwood, Everett, Harstine, and Indianola soils. These soils have less than l8 percent clay in the control section. Alderwood and Harstine soils have a duripan. Everett soils are sandy-skeletal, and Indianola soils are sandy.

DRAINAGE AND PERMEABILITY: Moderately well-drained; slow or medium runoff; slow permeability.

USE AND VEGETATION: Mostly forests and some cropland and pasture. Native vegetation is Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple, and willows, with understory of western brackenfern, western swordfern, salal, Oregon-grape, trailing blackberry, red huckleberry, vine maple, evergreen huckleberry, red elderberry, and wild ginger.

DISTRIBUTION AND EXTENT: Northwestern Washington. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Kitsap County, Washington, l934.

REMARKS: Classification changed 4/94 and 1/00 because of amendments to Soil Taxonomy. The 0 to 10 inch depth is estimated to have >5 percent volcanic glass and >0.4 percent Al + 1/2 Fe by acid-oxalate.

ADDITIONAL DATA: Partial laboratory data available on this soil. Pedon # S77WA-061-30, NSSL, Lincoln, NE.

National Cooperative Soil Survey
U.S.A.

APPENDIX C

Precipitation Data

WETS Station : SEATTLE TCOMA WSCMO AP, WA7473 Creation Date: 09/10/2002
Latitude: 4727 Longitude: 12218 Elevation: 00400
State FIPS/County(FIPS): 53033 County Name: King
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days w/.1 or more	avg total snow fall
	avg daily max	avg daily min	avg	avg	less than	more than		
January	45.8	35.9	40.9	5.13	3.58	6.10	11	2.4
February	49.5	37.2	43.3	4.18	2.73	5.02	10	1.3
March	53.2	39.1	46.2	3.75	2.77	4.40	10	0.6
April	58.2	42.1	50.1	2.59	1.71	3.11	7	0.1
May	64.3	47.2	55.7	1.77	1.16	2.13	5	0.0
June	69.5	51.7	60.6	1.49	0.96	1.79	4	0.0
July	75.2	55.3	65.3	0.79	0.43	0.97	2	0.0
August	75.5	55.7	65.6	1.02	0.38	1.24	2	0.0
September	70.1	51.9	61.0	1.63	0.62	2.03	4	0.0
October	59.7	45.7	52.7	3.19	1.96	3.86	7	0.1
November	50.5	39.9	45.2	5.90	4.10	7.02	13	1.1
December	45.4	35.9	40.7	5.62	3.94	6.68	11	1.9
Annual	-----	-----	-----	------	33.52	40.09	--	----
Average	59.7	44.8	52.3	------	------	------	--	----
Total	-----	-----	-----	37.07	------	------	86	7.5

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	1/20 to 12/28 343 days	2/ 7 to 12/ 8 304 days	3/ 9 to 11/15 252 days
70 percent *	> 365 days > 365 days	1/31 to 12/15 319 days	3/ 3 to 11/21 263 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

StateCode	Division	YearMonth	PCP	TAVG	PDSI	PHDI	ZNDX	PMDI	CDD	HDD	SP01	SP02	SP03	SP06	SP09	SP1
45	03	201506	.4	64.8	-2.8	-2.8	-3.5	-2.8	55	61	-1.68	-2.43	-2.67	-1.09	-.27	-.1
45	03	201507	.48	68	-3.77	-3.77	-3.77	-3.77	114	21	-.66	-1.63	-2.63	-1.15	-.91	-.2
45	03	201508	1.98	66.4	-3.54	-3.54	-.5	-3.54	82	38	.91	.35	-.79	-1.22	-.82	-.1

Airfield Park

Figure 19–7 Rainfall documentation worksheet

Rainfall Documentation
(use with photographs)

Date: 9/21/15

Weather station: _____ Landowner: _____ Tract no.: _____

County: _____ State: _____

Soil name: _____ Growing season: _____

Photo date: _____

	Long-term rainfall records							
Month	3 yrs. in 10 less than	Normal	3 yrs. in 10 more than	Rain fall	Condition dry, wet, normal	Condition value	Month weight value	Product of previous two columns
1st prior month* 8	0.38	1.02	1.24	1.98	wet	3	3	9
2nd prior month* 7	0.43	0.79	0.97	0.48	Normal	2	2	4
3rd prior month* 6	0.96	1.49	1.79	0.11	Dry	1	1	1
							Sum	14

* Compared to photo date

Note: If sum is
- 6 - 9 then prior period has been drier than normal
- 10 - 14 then prior period has been normal
- 15 - 18 then prior period has been wetter than normal

Condition value:
- Dry =1
- Normal =2
- Wet =3

Conclusions:

Normal

APPENDIX D

Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Airfield Park City/County: Bellevue/King Sampling Date: 9/21/2015

Applicant/Owner: City of Bellevue State: WA Sampling Point: SP-01

Investigator(s): Steven Quarterman and Jamie Sloan Section, Township, Range: S 11, T 24 N, R5 E

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR): A, Northwest Forests and Coast Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: Arents, Alderwood NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☒ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks: Located north of ponds. State is in declared drought.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lucida	30	Yes	FACW
2. Alnus rubra	30	Yes	FAC
3. Prunus sp.	10	No	FACU
4.			
	70	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5 ft)			
1. Rubus spectabilis	50	Y	FAC
2. Oemleria cerasiformis	5	N	FACU
3. Prunus sp.	45	Y	FACU
4.			
5.			
	100	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Lamium galeobdolon	75	Y	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: SP-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10 YR 2/1	100						Fibrous sandy loam
4-22+	7.5 YR 2.5/1	95	7.5YR 3/4	2	C	M		Sandy loam
			10YR 3/6	3	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☐ No ☒

Remarks: Redox features are hard nodules (relict features). Some plastic debris in soils, evidence of dumping.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Airfield Park City/County: Bellevue/King Sampling Date: 9/21/2015

Applicant/Owner: City of Bellevue State: WA Sampling Point: SP-A

Investigator(s): Steven Quarterman and Jamie Sloan Section, Township, Range: S 11, T 24 N, R5 E

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): None Slope (%): >5

Subregion (LRR): A, Northwest Forests and Coast Lat: Long: Datum:

Soil Map Unit Name: Arents, Alderwood NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☒ (If no, explain in Remarks.)

Are Vegetation N, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐ Hydric Soil Present? Yes ☒ No ☐ Wetland Hydrology Present? Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☒ No ☐

Remarks: Located south of ponds on fillslope associated with former landfill. State is in declared drought.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft)			
1. Rubus armeniacus	25	Y	FACU
2. Rubus laciniatus	5	N	FACU
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Phalaris arundinacea	90	Y	FACW
2. Juncus effusus	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species 100	x 2 = 200
FAC species	x 3 =
FACU species	x 4 =
UPL species 30	x 5 = 150
Column Totals: 130 (A)	350 (B)

Prevalence Index = B/A = 2.7

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: SP-A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10 YR 3/2	100						Loamy sand
6-12	2.5 Y 4/2	96	7.5YR 3/4	3	C	M		Loamy sand
			7.5 YR 4/6	1	C	M		
12+	refusal							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☒ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:_____

Depth (inches):_____

Hydric Soil Present? Yes ☒ No ☐

Remarks: Soils moist but not saturated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☒ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Hydrology assumed present based on "difficult wetland situation" and past observation of saturation in 2002.

APPENDIX E

Rating Form

Wetland name or number _____

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): Wetland A (Airfield Park) Date of site visit: 9-21-15

Rated by SJQ Trained by Ecology? Yes X No ___ Date of training_____

SEC: 11 TWNSHP: 24N RNGE: 5E Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure 3 Estimated size 600 sq ft

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV X

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	12
Score for Hydrologic Functions	6
Score for Habitat Functions	5
TOTAL score for Functions	23

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above)

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		**Depressional**	
Natural Heritage Wetland		**Riverine**	
Bog		**Lake-fringe**	
Mature Forest		**Slope**	X
Old Growth Forest		**Flats**	
Coastal Lagoon		**Freshwater Tidal**	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	

Does the wetland unit being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That May Need Additional Protection (in addition to the protection recommended for its category)	YES	NO
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered **animal or plant** species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		X
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered **animal** species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		X
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		X
SP4. *Does the wetland unit have a local significance in addition to its functions*? For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		X

To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

Classification of Wetland Units in Western Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides (i.e. except during floods)?

NO – go to 2 **YES** – the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES – Freshwater Tidal Fringe NO – Saltwater Tidal Fringe (Estuarine)**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p.).

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3 **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

3. Does the entire wetland unit **meet both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;

___At least 30% of the open water area is deeper than 6.6 ft (2 m)?

NO – go to 4 **YES –** The wetland class is **Lake-fringe (Lacustrine Fringe)**

4. Does the entire wetland unit **meet all** of the following criteria?

__X__ The wetland is on a slope (*slope can be very gradual*),

__X__ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

__X__ The water leaves the wetland **without being impounded**?

NOTE: *Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3ft diameter and less than 1 foot deep).*

NO - go to 5 **YES –** The wetland class is **Slope**

S	**Slope Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	**Points** (only 1 score per box)
S	**S 1. Does the wetland unit have the potential to improve water quality?**	*(see p.64)*
S	S 1.1 Characteristics of average slope of unit: Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance*) points = 3 Slope is 1% - 2% points = 2 Slope is 2% - 5% points = 1 Slope is greater than 5% points = 0	0
S	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES = 3 points NO = 0 points	0
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.* Dense, uncut, herbaceous vegetation > 90% of the wetland area points = 6 Dense, uncut, herbaceous vegetation > 1/2 of area points = 3 Dense, woody, vegetation > ½ of area points = 2 Dense, uncut, herbaceous vegetation > 1/4 of area points = 1 Does not meet any of the criteria above for vegetation points = 0 Aerial photo or map with vegetation polygons	**Figure** 3 6
S	**Total for S 1** *Add the points in the boxes above*	6
S	**S 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity*. — Grazing in the wetland or within 150ft — Untreated stormwater discharges to wetland — Tilled fields, logging, or orchards within 150 feet of wetland — Residential, urban areas, or golf courses are within 150 ft upslope of wetland X Other Seeps from landfill **YES** multiplier is **2** **NO** multiplier is **1**	*(see p.67)* multiplier 2
S	**TOTAL - Water Quality Functions** Multiply the score from S1 by S2 ***Add score to table on p. 1***	12

Comments

S	**Slope Wetlands** HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
	S 3. Does the wetland unit have the potential to reduce flooding and stream erosion?	***(see p.68)***
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. (stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows)* Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland. points = 6 Dense, uncut, **rigid** vegetation > 1/2 area of wetland points = 3 Dense, uncut, **rigid** vegetation > 1/4 area points = 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid points = 0	6
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points = 2 NO points = 0	0
S	*Add the points in the boxes above*	6
S	**S 4. Does the wetland have the opportunity to reduce flooding and erosion?** Is the wetland in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows? *Note which of the following conditions apply.* — Wetland has surface runoff that drains to a river or stream that has flooding problems — Other_____ *(Answer NO if the major source of water is controlled by a reservoir (e.g. wetland is a seep that is on the downstream side of a dam)* **YES** multiplier is **2** **NO** multiplier is **1**	***(see p. 70)*** multiplier 1
S	**TOTAL - Hydrologic Functions** Multiply the score from S 3 by S 4 ***Add score to table on p. 1***	6

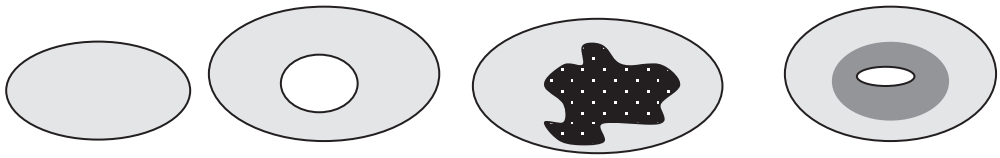
Comments

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the <u>potential</u> to provide habitat for many species?	
H 1.1 <u>Vegetation structure</u> ***(see p. 72)***	**Figure** 3
Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres. ____Aquatic bed __X__Emergent plants ____Scrub/shrub (areas where shrubs have >30% cover) ____Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* ____The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more points = 4 3 structures points = 2 2 structures points = 1 1 structure points = 0 Map of Cowardin vegetation classes	0
H 1.2. <u>Hydroperiods</u> ***(see p. 73)***	**Figure** 3
Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods) ____Permanently flooded or inundated 4 or more types present points = 3 ____Seasonally flooded or inundated 3 types present points = 2 ____Occasionally flooded or inundated 2 types present point = 1 _X_Saturated only 1 type present points = 0 ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ ***Lake-fringe wetland* = 2 points** ____***Freshwater tidal wetland* = 2 points** Map of hydroperiods	0
H 1.3. <u>Richness of Plant Species</u> ***(see p. 75)*** Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species points = 2 *List species below if you want to:* 5 - 19 species points = 1 < 5 species points = 0	0

Total for page 0

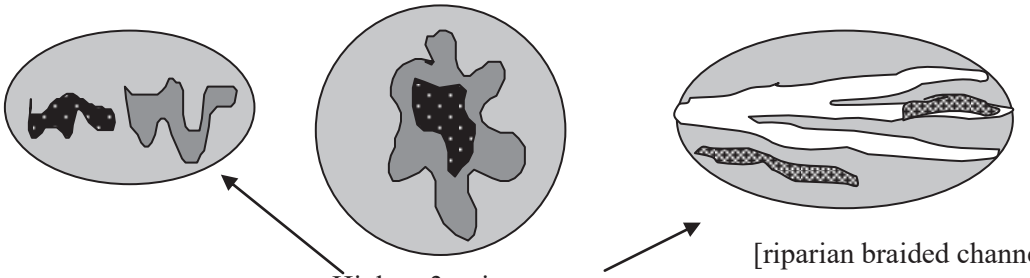
H 1.4. Interspersion of habitats ***(see p. 76)*** **Figure 3**

Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



None = 0 points Low = 1 point Moderate = 2 points

0



High = 3 points [riparian braided channels]

NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes

H 1.5. Special Habitat Features: ***(see p. 77)***

Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.

____Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long).

____Standing snags (diameter at the bottom > 4 inches) in the wetland

____Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m)

____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)*

____At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated.*(structures for egg-laying by amphibians)*

____ Invasive plants cover less than 25% of the wetland area in each stratum of plants

NOTE: The 20% *stated in early printings of the manual on page 78 is an error.*

0

H 1. TOTAL Score - potential for providing habitat
Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5

0

Comments

Refer to Figure 3. Wetland is relatively small, is entirely emergent vegetation and contains no depressions.

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers ***(see p. 80)*** *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer**.** (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0**. —X Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	**Figure** 3 1
H 2.2 Corridors and Connections ***(see p. 81)*** H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? (*dams in riparian corridors*, *heavily used gravel roads*, *paved roads, are considered breaks in the corridor*). YES = **4 points** (*go to H 2.3*) NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** (*go to H 2.3*) NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	1

Total for page 2

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*** Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. **(**Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ____**Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). ____**Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats **= 4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat **= 1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)*	0

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits*) ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	5
TOTAL for H 1 from page 14	0
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	5

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.

Wetland Type *Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.*	**Category**
SC 1.0 Estuarine wetlands ***(see p. 86)*** Does the wetland unit meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt. YES = Go to SC 1.1 NO X	
SC 1.1 Is the wetland unit within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? YES = Category I NO go to SC 1.2	**Cat. I**
SC 1.2 Is the wetland unit at least 1 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre. — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.	**Cat. I** **Cat. II** **Dual rating I/II**

SC 2.0 Natural Heritage Wetlands ***(see p. 87)*** Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 2.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ___ or accessed from WNHP/DNR web site ___ YES____ – contact WNHP/DNR (see p. 79) and go to SC 2.2 NO _X_ SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species? YES = Category I NO ____not a Heritage Wetland	**Cat. I**
SC 3.0 Bogs ***(see p. 87)*** Does the wetland unit (**or any part of the unit**) meet both the criteria for soils and vegetation in bogs? *Use the key below to identify if the wetland is a bog.* ***If you answer yes you will still need to rate the wetland based on its functions.*** 1. Does the unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to Q. 3 No - go to Q. 2 2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on a lake or pond? Yes - go to Q. 3 No - Is not a bog for purpose of rating 3. Does the unit have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes – Is a bog for purpose of rating No - go to Q. 4 NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog. *1.* Is the unit forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cover)?* 2. YES = Category I No___ Is not a bog for purpose of rating	**Cat. I**

SC 4.0 Forested Wetlands ***(see p. 90)*** Does the wetland unit have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its functions.* — **Old-growth forests**: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm) or more. NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter. — **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have average diameters (dbh) exceeding 21 inches (53cm); crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth. YES = Category I NO X not a forested wetland with special characteristics	**Cat. I**
SC 5.0 Wetlands in Coastal Lagoons ***(see p. 91)*** Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* YES = Go to SC 5.1 NO X not a wetland in a coastal lagoon SC 5.1 Does the wetland meets all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 74). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than 1/10 acre (4350 square feet) YES = Category I NO = Category II	**Cat. I** **Cat. II**

SC 6.0 Interdunal Wetlands ***(see p. 93)*** Is the wetland unit west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? YES - go to SC 6.1 NO __ not an interdunal wetland for rating ***If you answer yes you will still need to rate the wetland based on its functions.*** In practical terms that means the following geographic areas: • Long Beach Peninsula- lands west of SR 103 • Grayland-Westport- lands west of SR 105 • Ocean Shores-Copalis- lands west of SR 115 and SR 109 SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is once acre or larger? YES = Category II NO – go to SC 6.2 SC 6.2 Is the unit between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre? YES = Category III	**Cat. II** **Cat. III**
Category of wetland based on Special Characteristics *Choose the "highest" rating if wetland falls into several categories, and record on p. 1.* If you answered NO for all types enter "Not Applicable" on p.1	N/A

APPENDIX F

Selected Site Photographs

1. Sampling Point SP-A.

2. Component of Wetland A dominated by soft rush.

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Selected Site Photographs

Figure
F-1

3. Sampling Point SP-01.

4. Drainage swales near stormwater ponds.

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Selected Site Photographs

Figure
F-2

5. Former landfill area.

6. Stormwater detention pond.

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Selected Site Photographs

Figure
F-3

7. In vicinity of northwest corner of site facing southeast.

Source: P:\154800\1\R\Bellvue Airfield Park Summary Rpt\App A Wetlands Rpt\Appendices\App F

10/12/15P:\154800\1\R\Bellvue Airfield Park Summary Rpt\App A Wetlands Rpt\Appendices\App F\App F-4.docx

LANDAU ASSOCIATES

Bellevue Airfield Park
Bellevue, Washington

Selected Site Photographs

Figure
F-4