



# Memorandum

**Date:** December 16, 2016  
**To:** Kyle Kelly, MOA Girdwood Service Area Manager  
**Through:** D. Michael Rabe, PE - CRW Engineering Group, LLC  
**From:** Rebecca Campbell, PE, PTOE - CRW Engineering Group, LLC  
**Project:** Girdwood Cemetery  
**Project No:** CRW#10131.07  
**Subject:** Girdwood Cemetery Feasibility Study  
Tract D, Girdwood Elementary Subdivision

## Introduction

The Municipality of Anchorage (MOA) has identified Tract D, Girdwood Elementary Subdivision (project site) as a potential location for the Girdwood Cemetery. The project site, shown on Figure 1, is described as Tract D Girdwood Elementary School Subdivision; Parcel No. 075-031-34; SEC 8, T10N, R2E, SM; USGS Map Seward D-6; N60.97° W149.13° (NAD83). The location is along Crow Creek Road approximately 1 mile east of the Alyeska Highway. The subject property is located within the Glacier Creek watershed.

The Girdwood Board of Supervisors and Girdwood Cemetery Committee have developed a general vision statement for the cemetery that involves maintaining natural features of the existing land to every extent practicable, with burial sites interspersed in the natural environment. The cemetery would also function as a recreational area with unpaved walking paths capable of conversion to cross country skiing trails in the winter months, drawing upon the existing unofficial and unmaintained trails crisscrossing the subject property. Additional conceptual designs include the use of GPS coordinates to identify burial sites rather than formal headstones to minimize environmental disturbance

CRW Engineering Group, LLC (CRW), in cooperation with Restoration Science & Engineering, LLC, Shannon & Wilson, and DOWL HKM have been retained by the MOA to review the feasibility of locating a cemetery on the project site. A review of existing geological conditions, wetlands, archeological features, applicable building codes, and nearby utilities was completed as part of this effort. A map summarizing this research is shown in Figure 2.

## Site Description

Tract D, Girdwood Elementary Subdivision encompasses approximately 22 acres of gently sloping terrain. The lot is an irregular triangle shaped parcel. Neighboring properties include Raven Glacier Lodge to the west of the proposed site and Chugach State Park to the north and east. The Beaver Pond Trail maintained by the MOA parallels California Creek on the southwest side. Crow Creek Road delineates the property to the southeast. Crow Creek Road is the only access point to the site and approximately 725 feet of the lot



Photo 1 - Project Site

fronts the road. The parcel is currently under consideration of transfer from the Heritage Land Bank (HLB) to the Girdwood Service Area.

Existing easements on the parcel include ten foot telephone and electric easements on the south side fronting Crow Creek Road and along the western lot line. A creek maintenance easements runs along California Creek, twenty five feet each side of the ordinary high water mark (OHW.) Further title research is recommended for any additional lot restrictions.

California Creek runs north/south bisecting the property. California Creek is an anadromous stream that supports chum, coho, chinook, pink and sockeye salmon. The property provides suitable habitat for moose, black and brown bear, lynx, red squirrels, marten, porcupine, hawks, owls, ravens, spruce grouse, Steller's jay, and several species of resident and migratory songbirds. Nine species of migratory bird, including the bald eagle, are present within the project area. Due to the small footprint of the proposed cemetery which seeks to maintain natural features with minimal tree removal and vegetative disturbance, the project is not anticipated to affect migratory birds.

Vegetation in the area is predominantly needle leaf forest covering a dark but relatively open understory with few herbaceous species including sorrels, ferns, mosses, and liverworts. Alders occur in higher density near California Creek and the unnamed drainages traversing the subject property. The vegetation is typical of coastal mountainsides in Southcentral Alaska. Such vegetation communities support wildlife species associated with forested areas in Southcentral Alaska. No significant changes to vegetation are expected at the site due to the development of a cemetery. The cemetery development would be designed in concert with the natural site features. Only minor cutting or filling is anticipated.

Slopes within the project area average 5% to 10% based upon LIDAR imagery, posing few challenges to development. The project area increases in slope as it moves from east to west and south to north into the Chugach Mountains, with slopes of up to 20% at the property edge. The property slopes towards Crow Creek Road and drainage is conveyed overland southwest across the site to California Creek and to the road ditch system on Crow Creek Road. There is no existing storm drain on the project site or along Crow Creek Road. There have been reports of flooding on the site.



Photo 2 – Crow Creek Road at Project Site –Facing South

Avalanches are common in the Girdwood Valley. In areas where natural vegetation is still largely intact, avalanche paths can generally be easily seen. Several visible avalanche paths are located in the area the south of California Creek. The project area is located over 1000 feet from the nearest zone of moderate avalanche hazard (as mapped by HDR, Inc. 2004) defined as a 1% to 10% annual occurrence.

Crow Creek Road has a posted speed of 30 mph. The road is classified as a minor collector in the MOA Official Streets and Highways Plan. The road is paved for a portion of the project site and is



unpaved north of the project site. Sight distance for the site should be adequate. However, additional clearing may need to occur during driveway construction to ensure visibility. Crow Creek Road is owned and maintained by the State of Alaska. As such, any driveway connecting the site to Crow Creek Road will require a State of Alaska driveway permit.

### **Code Study**

Title 21, Chapter 9 of the MOA Municipal Code provides development guidelines and requirements for any new construction within Girdwood.

Tract D, Girdwood Elementary Subdivision is zoned GR5. Under GR5 zoning, a cemetery is an allowed use, but only under a Conditional Use Permit. The Conditional Use Permit requires site plan approval from the MOA Planning and Zoning Commission. As part of the site plan approval, the developer must provide public notice and solicit input from the community. Lot setbacks established under zoning GR5 include a 25' front setback, 15' side setback, and a 20' rear setback. No development including parking is allowed in the setback area.

A twenty five foot stream setback from the ordinary high water mark (OHW) of an identified stream (Title 21.07.02 Natural Resource Protection) is also required. This setback should overlap with the creek maintenance easement on California Creek. Additionally, a ten foot setback is required from the edge of each side of above-ground drainage ways and ephemeral channels. No disturbance in the stream or drainage setbacks are allowed except for trails, utilities and roadways that are perpendicular to the drainage way or stream and do not impact the natural flow characteristic of the stream.

A wildlife Management Corridor is also required along California Creek in accordance with Title 21.07.02. The Wildlife Management Corridor is a 200' setback from each side of the OHW of California Creek. In this area, all trash receptacles shall be bear resistant. Additionally, trails, driveways and drainage ways shall be designed to accommodate wildlife. Trail locations will require coordination with the Alaska Department of Fish and Game.

Under Title 21, Chapter 9, off-street parking will be required for the cemetery. This parking must be paved and have appropriate lighting. The amount of off-street parking spaces must be determined through a parking study based on the amount of burial space within the cemetery and will require coordination and approval of the MOA. If over twenty parking spaces are provided, interior parking lot landscaping will also be required. Under GR5 zoning, two driveways are allowed along Crow Creek Road with a maximum width of 24' each. The driveways must be paved with asphalt or concrete.

Snow storage is required for the parking, trails and driveway areas. Snow storage must equal twenty percent of the area used for parking, driveways and trails.

The 2004 Crow Creek Neighborhood Land Use Plan, through multiple community meetings and guidance from the municipal zoning authority, identified multiple goals for the area in which the subject property is located. These goals included responsible development to the service of Girdwood and Anchorage residents that maximizes the preservation of natural features, minimized impacts to recreational and natural resources, further expansion of the local trail system, and coordinated delivery of infrastructure. The proposed action is consistent with community goals and needs identified in the 2004 land use plan, while servicing a gap in local services for burial and honoring of the deceased.

### **On-Site Utilities**

Anchorage Water and Wastewater Utility provides water and sewer service to Girdwood. The project site is within the AWWU service area; however, water and sewer utilities are not currently located near the site. The closest water and sewer mains are located on the Girdwood School site, approximately 500 feet



from the project site. AWWU currently has no plans of extending water service along Crow Creek Road (AWWU Water Master Plan 2012). AWWU has long term plans to extend sewer service along Crow Creek, though nothing in the immediate future (AWWU Wastewater Master Plan 2014). A well and septic system should be considered for the site due to the expense of extending water and sewer utilities to the site.

Chugach Electric Association (CEA) provides electrical service to the Girdwood community. CEA has underground electrical facilities on the northwest side of Crow Creek Road. The line ends just south of the project site. Alaska Communications Systems (ACS) provides telephone service to the Girdwood community. ACS has an underground telecommunications line that runs on the northwest side of Crow Creek Road. This line ends just south of the project site.

Enstar Natural Gas Company (ENSTAR) provides natural gas service to the Girdwood community. An existing underground 2" plastic gas main runs along the northwest side of Crow Creek Road. This line stops just south of the project site.

#### **Geotechnical Investigation – Shannon & Wilson, Inc.**

A geotechnical investigation was performed by Shannon & Wilson in November of 2016. See attached geotechnical report for more detail on this investigation. Four bore holes were analyzed as part of the report. In general, the borings encountered a surficial layer of organic material (approximately 2' thick) overlying granular soils and over consolidated glacial till. Fines content in the granular soils ranged from 6% to 14%. Groundwater encountered ranged from 2 feet below the existing ground surface to 12 feet below the existing ground surface.

Based on the existing subsurface conditions, conventional shallow, heated foundations would be appropriate for building construction. New roads and pathways will require an improved structural section due to the fine contents. The structural section would vary from 2 feet to 5 feet on pathways, driveways, and parking lots. Structural fill will need to be clean, granular soil free of organic material and non-frost susceptible. Structural fill should meet the MOA requirements for Type II material. Due to the depth of groundwater, dewatering for construction of foundations and utilities is anticipated.

The site was also traversed for evidence of surface water. The largest area of surface water observed was along the north edge of the parcel. Evidence of ponding was also observed in low lying areas across the site. These areas are likely intermittently inundated with surface water and are dependent upon rainfall events.

Research was performed on potential borrow sites in Girdwood. There are no known high volume sources for clean, NFS material in the Girdwood valley. Imported material typically comes from either Anchorage or State of Alaska owned borrow sites along the Seward Highway. In the past, waste material in Girdwood is either used for fill on private properties or trucked to the Anchorage area.

#### **Environmental Investigation – Restoration Science & Engineering, LLC**

An Environmental Investigation and Preliminary Determination of Wetlands and Waters was completed by Restoration Science & Engineering, LLC in November of 2016. See attached Preliminary Determination of Wetlands & Waters.

California Creek is an anadromous stream that supports chum, coho, chinook, pink, and sockeye salmon. (RSE 2016). Fish tend to avoid spawning in glacially fed, braided streams because those channels are unpredictable and frequently shift. The most significant fish spawning in the Girdwood Valley occurs in California Creek. There is a significant fish milling area at the confluence of California Creek and Glacier



Creek. (MOA 2010). The extent of salmon use in the segment of the creek that flows through the property is unknown.

Under the National Wild and Scenic Rivers Act (1968), selected rivers in the United States are preserved for possessing outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Rivers, or sections of rivers, so designated are preserved in their free-flowing condition and are not dammed or otherwise impeded. California Creek is not listed as a Wild and Scenic River.

Local residents have voiced concerns regarding formaldehyde leachate from embalmed bodies migrating toward California Creek. Embalming is only required if a body is transported across state lines, and the more common embalming agent is formalin which carries nominal environmental risk compared to formaldehyde. (Veteran's Affairs 2016). Leachate potential is minimal. The Girdwood cemetery may employ an engineering control such that embalmed bodies would be placed further from California Creek. All burial sites would have a minimum distance from waterways as established by federal and local law.

Potential jurisdictional waters were identified on the property include California Creek, four small streams, and a pond occupied by a small excavation. Several drainage ways were identified on the property that are believed to be intermittent streams since they lack a discernible bed and bank. Wetlands were not found within the property. Based on evaluation of existing soils, vegetation, and hydrology, wetlands were not found within the project site.

#### **Floodplains— Restoration Science & Engineering, LLC**

Review of the Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) indicates the project area is in Zone D, an area in which flood hazards are undetermined, but possible. A 2004 study by HDR Inc. used a combination of existing MOA flood mapping and field delineation based on vegetation characteristics and topographic features. The most significant flood plain within the project area is located along the west bank of California Creek, on the southernmost extent of the subject property.

Although much of the existing Girdwood commercial district is contained in a similar flood zone, new development—including burials—should be excluded from known and probable flood prone areas. Burials will not be permitted within the 100-year flood plain, which is located across California Creek from the primary proposed access. Burials conducted outside the 100-year flood event zone are not considered to pose a risk of dislodgement. The FIRM and HDR maps are included in the Environmental Feasibility Study.

#### **Groundwater— Restoration Science & Engineering, LLC**

The geotechnical borings encountered groundwater between 5 and 20 feet below ground surface. Those areas with shallow groundwater are not considered eligible for buriable space. Only one (1) boring advanced demonstrated groundwater at 5 feet below ground surface. Selection of burial sites would require temporary installation of groundwater piezometers to document the fluctuation of groundwater across seasons, and selection of those areas where groundwater is not shown to rise above 6 feet below ground surface.

The subject property is shown on the Alaska Drinking Water Protection (DWP) map as being located directly outside of a Zone A (groundwater travel time of several months) and Zone B (groundwater travel time of 2-years) DWP area within the Chugach State Park. The subject property is not located within a drinking water protection area.



A single subsurface water right was identified to the west of the subject property, at the approximate location of the Raven Glacier Lodge. The owner is identified as Knapp Laurence. A corresponding record was not identified within the Alaska Well Log Tracking System (WELTS). The WELTS database did not identify wells within ½ mile of the subject property.

No contaminated sites monitoring wells were identified within ½ mile of the subject property on the Alaska Department of Environmental Conservation (ADEC) database.

Local residents have noted that protection of the area's water sources should be considered. Piezometers will be required at the subject property to determine seasonal fluctuations at various locations on the property. Areas exhibiting shallow groundwater properties will not be eligible for burial but may be within the cemetery's recreational area without incurring adverse impacts. Appropriate engineering controls would need to be utilized during construction to ensure no long-term adverse effects to groundwater. Based on standard modern burial practices, it is unlikely that embalming fluid or other decomposition byproducts would be released into the soil and/or groundwater. Modern embalming fluids are markedly less toxic as the primary active ingredients are no longer arsenic-based. (Veteran's Affairs 2016). Additionally, as the majority of Alaskans elect for cremation or columbarium placement, the potential for leachate commensurately decreases as no embalming fluids are used.

### **Cultural – DOWL HKM**

The Crow Creek area has played an important part in Girdwood history, and a key role in the area's early resource development. The cultural resources likely to exist in the area include materials left from Crow Creek's days as a mining hub. Additionally, a number of historic mining and tiehacking trails run through the area.

In 2016, DOWL HKM conducted a basic review of the Alaska Heritage Resource Survey and did not identify previously recorded cultural sites in the tax parcel. More detailed surveys are forthcoming once identification of the lead agency for the cemetery development is identified. As development moves forward in specific locations, detailed surveys will identify any resources the areas may contain. As these are identified, proper procedure will be followed, in accordance with historic preservation laws, to assure that significant materials and sites are preserved and/or documented.

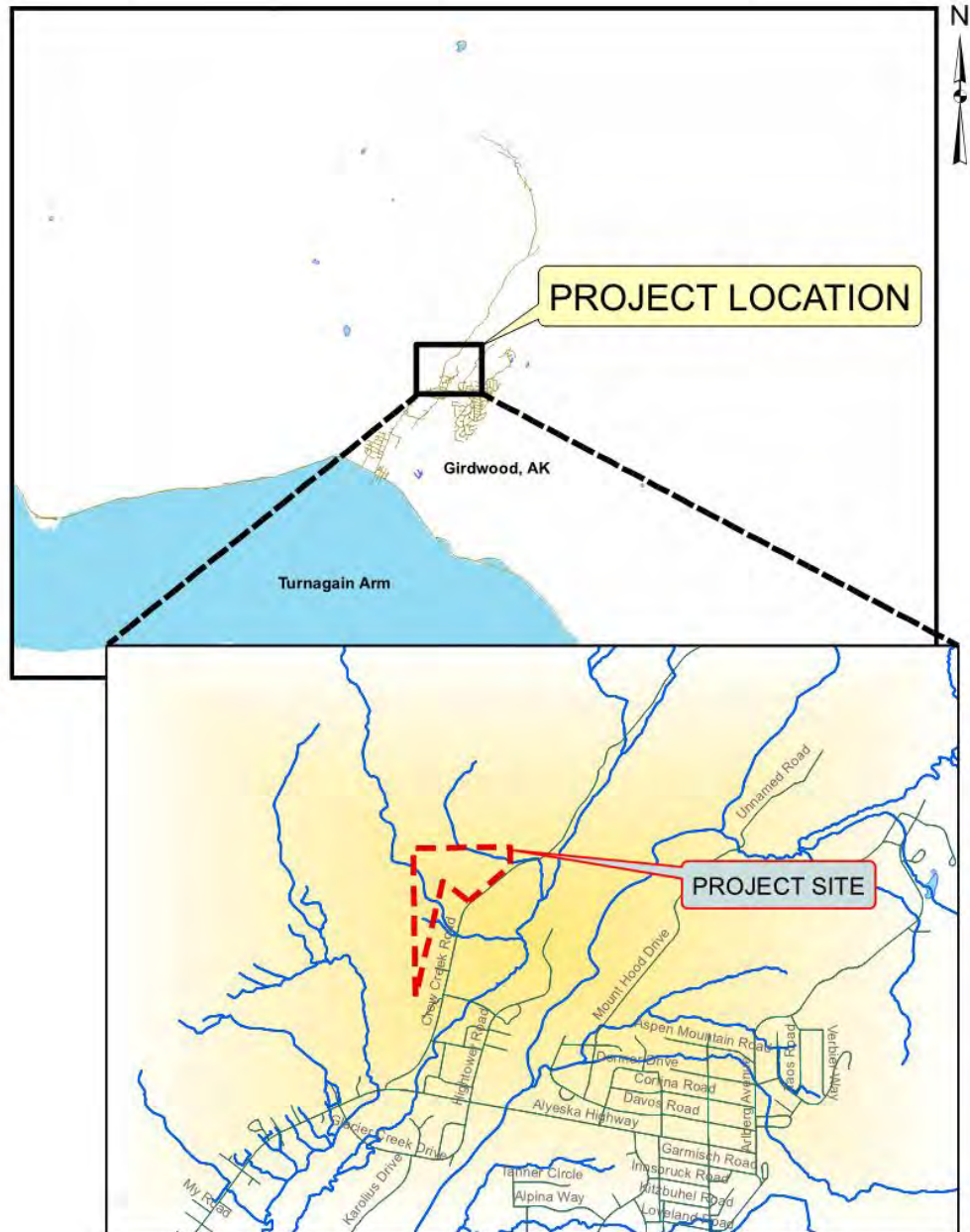
### **Findings**

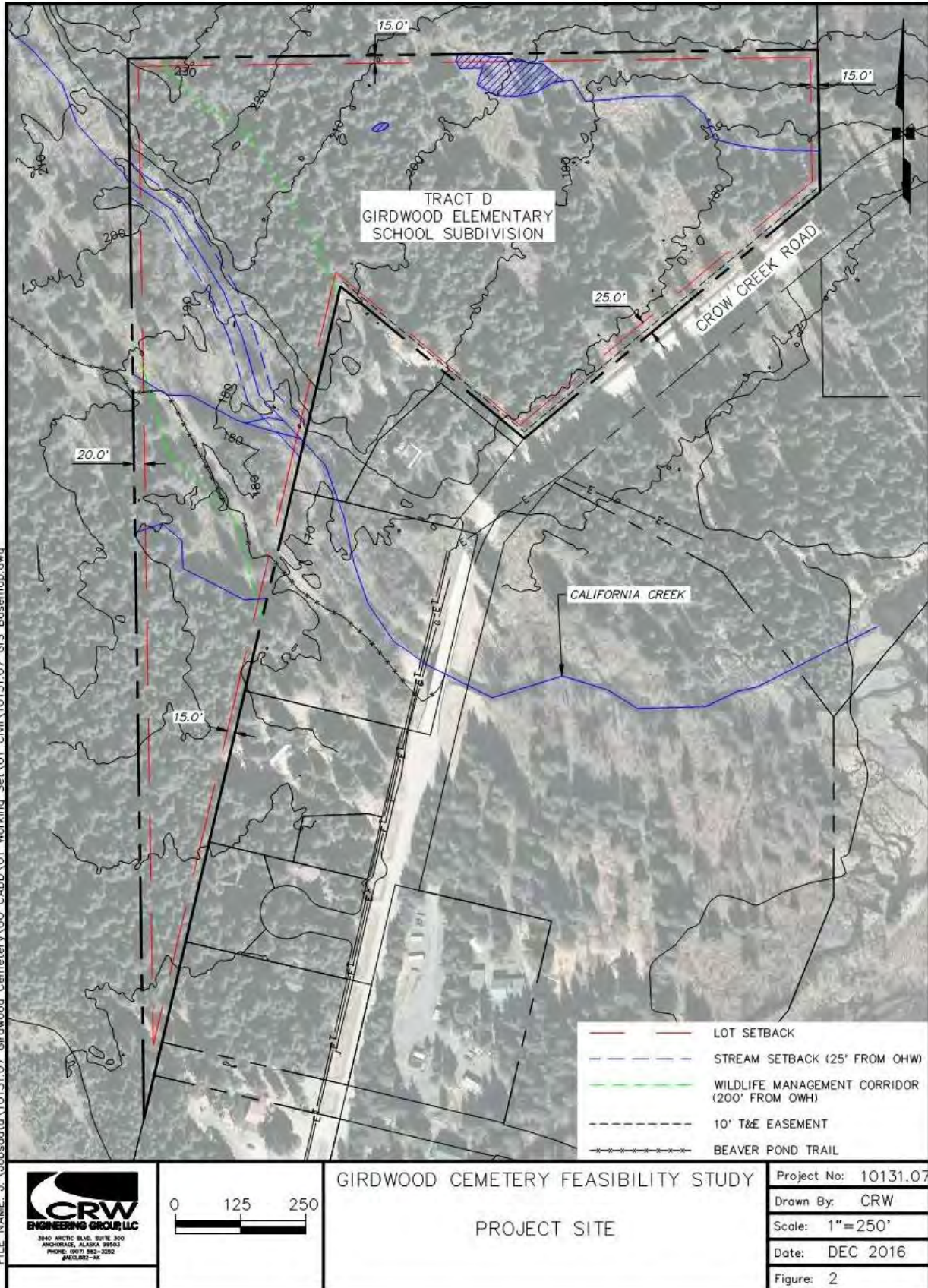
Based on the results of this study, the site appears to be feasible for a new cemetery. Approximately 7 acres of the 22 total acres on site are suitable for development due to creek and setback requirements, and the need to maintain existing drainage paths. This area is outlined on Figure 3. Additional areas of the 22 acre site may be developable, but will require additional permitting efforts including possible MOA criteria waivers.

Groundwater should be investigated further as it will limit placement of burial sites. It is recommended that parking and trails be located where the groundwater is an issue. Surface drainage issues have been reported, and the site will need to be regraded to mitigate this issue.

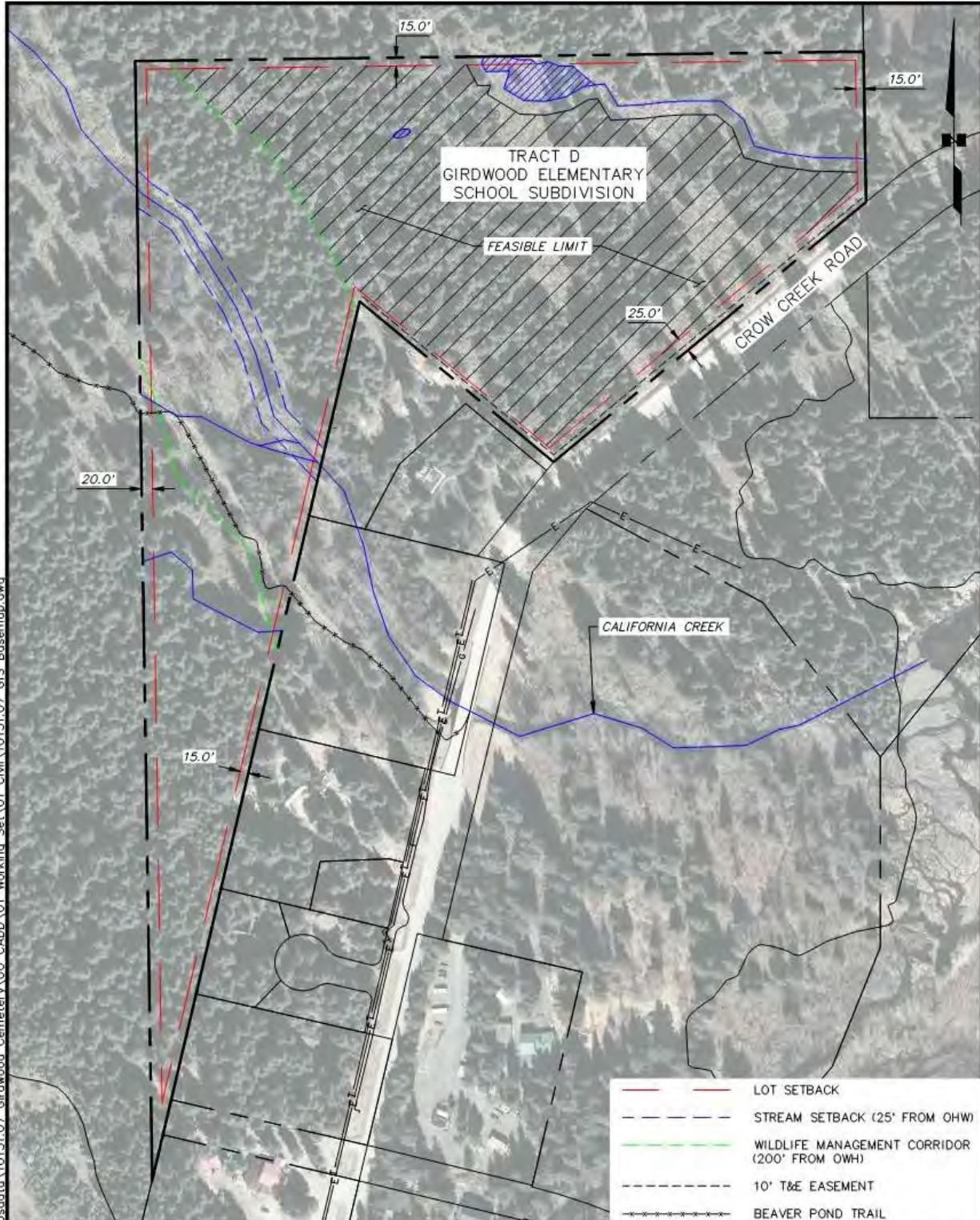
Dependent on the number of grave sites and the size of the columbarium, 7 acres should provide more than 50 years of burial space at the current death rate.

**Figure 1 – Location Map**

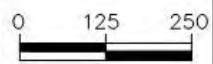




FILE NAME: j:\alabedata\10131.07 Girdwood Cemetery\00\_CADD\01\_Working\_Set\01\_Civil\10131.07\_GIS\_BaseMap.dwg



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GIRDWOOD CEMETERY FEASIBILITY STUDY

PROPOSED SITE

Project No: 10131.07

Drawn By: CRW

Scale: 1"=250'

Date: DEC 2016

Figure: 3



# Preliminary Determination of Wetlands & Waters

**Municipality of Anchorage  
Heritage Land Bank**

**Tract D Girdwood Elementary School Subdivision;  
Parcel No. 075-031-34; SEC 8, T10N, R2E, SM; N60.97° W149.13° (NAD83)**



**November 14, 2016**

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**Table of Contents**

Introduction..... 1  
Methods..... 1  
Findings..... 2  
References Consulted ..... 6

**Tables**

Table 1. Summary of Determination Point Data ..... 4  
Table 2. Summary of Streams..... 4

**Attachments**

1 - Maps

- Map 1 - Site Location
- Map 2 - Potential Wetlands and Waters
- Map 3 - Wetland Determination Points
- Map 4 - Site Topography
- Map 5 - Comparison with MOA and NWI Mapping Layers

2 - Data Sheets

3 - Photos

4 - Local Climatic Data

## Introduction

This report summarizes a delineation of wetlands and waters performed by Pat Athey of Restoration Science and Engineering, LLC at a property located within the Glacier Creek watershed in Girdwood, Alaska. The property is described as Tract D Girdwood Elementary School Subdivision; Parcel No. 075-031-34; SEC 8, T10N, R2E, SM; USGS Map Seward D-6; N60.97° W149.13° (NAD83). The location is along Crow Creek Road approximately 1 mile east of the Alyeska Highway.

This report includes maps, data, and photos taken during the inspection. The maps are provided in Attachment 1, and include the following:

Map 1 – Site Location

Map 2 – Potential Wetlands and Waters

Map 3 – Wetland Determination Points

Map 4 – Site Topography

Map 5 – Comparison with MOA and NWI Mapping Layers

Wetland data forms for the determination points are provided in Attachment 2. Selected photos of vegetation, soil, and hydrology features, the terrain, and other features are provided in Attachment 3. Local climatic data for the weeks and months prior to the days of the site inspection are provided in Attachment 4.

## Methods

Wetland determinations were performed at the property during the growing season of 2016 during two inspection events, one occurring early in the season on May 12 and 13, then later at the end of the season on September 26. Specific dates are listed on the Wetland Data Forms (Attachment 2). Determination of wetlands and the boundaries of wetlands with non-wetlands were made per the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0) dated September 2007 and the 1987 Corps of Engineers Wetland Delineation Manual.

The primary tasks for the work included: 1) a review of existing maps and ecological data, 2) field inspection of the site and collection of data at observation points to determine the presence or absence of wetlands, 3) mapping of all aquatic resources including streams, ponds, and wetlands, and 4) field delineation of the boundaries separating wetlands and uplands.

Existing data that was reviewed as part of this work included, USGS Topographic Maps, Municipality of Anchorage Wetland Atlas data, National Wetlands Inventory (NWI) data, and Natural Resource Conservation Service's *Soil Survey of Anchorage, Alaska*.

The methodology used for delineating wetlands is known as the triple parameter approach as described in the Alaska Regional Supplement. The premise of this approach is that the three essential characteristics of wetlands: hydrophytic (a term meaning *water-loving*) vegetation, hydric soils, and wetland hydrology must all be present to have a positive wetland determination. These methods were used to achieve accurate characterization of the wetland community at specific observation points and to correlate the findings with existing aerial imagery and ground conditions

to identify boundary points in the field. The determination points were numbered sequentially (e.g., "DP-1") for tracking on wetland determination data forms published in the Alaska Regional Manual.

Soils were evaluated for hydric indicators by digging test pits and comparing the soil to the listed indicators provided in the Regional Guidance document. Soil colors were evaluated with a Munsell Soil Color Chart (Kollmogren, 1990).

Water must be present for wetlands to exist; however, it does not need to be present throughout the entire year. Wetland hydrology is present when there is permanent or periodic inundation or soil saturation for a significant period during the growing season, which is specified as two weeks or more by Alaska Regional Guidance. Indicators of wetland hydrology include areas of ponding or soil saturation, evidence of previous water inundation such as dry algae on bare soil, watermarks on soils or leaves, and drainage patterns among others. Where positive indicators are observed, it is assumed that wetland hydrology occurs for a significant period of the growing season. Test pits were inspected to confirm the presence of indicators below ground surface (e.g., saturation, high water table).

Dominant plant species were characterized in an approximately 30-foot diameter circle centered at the soil pit. Within this circle, the total live aerial cover of each plant species was estimated visually. The vegetation cover of each species and its assigned wetland indicator status were used to calculate indices of hydrophytic vegetation as provided in the Wetland Data Forms. Plant species were identified using regional plant guides, including Collet (2002), Dickenson (1999), Hulten (1968), Johnson, et al. (1995), Pratt (1989), Tande and Lipkin (2003), Viereck and Little (1972), among others. Plant species names used on data forms followed the nomenclature of Lichvar (2012) which also provides the wetland indicator status of the plants.

Determination points (DPs) were flagged with a short piece of lime green flagging. Wetland boundary points, if present, were flagged in the field with pink flagging with a running "Wetland Delineation" printed in black letters and marked in the field with a unique identifier (e.g., A-1, B-2, etc.) and the GPS waypoint number. The geographic coordinates of wetland Determination Points, wetland boundaries, and other features were recorded in the field with a handheld GPS unit.

## **Findings**

Potential jurisdictional waters were identified on the property and include California Creek, four small streams, and a pond that occupies a small excavation.

Wetlands were not found within the property as determined by a detailed evaluation of vegetation, soils, and hydrology at established determination points and supported with observations throughout the area.

Several drainageways were identified on the property that are believed to not be intermittent streams since these lack a discernable bed and bank. These drainageways are included in the maps because of their proximity to the small streams and the potential for these to convey water during storm events.

Table 1 summarizes the results of determination point data. Table 2 summarizes the streams identified on the property. The location of the determination points is presented in Maps 3 and 4. The aerial imagery, 5-ft contours, and hill shade base layers were provided by the Municipality of Anchorage.

Inspection of the property occurred during the normal growing season in southcentral Alaska. Much of the dominant vegetation occurring at the site is perennial and visible plant structures including leaves and stems allowed for identification early and late in the season.

The regional climate data was reviewed for the cumulative precipitation for the calendar day of the inspection to evaluate whether normal conditions were present. In cases of extreme low or high cumulative precipitation compared to historical averages, the potential impact to the evaluation of wetland hydrology is an important consideration in wetland determination. Climate data from the Anchorage National Weather Service office was reviewed for the inspection dates (Attachment 4).

The initial site inspections of May 12 and 13 occurred during a normal dry season of the year in southcentral Alaska. The short-term cumulative precipitation in Anchorage since March 1 was 1.43 inches compared to the normal value of 1.31 inches; since January 1, there was 2.01 inches of cumulative precipitation compared to a normal value of 2.76 inches, a deficit of 0.75 inches or 27 percent.

The site was also inspected on September 26, which was within the normal wet season for southcentral Alaska. The cumulative precipitation in Anchorage since January 1 and this date was 14.15 inches, which was 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. These values were within the range of normal climatic conditions for providing sufficient hydration to determine wetlands.

Table 1 indicates that hydrophytic vegetation is prevalent among all but the most well-drained, upland sites, which is typical in coastal Alaska. Hydric soil is absent among the sites, and wetland hydrology was determined at two sites located with drainageways. Focus was made on the drainageway areas as potential wetlands, but the lack of hydric soil and water tables too deep to qualify were encountered. The presence of wetland hydrology at DP-7 and DP-9, which are in drainageways, are examples.

**Table 1. Summary of Wetland Determination Point (DP) Data**

Location (DP)	Altitude Ft	Local Relief	Slope %	Vegetation Hydrophytic	Wetland Hydrology	Soil Hydric	Wetland
DP-1	73	Convex	10				
DP-2	70	Flat	5	X			
DP-3	70	Concave	5	X			
DP-4	55	Concave	5	X			
DP-5	59	Convex	5				
DP-6	60	Concave	10	X			
DP-7	71	Concave	10	X	X		
DP-8	71	Concave	10	X			
DP-9	71	Concave	10	X	X		
DP-10	67	Convex	20	X			
DP-11	72	Convex	20	X			
DP-12	63	Convex	15	X			
DP-13	60	Convex	10	X			

X = Positive Result

**Table 2. Summary of Streams**

Name	Cowardin Class (assigned)	Fish Status <sup>1</sup>	Lineal Feet
California Creek	R3US1	Anadromous; ADFG No. 247-60-10250-2007 (CHs,COpr,Kpr,Pp,ss)	829
Stream #1	R3US5	No ADFG designation. No fish observed.	812
Stream #2	R3US5	No ADFG designation. No fish observed.	224
Stream #3	R3US5	Small tributary of California Creek; Likely has similar fish status.	228
Stream #4	R3US5	Fish observed (dolly varden); Small tributary of California Creek; Likely has similar fish status.	360
<b>Total</b>			<b>2,453</b>

<sup>1</sup>ADFG data from Johnson and Coleman (2014). Key:

CH = Chum Salmon CO = Coho Salmon K = Chinook Salmon P = Pink Salmon S = Sockeye Salmon

p = present, r = rearing, s = spawning

California Creek is an anadromous stream that supports chum, coho, chinook, pink, and sockeye salmon. The extent of salmon use in the segment of the Creek that flows through the property is unknown.

Streams #1 is on the east side of the property and is spatially intermittent, i.e., there are sections that the flow is subsurface and a dry channel is on the surface. This stream most likely conveys stormwater through the normally dry sections. Stream #2 is a tributary of Stream #1 that merges in the northeast part of the property. The stream channels average approximately 3 feet wide and 1 to 2 feet deep. Water depths in the flowing sections were estimated at 6 inches in depth.

Stream #3 is a small tributary of California Creek. It is very small but may inhabit resident fish species or juvenile salmon. The channel is approximately 2 feet wide and 2 foot deep, with water depth approximately 10 inches.

Stream #4 is a small tributary of California Creek that flows along the trail pathway in the southwest part of the property. The stream flows beneath the trail path via a culvert. A small fish was observed, possibly a dolly varden, but given the connection with California Creek salmon are potentially present in this stream.

There is also a small pond of water that has accumulated within an excavation in the north-central part of the property, estimated in size at 300 square feet. There are no surface water inlets or outlets to the pond; subsurface flow is likely maintaining the water level. There is no apparent purpose for the excavation and it may be a remnant of historic mining activity in the region. Although a close inspection of the water was not made, it is possible there are aquatic biota such as emergent vegetation and aquatic insects inhabiting the pond.

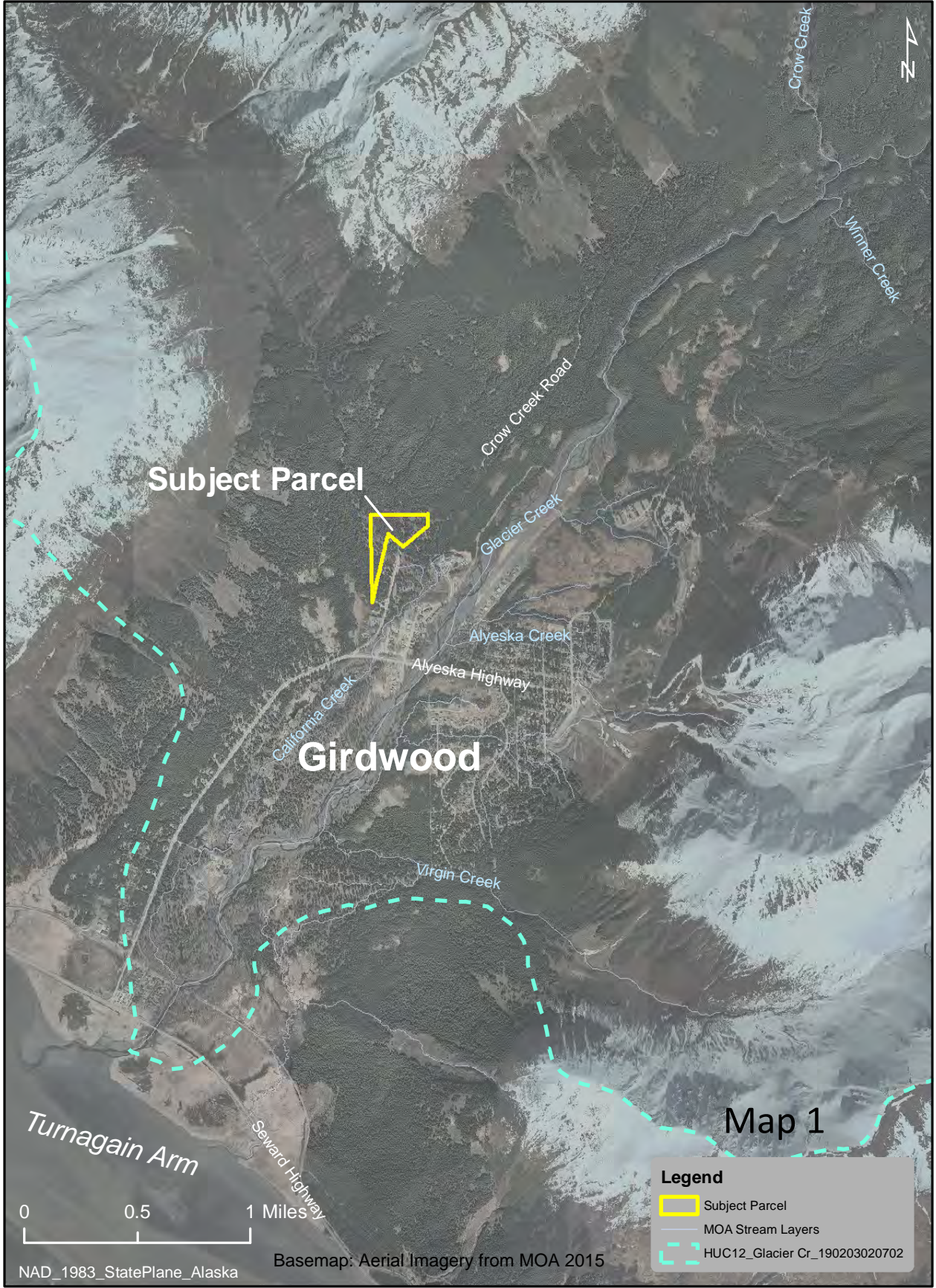
California Creek and the tributaries on the property flow into Turnagain Arm and Cook Inlet. Stream #1 (and tributary Stream #2) flow off the property and into the ditch of Crow Creek Road, then flows beneath a culvert and continues to the south toward the east branch of California Creek. The connection of Stream #1 with California Creek is unknown, but given the volume of water flowing in the channel leaving the property it is likely that a connection exists. Therefore, the streams are believed to be connected to Turnagain Arm and Cook Inlet.

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**Attachment 1**  
**Maps**



Subject Parcel

Girdwood

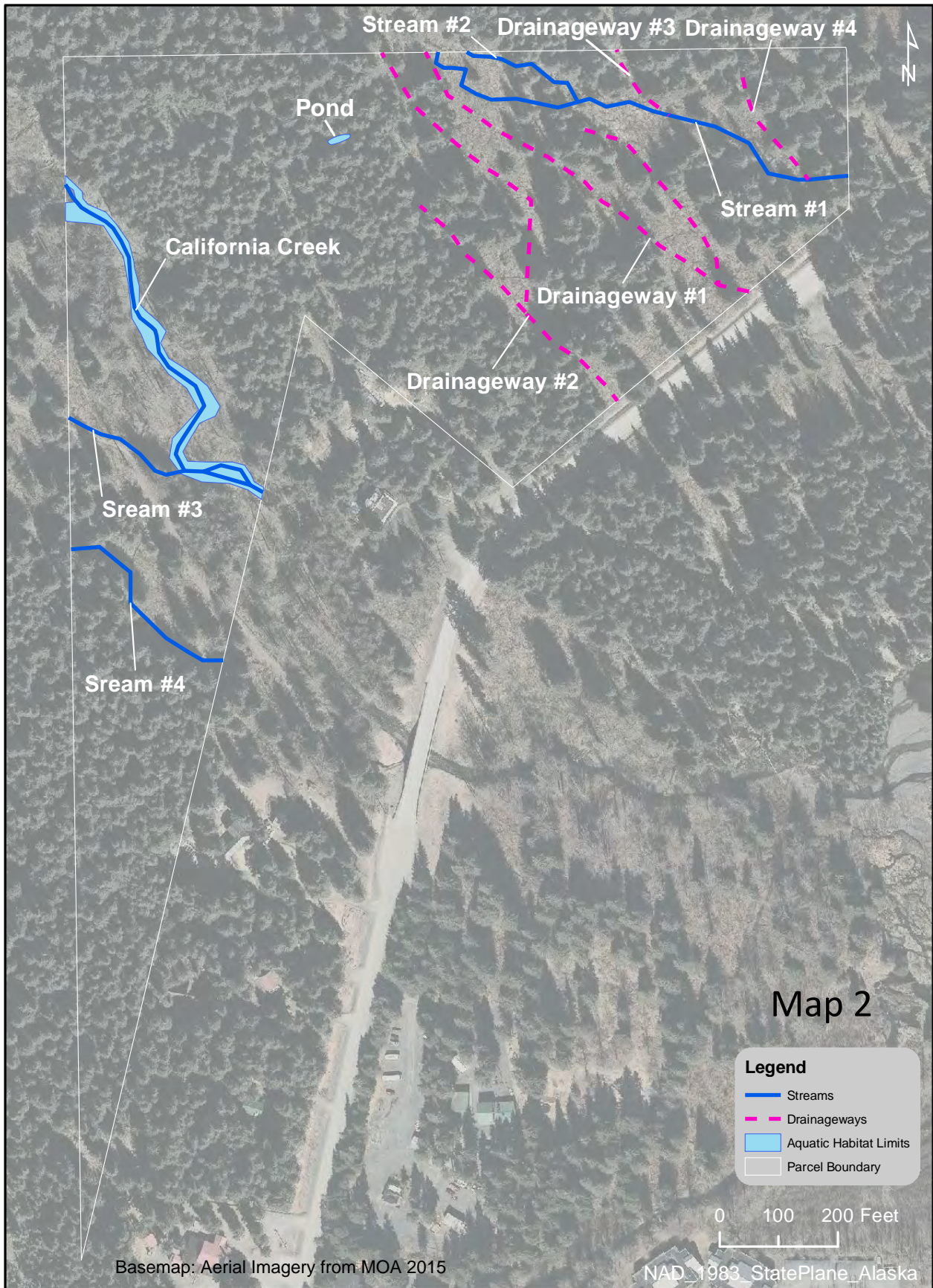
Map 1

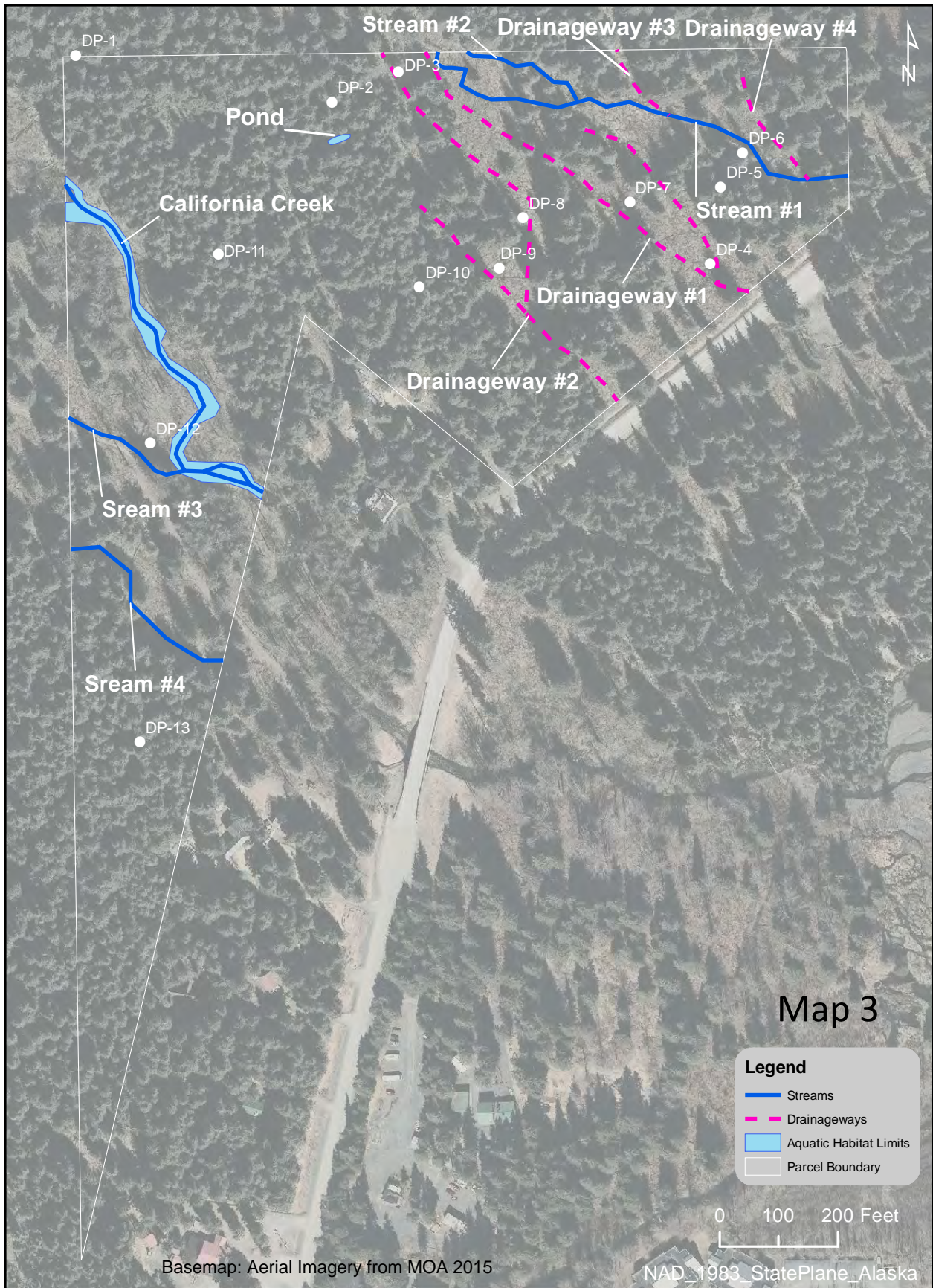
- Legend**
- Subject Parcel
  - MOA Stream Layers
  - HUC12\_Glacier Cr\_190203020702

0 0.5 1 Miles

NAD\_1983\_StatePlane\_Alaska

Basemap: Aerial Imagery from MOA 2015





DP-1

Stream #2 Drainageway #3 Drainageway #4

Pond

DP-2

DP-3

DP-6

DP-5

California Creek

DP-11

DP-8

DP-7

DP-4

Stream #1

Drainageway #1

Drainageway #2

Sream #3

DP-12

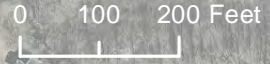
Sream #4

DP-13



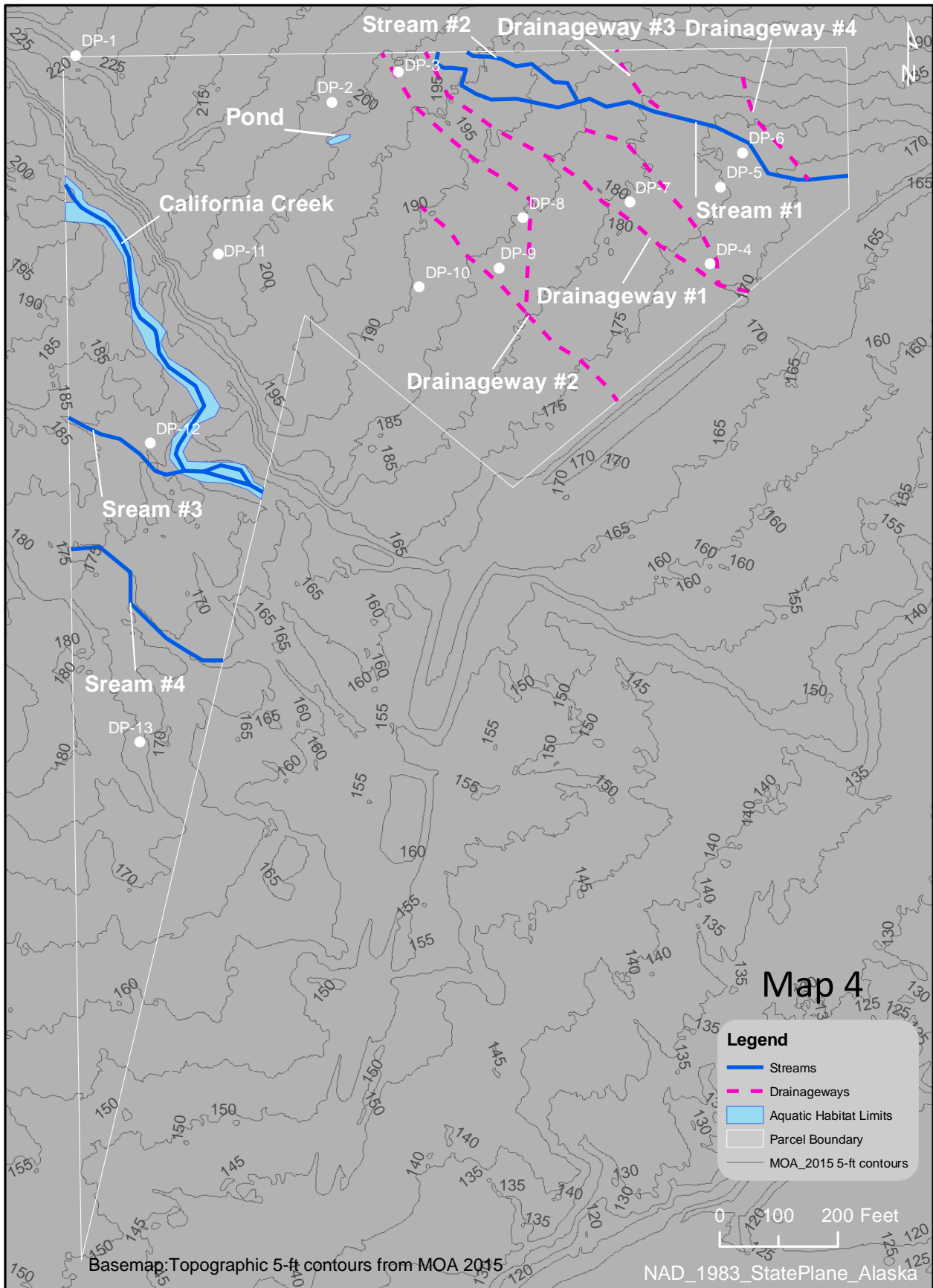
**Legend**

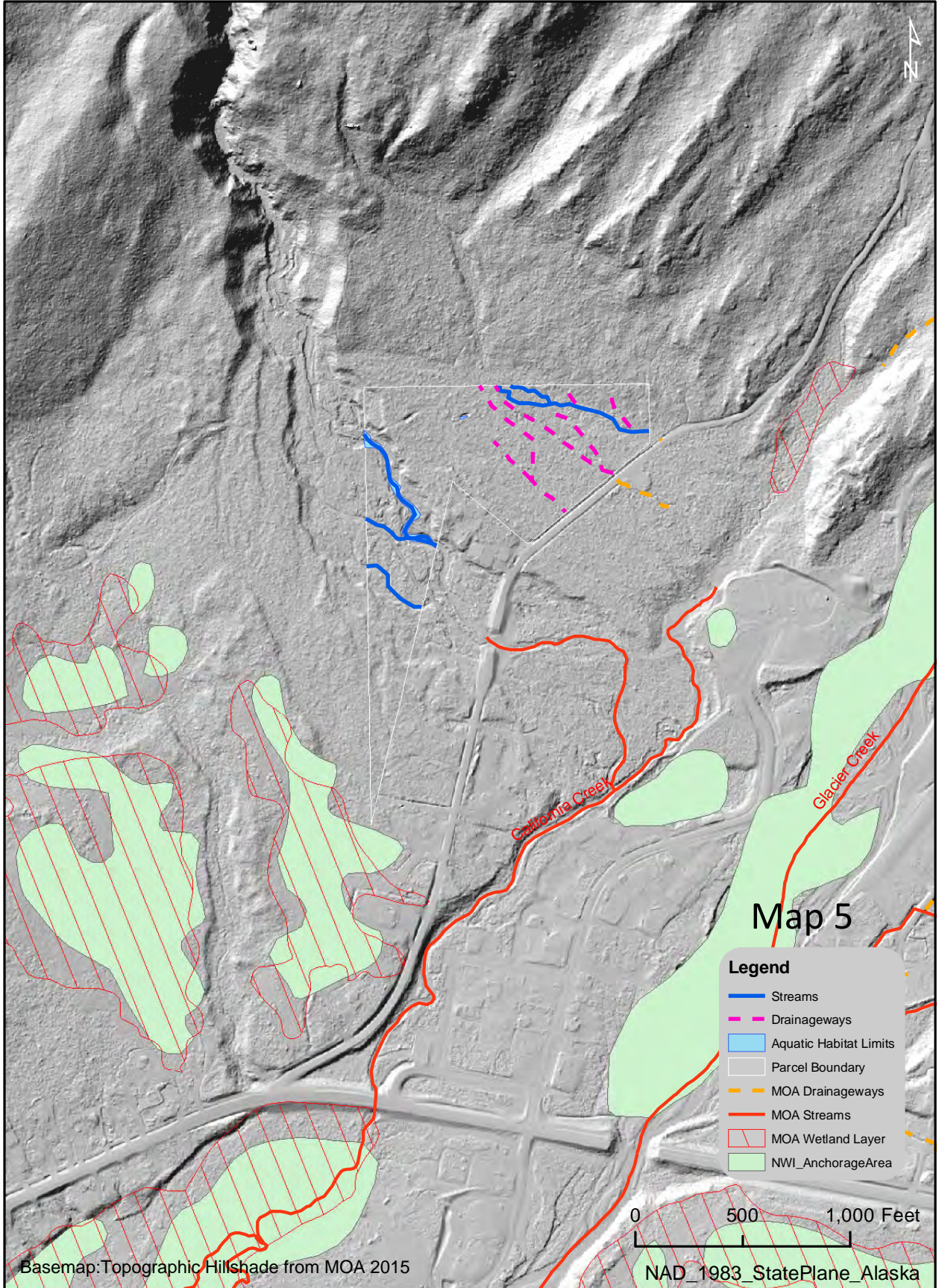
- Streams
- Drainageways
- Aquatic Habitat Limits
- Parcel Boundary



Basemap: Aerial Imagery from MOA 2015

NAD\_1983\_StatePlane\_Alaska





Basemap: Topographic Hillshade from MOA 2015

NAD\_1983\_StatePlane\_Alaska

**Attachment 2**  
**Data Forms**

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-34 Borough/City: Girdwood Sampling Date: 5/13/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-1  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 10  
 Subregion: Southcentral Lat: 60.971357 Long: -149.138111 Datum: NAD83  
 Soil Map Unit Name: No Soil Mapping for Area NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	<b>Is the Sampled Area within a Wetland?</b>	
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____ No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>		
Remarks: Site is located in the extreme northwest corner of the property on a terrace above California Creek. The vegetation is mature spruce-hemlock forest with a relatively open understory of mostly ferns and moss. This location is characteristic of most upland forested areas of the property. The site is in the highest elevation area of the property.				

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Tsuga mertensiana</i></u>	<u>75</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>25</u> (A/B)
2. <u><i>Picea sitchensis</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	
3. _____				
4. _____				
Total Cover: <u>100</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>95</u> x 3 = <u>285</u> FACU species <u>80</u> x 4 = <u>320</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>176</u> (A) <u>605</u> (B)
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Sapling/Shrub Stratum				
1. <u><i>Menziesia ferruginea</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	Prevalence Index = B/A = <u>3.45</u>  <b>Hydrophytic Vegetation Indicators:</b> <u>No</u> Dominance Test is >50% <u>No</u> Prevalence Index is ≤3.0 _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Oplopanax horridus</i></u>	<u>5</u>		<u>FACU</u>	
3. <u><i>Vaccinium ovalifolium</i></u>	<u>5</u>		<u>FAC</u>	
4. _____				
5. _____				
6. _____				
Total Cover: <u>35</u>				<b>Hydrophytic Vegetation</b> Present? Yes _____ No <u>X</u>
50% of total cover: <u>18</u> 20% of total cover: <u>7</u>				
Herb Stratum				
1. <u><i>Gymnocarpium dryopteris</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
2. <u><i>Athyrium filix-femina</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	
3. <u><i>Rubus pedatus</i></u>	<u>5</u>		<u>FAC</u>	
4. <u><i>Gymnocarpium dryopteris</i></u>	<u>1</u>		<u>FACU</u>	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
Total Cover: <u>41</u>				
50% of total cover: <u>21</u> 20% of total cover: <u>8</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>80</u> (Where applicable)				

Remarks: Mature hemlock-spruce forest, commonly found on upland sites in southcentral Alaska.

**SOIL**

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+8-0	brn 10YR5/3	50					organics and silt, many fine roots
	dk gr brn 10YR4/2	50					
0-28	v dk gr brn 10YR3/2	50					loamy gravel and cobbles
	gr brn 10YR5/2	50					

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

<b>Hydric Soil Indicators:</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue		
<input type="checkbox"/> Thick Dark Surface (A12)			
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.		
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.		
<input type="checkbox"/> Alaska Gleyed Pores (A15)			

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____    No <u>X</u>
--	--

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	<u>Secondary Indicators (2 or more required)</u>
<u>Primary Indicators (any one indicator is sufficient)</u>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes _____    No <u>X</u>
Surface Water Present?    Yes _____    No <u>X</u> Depth (inches): _____	
Water Table Present?    Yes _____    No <u>X</u> Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes _____    No <u>X</u> Depth (inches): _____	

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

Remarks: The site was inspected during the normal dry season for southcentral Alaska.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-35 Borough/City: Girdwood Sampling Date: 5/13/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-2  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Flat Slope (%): 5  
 Subregion: Southcentral Lat: 60.971128 Long: -149.135675 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in the north-central portion of the property in mature spruce-hemlock forest with an open understory of moss.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Tsuga mertensiana</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)
2. <u><i>Picea sitchensis</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <u>75</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>125</u> x 3 = <u>375</u> FACU species <u>65</u> x 4 = <u>260</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>190</u> (A) <u>635</u> (B)
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>				
Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index = B/A = <u>3.34</u>
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0 _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Tsuga mertensiana</i></u>	<u>10</u>	_____	<u>FAC</u>	
3. <u><i>Picea sitchensis</i></u>	<u>10</u>	_____	<u>FACU</u>	
4. <u><i>Rubus spectabilis</i></u>	<u>5</u>	_____	<u>FACU</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
Total Cover: <u>75</u>				<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>				
Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Remarks:
1. <u><i>Gymnocarpium dryopteris</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	Mature hemlock-spruce forest, commonly found on upland sites in southcentral Alaska.
2. <u><i>Athyrium filix-femina</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	
3. <u><i>Rubus pedatus</i></u>	<u>5</u>	_____	<u>FAC</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>40</u>				
50% of total cover: <u>20</u> 20% of total cover: <u>8</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>90</u> (Where applicable)				

**SOIL**

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+3-0	brn 10YR5/3	50					organics and silt, many fine roots
	dk gr brn 10YR4/2	50					
0-4	dk gr brn 10YR4/2	100					silt loam with gravel
4-20	dk gr brn 10YR4/2	90					silt loam with gravel, ash (light gray)
	lt gr 10YR7/1	10					

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____    No <u>X</u>
--	--

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Microtopographic Relief (D4)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes _____    No <u>X</u> Depth (inches): _____ Water Table Present?    Yes _____    No <u>X</u> Depth (inches): _____ Saturation Present? (includes capillary fringe)    Yes _____    No <u>X</u> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes _____    No <u>X</u>
---	--

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

Remarks: The site was inspected during the normal dry season for southcentral Alaska.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-36 Borough/City: Girdwood Sampling Date: 5/13/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-3  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 5  
 Subregion: Southcentral Lat: 60.971261 Long: -149.135038 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in the north-central portion of the property in a drainageway near a perennial stream to the east. The area may be in the flood zone of the stream, although there are no indications of recent water flow.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:		
1. <u><i>Alnus viridis</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)		
2. <u><i>Picea sitchensis</i></u>	<u>5</u>	<u>x</u>	<u>FACU</u>			
3. _____						
4. _____						
Total Cover: <u>15</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>120</u> x 3 = <u>360</u> FACU species <u>105</u> x 4 = <u>420</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>225</u> (A) <u>780</u> (B)  Prevalence Index = B/A = <u>3.46</u>		
50% of total cover: <u>8</u> 20% of total cover: <u>3</u>						
Sapling/Shrub Stratum						
1. <u><i>Alnus viridis</i></u>	<u>75</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0  _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.		
2. <u><i>Rubus spectabilis</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>			
3. <u><i>Tsuga mertensiana</i></u>	<u>5</u>		<u>FAC</u>			
4. <u><i>Ribes triste</i></u>	<u>5</u>		<u>FAC</u>			
5. _____						
6. _____						
Total Cover: <u>135</u>						
50% of total cover: <u>68</u> 20% of total cover: <u>27</u>						
Herb Stratum						
1. <u><i>Gymnocarpium dryopteris</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>			
2. <u><i>Athyrium filix-femina</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>			
3. _____						
4. _____						
5. _____						
6. _____						
7. _____						
8. _____						
9. _____						
10. _____						
Total Cover: <u>75</u>						
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>						
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>25</u>						
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>0</u> (Where applicable)						
<table style="width:100%;"> <tr> <td style="width:60%;"><b>Hydrophytic Vegetation Present?</b></td> <td>Yes <u>X</u></td> <td>No _____</td> </tr> </table>				<b>Hydrophytic Vegetation Present?</b>	Yes <u>X</u>	No _____
<b>Hydrophytic Vegetation Present?</b>	Yes <u>X</u>	No _____				
Remarks: Shrub-scrub vegetation common in riparian zones and drainageways in the region.						

**SOIL**

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+4-0	brn 10YR5/3	50					organics and silt, many fine roots
	dk gr brn 10YR4/2	50					
0-21	v dk gr brn 10YR3/2	50					silt loam with gravel, ash (light gray) in upper portion
	gr brn 10YR5/2	50					

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____    No <u>X</u>
--	--

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Water-stained Leaves (B9) <input checked="" type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
<b>Field Observations:</b> Surface Water Present?    Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present?        Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present?         Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes _____    No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. There were no other secondary indicators. The site was inspected during the normal dry season for southcentral Alaska.	

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-37 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-4  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 5  
 Subregion: Southcentral Lat: 60.970355 Long: -149.132093 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No _____	<b>Is the Sampled Area within a Wetland?</b>	Yes _____	No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>			
Wetland Hydrology Present?	Yes _____	No <u>X</u>			
Remarks: Site is located in the east part of the property in a drainage way. The site may be flooded during extreme precipitation events, although there are no indications of recent water flow.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b>
1. <u><i>Alnus viridis</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b>
Total Cover: <u>25</u>				Total % Cover of:
50% of total cover: <u>13</u> 20% of total cover: <u>5</u>				OBL species _____ x 1 = <u>0</u>
Sapling/Shrub Stratum				FACW species _____ x 2 = <u>0</u>
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	FAC species <u>120</u> x 3 = <u>360</u>
2. <u><i>Viburnum edule</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	FACU species <u>60</u> x 4 = <u>240</u>
3. <u><i>Oplopanax horridus</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	UPL species _____ x 5 = <u>0</u>
4. <u><i>Cornus canadensis</i></u>	<u>5</u>	_____	<u>FACU</u>	Column Totals: <u>180</u> (A) <u>600</u> (B)
5. <u><i>Sambucus racemosa</i></u>	<u>5</u>	_____	<u>FACU</u>	Prevalence Index = B/A = <u>3.33</u>
6. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>
Total Cover: <u>110</u>				<u>Yes</u> Dominance Test is >50%
50% of total cover: <u>55</u> 20% of total cover: <u>22</u>				<u>No</u> Prevalence Index is ≤3.0
Herb Stratum				____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1. <u><i>Athyrium filix-femina</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. <u><i>Calamagrostis canadensis</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
3. <u><i>Galium triflorum</i></u>	<u>5</u>	_____	<u>FAC</u>	
4. <u><i>Geum macrophyllum</i></u>	<u>5</u>	_____	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>45</u>				<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____
50% of total cover: <u>23</u> 20% of total cover: <u>9</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>10</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>10</u> (Where applicable)				
Remarks: Shrub-scrub vegetation common in riparian zones and drainageways in the region.				

**SOIL**

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
0-15	gr brn 10YR 5/2	100					silt loam, many coarse roots in upper part
15-20	gr brn 10YR 5/2	100					fine sand with silt

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

<b>Hydric Soil Indicators:</b>	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b>	<b>Hydric Soil Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: <u>none</u>	
Depth (inches): _____	

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	<b>Secondary Indicators (2 or more required)</b>
<b>Primary Indicators (any one indicator is sufficient)</b>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

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

Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-38 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-5  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 5  
 Subregion: Southcentral Lat: 60.970711 Long: -149.131985 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in the east part of the property in spruce-hemlock forest between a drainage way and a perennial stream.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Tsuga mertensiana</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>40</u> (A/B)
2. <u><i>Picea sitchensis</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <u>100</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>110</u> x 3 = <u>330</u> FACU species <u>155</u> x 4 = <u>620</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>265</u> (A) <u>950</u> (B)  Prevalence Index = B/A = <u>3.58</u>
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:
1. <u><i>Cornus canadensis</i></u>	<u>75</u>	<u>x</u>	<u>FACU</u>	<u>No</u> Dominance Test is >50% <u>No</u> Prevalence Index is ≤3.0 _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Menziesia ferruginea</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>100</u>				<b>Hydrophytic Vegetation Present?</b> Yes _____ No <u>X</u>
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Remarks:
1. <u><i>Rubus pedatus</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Shrub-scrub vegetation common in riparian zones and drainageways in the region.
2. <u><i>Athyrium filix-femina</i></u>	<u>10</u>	_____	<u>FAC</u>	
3. <u><i>Geocaulon lividum</i></u>	<u>5</u>	_____	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>65</u>				
50% of total cover: <u>33</u> 20% of total cover: <u>13</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>1</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>75</u> (Where applicable)				

**SOIL**

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
3-0	dk gr brn 10YR4/2	100					organics and silt, many fine roots	
0-7	dk brn 10YR3/3 lt gr 10YR 7/2	90 10					silt loam, ash (light gray), many fine roots	
7-10	red brn 5YR4/3 yel brn 10YR5/4	50 50					silt loam	
10-19	yel brn 10YR 5/4	100					silt loam with sand	

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____    No <u>X</u>
--	--

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Microtopographic Relief (D4)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes _____    No <u>X</u> Depth (inches): _____ Water Table Present?    Yes _____    No <u>X</u> Depth (inches): _____ Saturation Present? (includes capillary fringe)    Yes _____    No <u>X</u> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes _____    No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-39 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-6  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope/ Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 10  
 Subregion: Southcentral Lat: 60.970865 Long: -149.131769 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>		Yes _____	No _____
Remarks: Site is located in a drainageway zone adjacent to a perennial stream in the east part of the property. Normal high precipitation in the previous weeks has charged the soil with water as indicated by high water table but the site is not wetland.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Picea sitchensis</i></u>	<u>10</u>	<u>x</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)
2. <u><i>Alnus viridis</i></u>	<u>5</u>	<u>x</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <u>15</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>180</u> x 3 = <u>540</u> FACU species <u>80</u> x 4 = <u>320</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>260</u> (A) <u>860</u> (B)
50% of total cover: <u>8</u> 20% of total cover: <u>3</u>				
Sapling/Shrub Stratum				
1. <u><i>Alnus viridis</i></u>	<u>75</u>	<u>x</u>	<u>FAC</u>	Prevalence Index = B/A = <u>3.30</u>  <b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0 _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Oplopanax horridus</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>	
3. <u><i>Viburnum edule</i></u>	<u>10</u>	_____	<u>FACU</u>	
4. <u><i>Cornus canadensis</i></u>	<u>10</u>	_____	<u>FACU</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
Total Cover: <u>145</u>				<b>Hydrophytic Vegetation</b> Present? Yes <u>X</u> No _____
50% of total cover: <u>73</u> 20% of total cover: <u>29</u>				
Herb Stratum				
1. <u><i>Athyrium filix-femina</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
2. <u><i>Rubus pedatus</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>100</u>				
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>90</u> (Where applicable)				
Remarks: An unidentified lower plant, possibly a leafy liverwort, looks similar to moss and covers much of the ground surface. There is no obvious wetland mosses such as Sphagnum present.				

**SOIL**

Sampling Point: DP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
+2-0	dk gr brn 10YR4/2	100					organics and silt, many fine roots	
0-20	gr brn 10YR 5/2	75					silt loam with fine sand	
	lt gr brn 10YR 6/2	25						

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

<b>Hydric Soil Indicators:</b>	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b>	<b>Hydric Soil Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: <u>none</u>	
Depth (inches): _____	

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	<b>Secondary Indicators (2 or more required)</b>
<b>Primary Indicators (any one indicator is sufficient)</b>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>15</u>	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

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

Remarks: The site is within a drainage way zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated. At this site the presence of a water table are not considered indicative of wetlands but accumulated precipitation in a drainage way at the end of the growing season. The lack of strong hydric soil indicators and the dominance of FAC vegetation supports this finding.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-40 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-7  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 10  
 Subregion: Southcentral Lat: 60.970646 Long: -149.13285 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <u>X</u>
Hydric Soil Present?	Yes	No <u>X</u>	
Wetland Hydrology Present?	Yes <u>X</u>	No	
Remarks: Site is located in a drainageway zone in the east part of the property. Normal high precipitation in the previous weeks has charged the soil with water as indicated by high water table but the site is not wetland.			

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. <u><i>Alnus viridis</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
Total Cover: <u>25</u>				<b>Prevalence Index worksheet:</b> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>125</u></td> <td>x 3 = <u>375</u></td> </tr> <tr> <td>FACU species <u>60</u></td> <td>x 4 = <u>240</u></td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>185</u></td> <td>(A) <u>615</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.32</u>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = <u>0</u>	FACW species _____	x 2 = <u>0</u>	FAC species <u>125</u>	x 3 = <u>375</u>	FACU species <u>60</u>	x 4 = <u>240</u>	UPL species _____	x 5 = <u>0</u>	Column Totals: <u>185</u>	(A) <u>615</u> (B)
Total % Cover of:	Multiply by:																	
OBL species _____	x 1 = <u>0</u>																	
FACW species _____	x 2 = <u>0</u>																	
FAC species <u>125</u>	x 3 = <u>375</u>																	
FACU species <u>60</u>	x 4 = <u>240</u>																	
UPL species _____	x 5 = <u>0</u>																	
Column Totals: <u>185</u>	(A) <u>615</u> (B)																	
50% of total cover: <u>13</u> 20% of total cover: <u>5</u>																		
<b>Sapling/Shrub Stratum</b>																		
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0 _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.														
2. <u><i>Oplopanax horridus</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>															
3. <u><i>Viburnum edule</i></u>	<u>10</u>	_____	<u>FACU</u>															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
Total Cover: <u>110</u>				Hydrophytic Vegetation Present? Yes <u>X</u> No _____														
50% of total cover: <u>55</u> 20% of total cover: <u>22</u>																		
<b>Herb Stratum</b>																		
1. <u><i>Athyrium filix-femina</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Hydrophytic Vegetation Present? Yes <u>X</u> No _____														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
Total Cover: <u>50</u>																		
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>																		
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>10</u>																		
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>90</u> (Where applicable)																		
Remarks: An unidentified lower plant, possibly a leafy liverwort, looks similar to moss is present. There is no obvious wetland mosses such as Sphagnum present.																		

**SOIL**

Sampling Point: DP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
+3-0	dk gr brn 10YR4/2	100					organics and silt, many coarse roots in upper part	
4-10	gr brn 10YR5/2	50					silt loam with fine sand, few fine roots	
	pale brn 10YR6/3	50						
'10-16	gr brn 10YR5/2	50					loamy gravel with cobbles	
	gr 10YR6/1	50						
16-18+	lt brn gr 10YR6/2	80					loamy sand and gravel w/ cobbles	
	blue gr 5PB5/1	20						

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____ No <u>X</u>
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Remarks: No hydric soil indicators are present. Soil is slightly depleted below 16 inches depth.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Microtopographic Relief (D4)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>16</u> Saturation Present? (includes capillary fringe) Yes <u>X</u> No _____ Depth (inches): <u>10</u>	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated. At this site the soil saturation and high water table are not considered indicative of wetlands but accumulated precipitation in a drainageway at the end of the growing season. The lack of strong hydric soil indicators and the dominance of FAC vegetation supports this finding.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-41 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-8  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 10  
 Subregion: Southcentral Lat: 60.970577 Long: -149.13387 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in a drainageway zone in the east-central part of the property. Normal high precipitation in the previous weeks has charged the soil with water as indicated by high water table but the site is not wetland.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Picea sitchensis</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)
2. <u><i>Alnus viridis</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <u>35</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>110</u> x 3 = <u>330</u> FACU species <u>80</u> x 4 = <u>320</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>190</u> (A) <u>650</u> (B)
50% of total cover: <u>18</u> 20% of total cover: <u>7</u>				
Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index = B/A = <u>3.42</u>
1. <u><i>Oplopanax horridus</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>	<b>Hydrophytic Vegetation Indicators:</b> <u>Yes</u> Dominance Test is >50% <u>No</u> Prevalence Index is ≤3.0  _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Alnus viridis</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	
3. <u><i>Sambucus racemosa</i></u>	<u>5</u>	_____	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>80</u>				<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____
50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				
Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Remarks:
1. <u><i>Athyrium filix-femina</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	An unidentified lower plant, possibly a leafy liverwort, looks similar to moss is present. There is no obvious wetland mosses such as Sphagnum present.
2. <u><i>Rubus pedatus</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>75</u>				
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>90</u> (Where applicable)				

**SOIL**

Sampling Point: DP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	dk gr brn 10YR4/2	100					silt loam, few fine roots	
2-6	v dk gr brn 10YR3/2 gr brn 10YR5/2	50 50					silt loam	
6-22	gr brn 10YR4/2 v dk gr brn 10YR3/2	80 20					silt loam	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
<b>Hydric Soil Indicators:</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>						
<input type="checkbox"/> Histosol or Histel (A1)			<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer				
<input type="checkbox"/> Histic Epipedon (A2)			<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)				
<input type="checkbox"/> Hydrogen Sulfide (A4)			<input type="checkbox"/> Alaska Redox With 2.5Y Hue					
<input type="checkbox"/> Thick Dark Surface (A12)			<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.					
<input type="checkbox"/> Alaska Gleyed (A13)			<sup>4</sup> Give details of color change in Remarks.					
<input type="checkbox"/> Alaska Redox (A14)								
<input type="checkbox"/> Alaska Gleyed Pores (A15)								
<b>Restrictive Layer (if present):</b>								
Type: <u>none</u>								
Depth (inches): _____			Hydric Soil Present?    Yes _____    No <u>X</u>					
Remarks: No hydric soil indicators are present.								

**HYDROLOGY**

Wetland Hydrology Indicators:		Secondary Indicators (2 or more required)	
Primary Indicators (any one indicator is sufficient)			
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Water-stained Leaves (B9)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)	<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Salt Deposits (C5)	
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)	
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Geomorphic Position (D2)	
<input type="checkbox"/> Algal Mat or Crust (B4)		<input type="checkbox"/> Shallow Aquitard (D3)	
<input type="checkbox"/> Iron Deposits (B5)		<input type="checkbox"/> Microtopographic Relief (D4)	
<input type="checkbox"/> Surface Soil Cracks (B6)		<input type="checkbox"/> FAC-Neutral Test (D5)	
<b>Field Observations:</b>			
Surface Water Present?	Yes _____ No <u>X</u> Depth (inches): _____	Wetland Hydrology Present?    Yes _____    No <u>X</u>	
Water Table Present?	Yes <u>X</u> No _____    Depth (inches): <u>14</u>		
Saturation Present? (includes capillary fringe)	Yes _____ No <u>X</u> Depth (inches): _____		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated. At this site the high water table IS not considered indicative of wetlands but accumulated precipitation in a drainageway at the end of the growing season. The lack of strong hydric soil indicators and the dominance of FAC vegetation supports this finding.			

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-42 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-9  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Concave Slope (%): 10  
 Subregion: Southcentral Lat: 60.970347 Long: -149.1341 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b> Yes _____ No <u>X</u>
Hydric Soil Present?	Yes	No <u>X</u>	
Wetland Hydrology Present?	Yes <u>X</u>	No	
Remarks: Site is located in a drainageway zone in the east-central part of the property. Normal high precipitation in the previous weeks has charged the soil with water as indicated by high water table but the site is not wetland.			

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. <u><i>Picea sitchensis</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)														
2. <u><i>Tsuga mertensiana</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>															
3. <u><i>Alnus viridis</i></u>	<u>10</u>		<u>FAC</u>															
4. _____																		
Total Cover: <u>60</u>				<b>Prevalence Index worksheet:</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>110</u></td> <td>x 3 = <u>330</u></td> </tr> <tr> <td>FACU species <u>55</u></td> <td>x 4 = <u>220</u></td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>165</u></td> <td>(A) <u>550</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.33</u>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = <u>0</u>	FACW species _____	x 2 = <u>0</u>	FAC species <u>110</u>	x 3 = <u>330</u>	FACU species <u>55</u>	x 4 = <u>220</u>	UPL species _____	x 5 = <u>0</u>	Column Totals: <u>165</u>	(A) <u>550</u> (B)
Total % Cover of:	Multiply by:																	
OBL species _____	x 1 = <u>0</u>																	
FACW species _____	x 2 = <u>0</u>																	
FAC species <u>110</u>	x 3 = <u>330</u>																	
FACU species <u>55</u>	x 4 = <u>220</u>																	
UPL species _____	x 5 = <u>0</u>																	
Column Totals: <u>165</u>	(A) <u>550</u> (B)																	
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>																		
<b>Sapling/Shrub Stratum</b>																		
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0  ___ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.														
2. <u><i>Oplopanax horridus</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>															
3. <u><i>Sambucus racemosa</i></u>	<u>5</u>		<u>FACU</u>															
4. _____																		
5. _____																		
6. _____																		
Total Cover: <u>80</u>																		
50% of total cover: <u>40</u> 20% of total cover: <u>16</u>																		
<b>Herb Stratum</b>																		
1. <u><i>Athyrium filix-femina</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
Total Cover: <u>25</u>																		
50% of total cover: <u>13</u> 20% of total cover: <u>5</u>																		
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>25</u>																		
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>50</u> (Where applicable)																		
Remarks: An unidentified lower plant, possibly a leafy liverwort, looks similar to moss is present. There is no obvious wetland mosses such as Sphagnum present.																		

**SOIL**

Sampling Point: DP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	dk gr brn 10YR4/2	100					silt loam, few fine roots	
2-17	dk gr brn 10YR4/2 brn 10YR 5/3	50 50					silt loam with gravels and cobbles	
17-22+	lt brn gr 10YR6/2 blue gr 5PB5/1	80 20					loamy sand and gravel w/ cobbles	
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup> Location: PL=Pore Lining, M=Matrix.								
<b>Hydric Soil Indicators:</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>						
<input type="checkbox"/>	Histosol or Histel (A1)		<input type="checkbox"/>	Alaska Color Change (TA4) <sup>4</sup>		<input type="checkbox"/>	Alaska Gleyed Without Hue 5Y or Redder Underlying Layer	
<input type="checkbox"/>	Histic Epipedon (A2)		<input type="checkbox"/>	Alaska Alpine Swales (TA5)		<input type="checkbox"/>	Other (Explain in Remarks)	
<input type="checkbox"/>	Hydrogen Sulfide (A4)		<input type="checkbox"/>	Alaska Redox With 2.5Y Hue				
<input type="checkbox"/>	Thick Dark Surface (A12)							
<input type="checkbox"/>	Alaska Gleyed (A13)		<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.					
<input type="checkbox"/>	Alaska Redox (A14)		<sup>4</sup> Give details of color change in Remarks.					
<input type="checkbox"/>	Alaska Gleyed Pores (A15)							
<b>Restrictive Layer (if present):</b>								
Type: <u>none</u>								
Depth (inches): _____			<b>Hydric Soil Present?</b> Yes _____    No <u>X</u>					
Remarks: No hydric soil indicators are present. Soil is slightly depleted below 17 inches depth.								

**HYDROLOGY**

Wetland Hydrology Indicators:		Secondary Indicators (2 or more required)	
Primary Indicators (any one indicator is sufficient)			
<input type="checkbox"/>	Surface Water (A1)	<input type="checkbox"/>	Water-stained Leaves (B9)
<input checked="" type="checkbox"/>	High Water Table (A2)	<input checked="" type="checkbox"/>	Drainage Patterns (B10)
<input checked="" type="checkbox"/>	Saturation (A3)	<input type="checkbox"/>	Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/>	Water Marks (B1)	<input type="checkbox"/>	Presence of Reduced Iron (C4)
<input type="checkbox"/>	Sediment Deposits (B2)	<input type="checkbox"/>	Salt Deposits (C5)
<input type="checkbox"/>	Drift Deposits (B3)	<input type="checkbox"/>	Stunted or Stressed Plants (D1)
<input type="checkbox"/>	Algal Mat or Crust (B4)	<input type="checkbox"/>	Geomorphic Position (D2)
<input type="checkbox"/>	Iron Deposits (B5)	<input type="checkbox"/>	Shallow Aquitard (D3)
<input type="checkbox"/>	Surface Soil Cracks (B6)	<input type="checkbox"/>	Microtopographic Relief (D4)
<input type="checkbox"/>		<input type="checkbox"/>	FAC-Neutral Test (D5)
<b>Field Observations:</b>			
Surface Water Present?	Yes _____ No <u>X</u> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <u>X</u> No _____	
Water Table Present?	Yes <u>X</u> No _____    Depth (inches): <u>6</u>		
Saturation Present? (includes capillary fringe)	Yes _____ No <u>X</u> Depth (inches): <u>4</u>		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
Remarks: The site is within a drainageway zone that qualifies as secondary indicator B10. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated. At this site the high water table IS not considered indicative of wetlands but accumulated precipitation in a drainageway at the end of the growing season. The lack of strong hydric soil indicators and the dominance of FAC vegetation supports this finding.			

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-43 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-10  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope/ Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 20  
 Subregion: Southcentral Lat: 60.970267 Long: -149.134865 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in the central part of the property in mature spruce-hemlock forest with a relatively open understory of mostly ferns and moss.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u><i>Tsuga mertensiana</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66.67</u> (A/B)
2. <u><i>Picea sitchensis</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <u>75</u>				<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = <u>0</u> FACW species _____ x 2 = <u>0</u> FAC species <u>115</u> x 3 = <u>345</u> FACU species <u>55</u> x 4 = <u>220</u> UPL species _____ x 5 = <u>0</u> Column Totals: <u>170</u> (A) <u>565</u> (B)
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>				
Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index = B/A = <u>3.32</u>
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0  ___ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u><i>Oplopanax horridus</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>	
3. <u><i>Sambucus racemosa</i></u>	<u>5</u>	_____	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
Total Cover: <u>80</u>				<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____
50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				
Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Remarks:
1. <u><i>Rubus pedatus</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	Although Sphagnum moss covers much of the ground surface, it is not indicative of hydrophytic vegetation at this site; Sphagnum is commonly found in upland, mature hemlock forests as a groundcover beneath the tree canopy.
2. <u><i>Athyrium filix-femina</i></u>	<u>5</u>	<u>x</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>15</u>				
50% of total cover: <u>8</u> 20% of total cover: <u>3</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>50</u> Total Cover of Bryophytes <u>100</u> (Where applicable)				

**SOIL**

Sampling Point: DP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+4-0	dk gr brn 10YR4/2	100					organics and silt, decomposed moss
0-13	dk gr brn 10YR4/2	100					silty gravel and cobbles

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____ No <u>X</u>
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Remarks: No hydric soil indicators are present.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <u>X</u> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-44 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-11  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 20  
 Subregion: Southcentral Lat: 60.970429 Long: -149.136779 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No _____	<b>Is the Sampled Area within a Wetland?</b>	Yes _____	No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>			
Wetland Hydrology Present?	Yes _____	No <u>X</u>			
Remarks: Site is located in the west-central part of the property in mature spruce-hemlock forest with a relatively open understory of mostly ferns and moss.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b>
1. <u><i>Tsuga mertensiana</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	
2. <u><i>Picea sitchensis</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b>
Total Cover: <u>100</u>				Total % Cover of: _____ Multiply by: _____
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				OBL species _____ x 1 = <u>0</u>
Sapling/Shrub Stratum				FACW species _____ x 2 = <u>0</u>
1. <u><i>Tsuga mertensiana</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	FAC species <u>85</u> x 3 = <u>255</u>
2. <u><i>Vaccinium ovalifolium</i></u>	<u>5</u>	_____	<u>FAC</u>	FACU species <u>55</u> x 4 = <u>220</u>
3. <u><i>Cornus canadensis</i></u>	<u>5</u>	_____	<u>FACU</u>	UPL species _____ x 5 = <u>0</u>
4. <u><i>Actaea rubra</i></u>	<u>5</u>	_____	<u>FAC</u>	Column Totals: <u>140</u> (A) <u>475</u> (B)
5. _____	_____	_____	_____	Prevalence Index = B/A = <u>3.39</u>
6. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>
Total Cover: <u>25</u>				<u>Yes</u> Dominance Test is >50%
50% of total cover: <u>13</u> 20% of total cover: <u>5</u>				<u>No</u> Prevalence Index is ≤3.0
Herb Stratum				____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1. <u><i>Rubus pedatus</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. <u><i>Athyrium filix-femina</i></u>	<u>5</u>	<u>x</u>	<u>FAC</u>	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>15</u>				<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____
50% of total cover: <u>8</u> 20% of total cover: <u>3</u>				
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>95</u> (Where applicable)				
Remarks: Mature hemlock-spruce forest, commonly found on upland sites in southcentral Alaska.				

**SOIL**

Sampling Point: DP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+4-0	dk gr brn 10YR4/2	100					organics and silt, decomposed moss
0-16	dk gr brn 10YR4/2	100					cobbles and silty gravel

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

<b>Hydric Soil Indicators:</b>	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b>	<b>Hydric Soil Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: <u>none</u>	
Depth (inches): _____	

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	<b>Secondary Indicators (2 or more required)</b>
<b>Primary Indicators (any one indicator is sufficient)</b>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

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

Remarks: The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-45 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-12  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope/ Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 15  
 Subregion: Southcentral Lat: 60.969559 Long: -149.137451 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes	No <u>X</u>		Yes _____	No <u>X</u>
Wetland Hydrology Present?	Yes	No <u>X</u>			
Remarks: Site is located in the riparian zone of California Creek with a substrate of gravel and cobbles. The location may be disturbed by flooding infrequently.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:														
1. <u><i>Alnus viridis</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)														
2. <u><i>Populus balsamifera</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>															
3. _____																		
4. _____																		
Total Cover: <u>50</u>				<b>Prevalence Index worksheet:</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>85</u></td> <td>x 3 = <u>255</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>135</u></td> <td>(A) <u>455</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.37</u>	Total % Cover of:	Multiply by:	OBL species _____	x 1 = <u>0</u>	FACW species _____	x 2 = <u>0</u>	FAC species <u>85</u>	x 3 = <u>255</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species _____	x 5 = <u>0</u>	Column Totals: <u>135</u>	(A) <u>455</u> (B)
Total % Cover of:	Multiply by:																	
OBL species _____	x 1 = <u>0</u>																	
FACW species _____	x 2 = <u>0</u>																	
FAC species <u>85</u>	x 3 = <u>255</u>																	
FACU species <u>50</u>	x 4 = <u>200</u>																	
UPL species _____	x 5 = <u>0</u>																	
Column Totals: <u>135</u>	(A) <u>455</u> (B)																	
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>																		
Sapling/Shrub Stratum																		
1. <u><i>Alnus viridis</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> Yes Dominance Test is >50% No Prevalence Index is ≤3.0  _____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.														
2. <u><i>Sambucus racemosa</i></u>	<u>25</u>	<u>x</u>	<u>FACU</u>															
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
Total Cover: <u>75</u>																		
50% of total cover: <u>38</u> 20% of total cover: <u>15</u>																		
Herb Stratum																		
1. <u><i>Athyrium filix-femina</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Present?</b> Yes <u>X</u> No _____														
2. _____																		
3. _____																		
4. _____																		
5. _____																		
6. _____																		
7. _____																		
8. _____																		
9. _____																		
10. _____																		
Total Cover: <u>10</u>																		
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>																		
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>25</u>																		
% Cover of Wetland Bryophytes <u>0</u> Total Cover of Bryophytes <u>0</u> (Where applicable)																		
Remarks: Shrub-scrub vegetation common in riparian zones and drainageways in the region.																		

**SOIL**

Sampling Point: DP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>		
+4-0	dk gr brn 10YR4/2	100					organics and silt, decomposed organics
0-16	dk gr brn 10YR4/2	100					cobbles and silty organics

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

<b>Hydric Soil Indicators:</b>	<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b>	<b>Hydric Soil Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: <u>none</u>	
Depth (inches): _____	

Remarks: No hydric soil indicators are present.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	<b>Secondary Indicators (2 or more required)</b>
<b>Primary Indicators (any one indicator is sufficient)</b>	<input type="checkbox"/> Water-stained Leaves (B9)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

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

Remarks: The site is within the riparian zone of California Creek and may be subject to flooding. The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**WETLAND DETERMINATION DATA FORM – Alaska Region**

Tract D Girdwood Elementary School Subdivision;  
 Project/Site: Parcel No. 075-031-46 Borough/City: Girdwood Sampling Date: 9/26/2016  
 Applicant/Owner: Municipality of Anchorage Sampling Point: DP-13  
 Investigator(s): Pat Athey, RSE Landform (hillside, terrace, hummocks, etc.): Lower Mountain Slope / Alluvial Fan  
 Local relief (concave, convex, none): Convex Slope (%): 10  
 Subregion: Southcentral Lat: 60.968175 Long: -149.137587 Datum: NAD83  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: NWI Indicates No Wetlands

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes X No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ 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 <u>X</u>	No _____	<b>Is the Sampled Area within a Wetland?</b>	Yes _____	No <u>X</u>
Hydric Soil Present?	Yes _____	No <u>X</u>			
Wetland Hydrology Present?	Yes _____	No <u>X</u>			
Remarks: The site is located in the southwest part of the property in mature spruce-hemlock forest with a relatively open understory of ferns and moss.					

**VEGETATION** – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b>
1. <u><i>Picea sitchensis</i></u>	<u>50</u>	<u>x</u>	<u>FACU</u>	
2. <u><i>Tsuga mertensiana</i></u>	<u>50</u>	<u>x</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>83.33</u> (A/B)
4. _____	_____	_____	_____	<b>Prevalence Index worksheet:</b>
Total Cover: <u>100</u>				Total % Cover of:
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				OBL species _____ x 1 = <u>0</u>
Sapling/Shrub Stratum				FACW species _____ x 2 = <u>0</u>
1. <u><i>Tsuga mertensiana</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	FAC species <u>105</u> x 3 = <u>315</u>
2. <u><i>Vaccinium ovalifolium</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	FACU species <u>60</u> x 4 = <u>240</u>
3. <u><i>Cornus canadensis</i></u>	<u>5</u>	_____	<u>FACU</u>	UPL species _____ x 5 = <u>0</u>
4. <u><i>Menziesia ferruginea</i></u>	<u>5</u>	_____	<u>FACU</u>	Column Totals: <u>165</u> (A) <u>555</u> (B)
5. _____	_____	_____	_____	Prevalence Index = B/A = <u>3.36</u>
6. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>
Total Cover: <u>30</u>				<u>Yes</u> Dominance Test is >50%
50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				<u>No</u> Prevalence Index is ≤3.0
Herb Stratum				____ Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
1. <u><i>Athyrium filix-femina</i></u>	<u>25</u>	<u>x</u>	<u>FAC</u>	____ Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
2. <u><i>Rubus pedatus</i></u>	<u>10</u>	<u>x</u>	<u>FAC</u>	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
Total Cover: <u>35</u>				<b>Hydrophytic Vegetation Present?</b>
50% of total cover: <u>18</u> 20% of total cover: <u>7</u>				Yes <u>X</u> No _____
Plot size (radius, or length x width) <u>30-ft diameter</u> % Bare Ground <u>0</u>				
% Cover of Wetland Bryophytes <u>90</u> Total Cover of Bryophytes <u>90</u> (Where applicable)				
Remarks: Although Sphagnum moss covers much of the ground surface, it is not indicative of hydrophytic vegetation at this site; Sphagnum is commonly found in upland, mature hemlock forests as a groundcover beneath the tree canopy.				

**SOIL**

Sampling Point: DP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
+3-0	dk gr brn 10YR4/2	100					organics and silt, many fine roots	
0-8	dk gr brn 10YR4/2 blk 10YR2/1	50 50					silt loam	
42604	gr brn 10YR 5/2 brn 10YR5/3 lt gr 10YR7/1	50 50 10					silt loam with gravel	

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

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

<b>Restrictive Layer (if present):</b> Type: <u>none</u> Depth (inches): _____	<b>Hydric Soil Present?</b> Yes _____ No <u>X</u>
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Remarks: No hydric soil indicators are present.

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Water-stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <u>X</u> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes _____ No <u>X</u>
---	---

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

Remarks: The site was inspected during the normal wet season for southcentral Alaska. In addition, the cumulative precipitation in Anchorage since January 1 has been 14.15 inches, which is 2.26 inches (19 percent) above the normal value of 11.89 inches for this date. The result is that soil saturation and high water tables are likely to occur in non-wetlands as well as wetlands; therefore, the hydrology indicators were carefully evaluated.

**Attachment 3**  
**Photos**



**Stream #1 (near north property line)**



**Stream #1**



**Stream #3**



**Stream #4 (near west property line)**



**Stream #4**



**Stream #1 (dry channel portion)**



**California Creek (near west property line, view to north)**



**California Creek**



**California Creek**



**California Creek**



DP-1



DP-1



DP-1



DP-1



DP-2



DP-2



**DP-2**



**DP-2**



DP-3



DP-3



DP-3



DP-3



DP-4



DP-4



DP-4



DP-4



DP-5



DP-5



DP-5



DP-5



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DP-10



DP-10



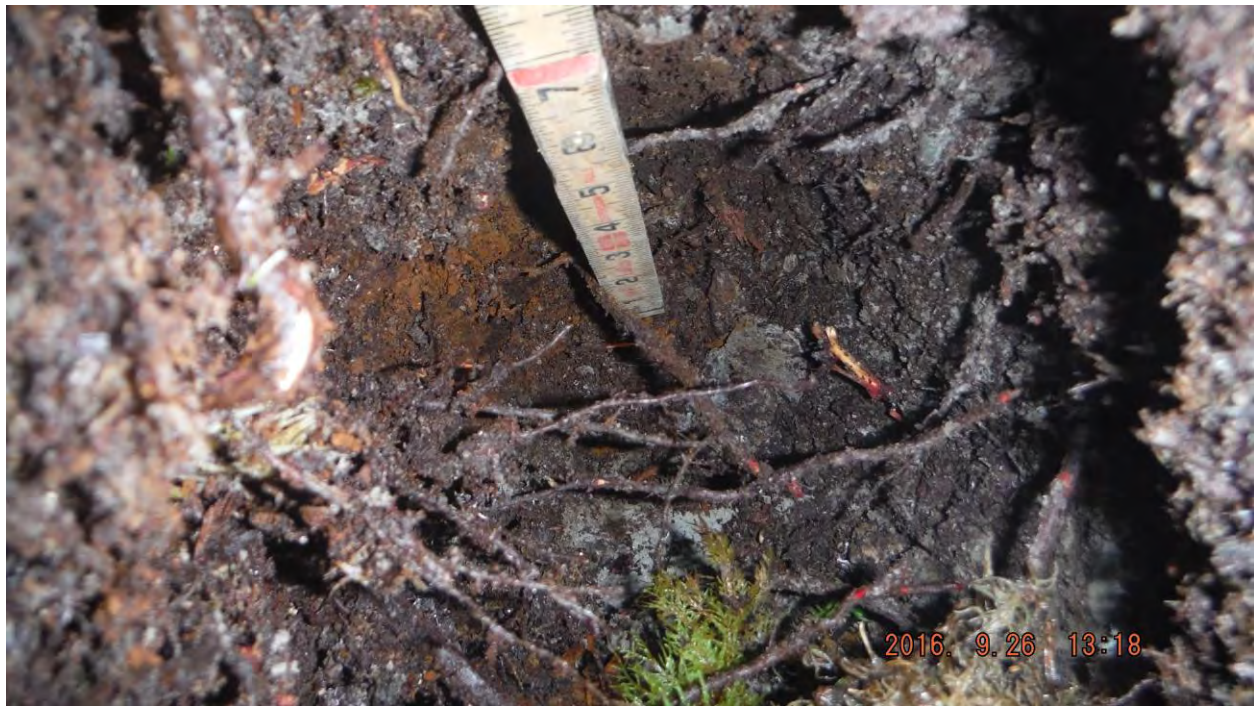
**DP-10**



**DP-10**



DP-11



DP-11



DP-11



DP-11



DP-12



DP-12



DP-12



DP-12



DP-13



DP-13



**DP-13**



**DP-13**

**Attachment 4**  
**Local Climatic Data**

**These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - <http://www.ncdc.noaa.gov>.**

## Climatological Report (Daily)

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CLIANC

CLIMATE REPORT  
NATIONAL WEATHER SERVICE ANCHORAGE, AK  
457 AM AKDT TUE SEP 27 2016

.....  
...THE ANCHORAGE AK CLIMATE SUMMARY FOR SEPTEMBER 26 2016...

CLIMATE NORMAL PERIOD 1981 TO 2010  
CLIMATE RECORD PERIOD 1952 TO 2016

WEATHER ITEM	OBSERVED VALUE	TIME (LST)	RECORD VALUE	YEAR	NORMAL VALUE	DEPARTURE FROM NORMAL	LAST YEAR
--------------	----------------	------------	--------------	------	--------------	-----------------------	-----------

.....							
TEMPERATURE (F)							
YESTERDAY							
MAXIMUM	51	319 PM	59	1995	51	0	43
				1975			
MINIMUM	37	713 AM	22	1992	39	-2	36
AVERAGE	44				45	-1	40

PRECIPITATION (IN)							
YESTERDAY	0.00		0.78	2004	0.10	-0.10	
MONTH TO DATE	2.35				2.60	-0.25	
SINCE SEP 1	2.35				2.60	-0.25	
SINCE JAN 1	14.15				11.89	2.26	

SNOWFALL (IN)							
YESTERDAY	0.0		0.1	2004	0.0	0.0	0.0
MONTH TO DATE	0.0				0.2	-0.2	0.0
SINCE SEP 1	0.0				0.2	-0.2	0.0
SINCE JUL 1	0.0				0.2	-0.2	0.0
SNOW DEPTH	0						

DEGREE DAYS							
HEATING							
YESTERDAY	21					1	
MONTH TO DATE	309					-98	
SINCE SEP 1	309					-98	
SINCE JUL 1	513					-344	

COOLING							
YESTERDAY	0					0	
MONTH TO DATE	0					0	
SINCE SEP 1	0					0	
SINCE JAN 1	13					11	

.....							
WIND (MPH)							
HIGHEST WIND SPEED	12		HIGHEST WIND DIRECTION			N (340)	
HIGHEST GUST SPEED	16		HIGHEST GUST DIRECTION			N (10)	
AVERAGE WIND SPEED	4.0						

RELATIVE HUMIDITY (PERCENT)							
HIGHEST	96						
LOWEST	52						
AVERAGE	74						



**Geotechnical Report  
Girdwood Cemetery Feasibility Study  
Girdwood, Alaska**

November 2016

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32-1-02546

**TABLE OF CONTENTS**

	<b>Page</b>
1.0 INTRODUCTION.....	1
2.0 SITE AND PROJECT DESCRIPTION.....	1
3.0 SUBSURFACE EXPLORATIONS.....	2
4.0 LABORATORY TESTING.....	3
5.0 SURFACE AND SUBSURFACE OBSERVATIONS.....	3
5.1 Groundwater Conditions.....	4
5.2 Surface Water Conditions.....	4
6.0 PRELIMINARY RECOMMENDATIONS.....	5
7.0 CLOSURE AND LIMITATIONS.....	6

**TABLES**

- 1 Surface Water Observations

**FIGURES**

- 1 Vicinity Map
- 2 Site Plan
- 3 Soil Description and Log Key
- 4 Frost Classification Legend
- 5 Log of Boring B-1
- 6 Log of Boring B-2
- 7 Log of Boring B-3
- 8 Log of Boring B-4
- 9 Grain Size Classification (2 Sheets)

**APPENDICES**

- A Important Information About Your Geotechnical/Environmental Report

**GEOTECHNICAL REPORT  
GIRDWOOD CEMETERY FEASIBILITY STUDY  
GIRDWOOD, ALASKA**

**1.0 INTRODUCTION**

This report presents the results of subsurface explorations and laboratory testing conducted by Shannon & Wilson, Inc. at the potential cemetery site on Crow Creek Road in Girdwood, Alaska. The purpose of this geotechnical study was to observe and document subsurface conditions. To accomplish this, we advanced four geotechnical borings within the project area. Selected soil samples recovered from the borings were tested in our Anchorage laboratory. Presented in this report are descriptions of the site and project, subsurface exploration and laboratory test results, an interpretation of subsurface conditions, and preliminary recommendations.

Authorization to proceed with this work was received in the form of a signed letter of authorization from Mr. D. Michael Rabe of CRW Engineering Group, LLC (CRW) on September 12, 2016. Our work was conducted in general accordance with our March 24, 2016 proposal.

**2.0 SITE AND PROJECT DESCRIPTION**

The project is located on a relatively undeveloped 22-acre parcel designated as Tract D, Girdwood Elementary Subdivision on Crow Creek Road in Girdwood, Alaska. The topography at the site slopes down from the northwest to the southeast with an elevation difference of approximately 50 feet (across the northern portion of the parcel) and approximately 70 feet to the south (across the irregular triangle-shaped portion of the parcel). At the time of our explorations, the parcel was densely forested with areas of very tall, mature evergreens as well as thickets of alders and other small, bushy vegetation. The underbrush consisted of devil's club, blueberry bushes, and ferns and the forest floor was typically covered with a thick layer of moss and numerous downed trees. The parcel is bounded on one side by Crow Creek Road and it extends in an irregular shape behind several developed, residential parcels. California Creek crosses the parcel and a multi-use trail parallels the creek through the parcel and beyond. A vicinity map indicating the general project location is presented as Figure 1. A site plan, included as Figure 2, shows prominent site features and the approximate boring locations.

### 3.0 SUBSURFACE EXPLORATIONS

Subsurface explorations for this study consisted of drilling and sampling four borings, designated Borings B-1 through B-4, in the project area on September 20 through 22, 2016. The general boring locations were selected by Shannon & Wilson to provide relatively even coverage across the northern portion of the site. The boring locations, shown on Figure 2, were recorded with a handheld GPS unit that is generally considered accurate to within 20 feet horizontally. It should be noted that GPS accuracy may be affected by geographic features, tree canopy, and atmospheric anomalies. Elevations shown on the boring logs were based on topographic contours provided by CRW. The boring locations shown on the site plan and elevations shown on the boring logs should be considered approximate.

Drilling services for this project were provided by Discovery Drilling, using a 6712 DT Geoprobe drill rig. An experienced geologist from our firm was present during drilling to locate the borings, observe drill action, collect samples, log subsurface conditions, and observe groundwater conditions.

The borings were advanced with 3<sup>1</sup>/<sub>4</sub>-inch inner diameter (ID), continuous flight, hollow-stem augers to depths ranging between 20.6 and 26.5 feet below ground surface (bgs). As the borings were advanced, samples were typically recovered using standard penetration test (SPT) methods at 2.5-foot intervals to 10 feet bgs and at 5-foot intervals thereafter. For the SPT method, samples are recovered by driving a 2-inch outer diameter (OD) split-spoon sampler into the bottom of the advancing hole with blows of a 140-pound hammer free falling 30 inches onto the drill rod. The number of blows required to advance the sampler the final 12 inches of an 18-inch penetration into undisturbed soil is recorded. Where the sampler did not penetrate the full 18 inches, our logs report the blow count and corresponding penetration in inches. Blow counts are shown graphically on the boring logs as “penetration resistance” and are displayed adjacent to sample depth. The penetration resistance values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless or cohesive soils, respectively. In addition to the split-spoon samples, a grab sample of the near-surface soils was collected from the auger cuttings in the upper 2 feet of each boring.

The soils that were encountered in the borings were observed and described in the field in general accordance with the classification system described by ASTM International (ASTM) D2488. Selected samples recovered during drilling were tested in our laboratory to refine our soil descriptions in general accordance with the Unified Soil Classification System (USCS)

described in Figure 3. Frost classifications were also estimated for samples based on laboratory testing (sieve analyses and percent passing the Number 200 sieve [P-200]) and are shown on the boring logs. The frost classification system is presented in Figure 4. Summary logs of the borings are presented in Figures 5 through 8.

Upon completion of our borings, 1-inch PVC groundwater level monitoring casing was installed to the bottom of the borings to facilitate static water level measurements. The annulus around the PVC casings were backfilled with cuttings generated during drilling.

#### **4.0 LABORATORY TESTING**

Laboratory tests were performed on selected soil samples recovered from the borings. The laboratory testing was formulated with emphasis on determining gradation properties, natural water content, and frost characteristics.

Water content tests were performed on the samples returned to our laboratory. Water content tests were performed in general accordance with ASTM D2216. The results of the water content measurements are presented graphically on the boring logs in Figures 5 through 8.

Grain size classification (gradation) testing was performed to estimate the particle size distribution of selected samples from the borings. The gradation testing generally followed the procedures described in ASTM C117/C136 and ASTM D421/422. The test results are presented on Figure 9 (3 sheets) and summarized on the boring logs as percent gravel, percent sand, and percent fines. Percent fines on the boring logs are equal to the sum of the silt and clay fractions indicated by the percent passing the No. 200 sieve. Note that hydrometer testing indicates particle size only and visual classification under USCS designates the entire fraction of soil finer than the No. 200 sieve as silt. Plasticity characteristics (Atterberg Limits results) are required to differentiate between silt and clay soils under USCS.

#### **5.0 SURFACE AND SUBSURFACE OBSERVATIONS**

The subsurface conditions encountered in our explorations are presented graphically on the boring logs included in Figures 5 through 8. In general, our borings encountered a surficial layer of organic material overlying granular soils and overconsolidated glacial till.

The surficial layer generally consisted of root mat and forest duff with organic-rich material which was medium dense or soft and approximately 2-feet thick. Beneath the surficial layer, we

found alluvial and/or glaciofluvial granular material with varying amounts of silt. This layer consisted of sand and gravel with varying amounts of silt and was generally dense to very dense. Cobbles and/or boulders were noted within this layer based on drill action. Fines content in the alluvium ranged from 8 to 14 percent based on the samples tested in our laboratory.

Beneath the alluvial material was glacial till which consisted of silty sand with gravel, silt with sand, silt with sand and gravel, and gravel with silt and sand. The top of the till layer was found between approximately 8 and 13 feet bgs and extended to the bottom of each boring. Drilling within the till was generally hard and sample penetration resistance was typically more than 50 blows per foot.

### **5.1 Groundwater Conditions**

Groundwater was encountered during drilling at approximately 7.5 feet bgs in Boring B-1, at 5 feet bgs in Borings B-2 and B-4, and at 25 feet bgs in Boring B-3. Static water levels were measured on October 14, 2016. With the exception of Boring B-2, static water levels were higher compared to water levels at the time of drilling. The static water level was measured at 4.8 feet bgs for Boring B-1, at 11.6 feet bgs for Boring B-2, at 11.7 feet bgs for Boring B-3, and at 2.1 feet bgs in Boring B-4. Note that water levels may fluctuate by several feet seasonally and may vary during periods of high precipitation or rapid snow melt.

### **5.2 Surface Water Conditions**

On October 14, 2016, Shannon & Wilson representatives traversed the site to make surface water observations. During this visit, standing surface water and areas where evidence of previous surface water were noted and mapped using a handheld gps. Results of this effort are summarized on Table 1 and shown on the site plan presented as Figure 2. Generally, surface water was not prevalent throughout the site at the time of our site visit. With the exception of California Creek, the largest area of surface water observed was along the north edge of the parcel where a small (approximately 1 to 3-foot wide) stream was visible and flowing in some areas. The stream ponded in low lying areas as indicated on the site plan and flowed east toward a culvert under Crow Creek Road. The other areas noted on the site plan were not of significant size and most were mapped due to evidence of previous ponding rather than observed surface water. These areas are likely intermittently inundated with water and surface water expression is highly dependent upon precipitation amounts in this temperate rainforest climate.

## 6.0 PRELIMINARY RECOMMENDATIONS

Based on the observations made and the subsurface data collected, it is our opinion that this parcel would be suitable for development. Our explorations at the site generally encountered medium dense to very dense, granular materials. If a building is to be constructed, a conventional, shallow foundation would be appropriate. Other geotechnical considerations associated with this project may consist of excavations, drainage, subsurface frost conditions, and general constructability. We recommend conducting additional explorations at the site once a final development plan is determined to review and refine our preliminary recommendations.

We expect that gravel or paved access roads and pathways may be constructed as part of the cemetery development. Based on the elevated fines content and frost susceptibility of the material encountered at the site, it is likely that a structural section for new roads and pathways could vary between about 2 and 5 feet thick. Paved roads and pathways would likely need to have the thicker section and would likely need to include insulation unless the Municipality of Anchorage provides a variance from their design criteria. A thinner section may be able to be used if the road and pathway surfaces are gravel (rather than pavement) and frost related movement can be tolerated.

Excavations will likely be necessary for building foundation construction and new installations of buried pipes and cables for utilities. Static water levels were measured between 2 and 12 feet bgs, so it is likely that shallow groundwater will be encountered during construction. Dewatering will need to be considered and planned for during excavation. It should be noted that surface and groundwater levels are subject to variation and may fluctuate by several feet seasonally or during precipitation events. In addition, cobbles and boulders were noted during drilling as well as elevated fines content in some places. It is likely that digging conditions could be difficult in some areas due to the density and size of in situ materials and could be sensitive to moisture and disturbance in other areas (due to high fines content).

Structural fill may be needed to support pavements, structures, and new utilities. Structural fill that is imported should be clean, granular soil free of organic material to provide drainage and frost protection. The Municipality of Anchorage Standard Specification (MASS) has several gradation options for structural fill. Structural fill that is placed should be compacted with proper moisture density control. Most of the material encountered in our borings had elevated fines content and is moderately frost susceptible and should not be used under unheated slabs or in structural sections under paved or gravel-surfaced roadways. However, it may be reused in

areas where non-frost susceptible (NFS) material is not required. Special handling techniques (i.e. moisture control/protection, reduced traffic, etc.) may need to be implemented if they are to be re-used. Re-use will be dictated by the contractor's ability to protect moisture sensitive soils from moisture during handling and placement. In addition, moisture sensitive materials that are exposed during site preparation activities should be protected from excess moisture prior to construction.

Our representative contacted several sources in order to evaluate potential borrow sources and potential waste sites that may be utilized for development of the cemetery. Response from local contractors and contractors that have recently conducted work in Girdwood was sparse. There are no known high volume sources for clean, NFS material in the Girdwood valley. There may be small pockets of usable material on site, but it is likely that material will need to be imported for development of the cemetery site. Imported material may come from Anchorage or potentially from a closer source such as State of Alaska borrow sites south of Girdwood along the Seward Highway. One contractor stated that he used a material source in the Portage valley for his recent project in Girdwood and also imported material from Anchorage. Other contractors have imported and stockpiled material in Girdwood for small, local needs. Information regarding waste sites was also sparse, several contractors have used local residents for their waste material and have generated business by "working in the area and talking to local residents who stop by the job site". Waste material has also been trucked to the Anchorage area for disposal.

## **7.0 CLOSURE AND LIMITATIONS**

This report was prepared for the exclusive use of our client and their representatives for evaluating the site as it relates to the geotechnical aspects discussed herein. The preliminary conclusions contained in this report are based on site conditions as they presently exist. It is assumed that the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the explorations.

If there is a substantial lapse of time between the submittal of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the conclusions considering the changed conditions and time lapse. Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil

samples or advancing borings. Shannon & Wilson has prepared the attachments in Appendix A *Important Information About Your Geotechnical/Environmental Report* to assist you and others in understanding the use and limitations of the reports.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact the undersigned.

We appreciate this opportunity to be of service. Please contact the undersigned at (907) 561-2120 with questions or comments concerning the contents of this report.

**SHANNON & WILSON, INC.**

Katra Wedeking CPG  
Senior Geologist



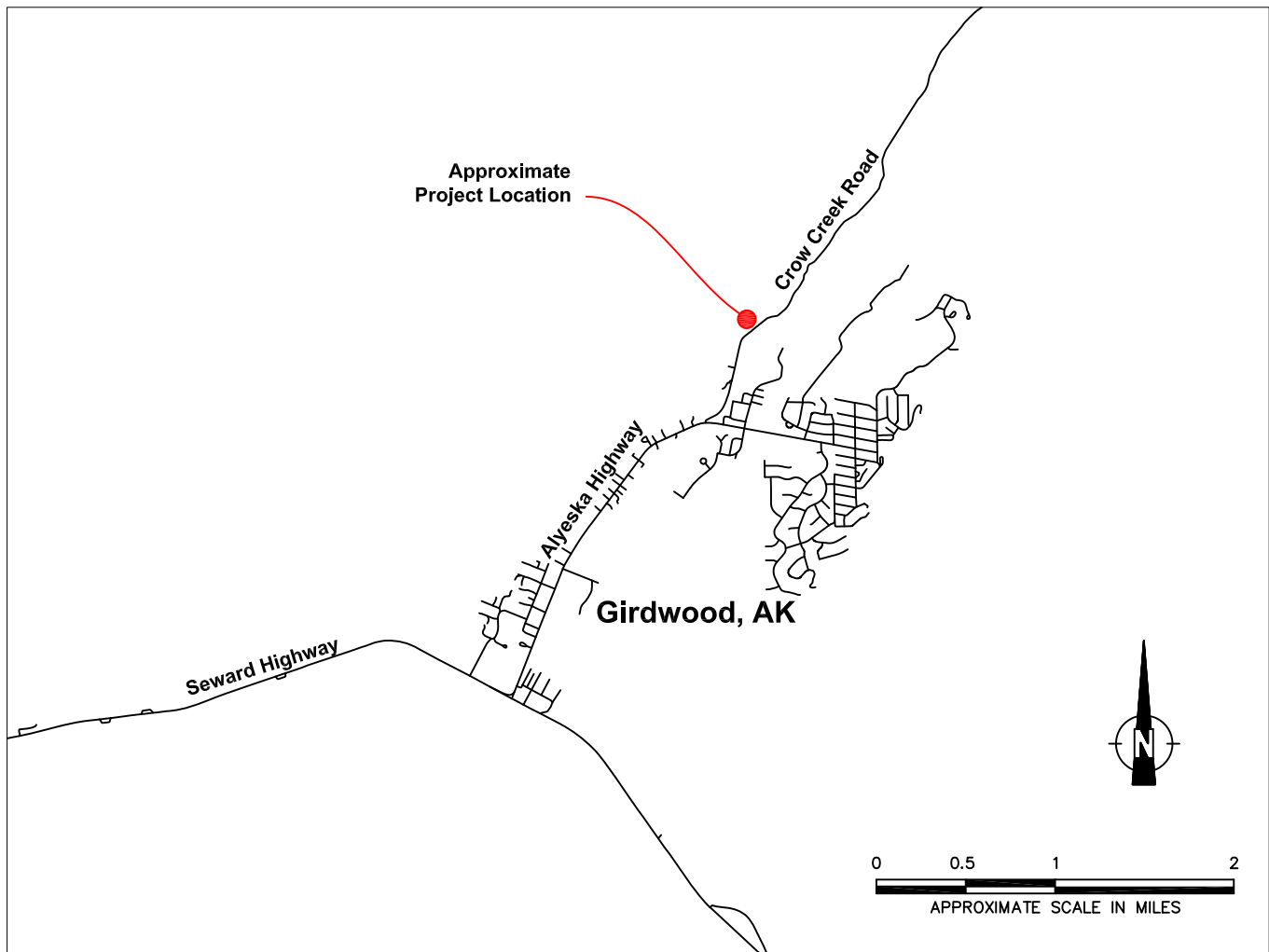
Kyle Brennan, PE  
Vice President

**Table 1**  
**Surface Water Observations**


SW1	Small Stagnant Pond	This feature contained water at the time of our site visit. It was approximately 5 to 8 inches deep. Water appeared stagnant and no apparent flow path was observed.
SW2	Drainage Ditch	Ditch apparent along California Creek trail. No water observed during surface water site visit.
SW3	Low Lying Area	Evidence of water ponding in low lying areas during previous rainfall event. No water observed during site visit. Minimal feature.
SW4	Rectangular Excavation	This obvious feature does not appear to be naturally occurring. Mineral soil was exposed on bottom and sides. No water was observed within pit during the surface water site visit. However, while marking the proposed boring locations on 9.17.16, shallow ponding (approximately 8 - 12 inches) was visible in the bottom of the pit, and while drilling during a rain event (9.22.16), the pit was completely full of water. The pit is approximately 6 feet deep in the center.
SW5	Low Lying Area	Evidence of water ponding in low lying areas during a previous precipitation event. No water observed during site visit. Minimal feature.
SW6	Small Stream	This feature was a small (approximately 1 to 2 feet wide) flowing stream with braided channels and occasional standing water in low lying areas between channels. Standing water was shallow, approximately 6 to 8 inches deep.
SW7	Stream	The stream continues from observation location SW6 through this area and occasional shallow (less than 8 inches deep) ponded water was observed. We also observed braided channels with no water at the time of our surface water site visit, but with sandy, cobbly bottoms and evidence of previous flow.
SW8	Wide Shallow Stream	The stream at this point has channelized as a collection point for the water within the areas upstream. It is shallow (approximately 6 to 8 inches deep) and wide (approximately 4 to 5 feet) and flows into a culvert beneath Crow Creek Road.
	California Creek	This obvious water feature is a well established creek within the project site. It is approximately 10 to 20 feet wide in the project area and an estimated 3 to 5 feet deep. It flows rapidly and there are several downed trees along its vegetated banks.

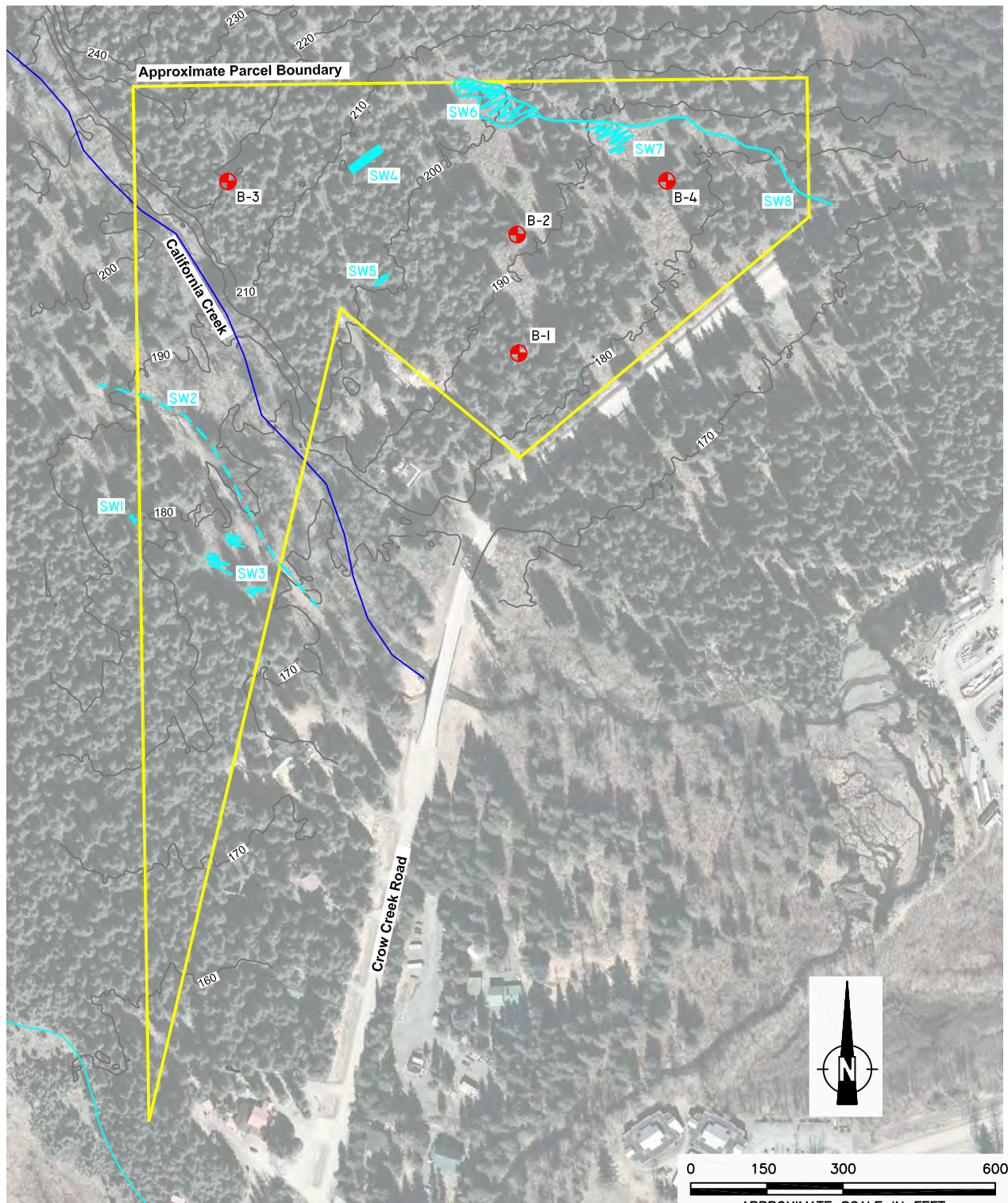
Surface Water Observation site visit was conducted on October 14, 2016.

See Site Plan presented in Figure 2 for Surface Water Feature locations.



Map adapted from shape files provided by the Municipality of Anchorage mapping website.

Girdwood Cemetery Feasibility Study Girdwood, Alaska	
<b>VICINITY MAP</b>	
November 2016	32-1-02546
 <b>SHANNON &amp; WILSON, INC.</b> <small>Geotechnical and Environmental Consultants</small>	<b>FIG. 1</b>



Drawing adapted from base map provided by CRW Engineering Group, LLC. Contour interval is 10 feet.

### LEGEND

- B-1 Approximate location of Boring B-1, advanced by Shannon & Wilson, September 2016
- SW1 Approximate location of Surface Water Feature SW1, see Surface Water Observations presented in Table 1 for details

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

### SITE PLAN

November 2016

32-1-02546



SHANNON & WILSON, INC.  
Geotechnical and Environmental Consultants

**FIG. 2**

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

**S&W INORGANIC SOIL CONSTITUENT DEFINITIONS**

CONSTITUENT <sup>2</sup>	FINE-GRAINED SOILS (50% or more fines) <sup>1</sup>	COARSE-GRAINED SOILS (less than 50% fines) <sup>1</sup>
<b>Major</b>	<b>Silt, Lean Clay, Elastic Silt, or Fat Clay<sup>3</sup></b>	<b>Sand or Gravel<sup>4</sup></b>
<b>Modifying (Secondary)</b> Precedes major constituent	30% or more coarse-grained: <b>Sandy or Gravelly<sup>4</sup></b>	More than 12% fine-grained: <b>Silty or Clayey<sup>3</sup></b>
<b>Minor</b> Follows major constituent	15% to 30% coarse-grained: <b>with Sand or with Gravel<sup>4</sup></b> 30% or more total coarse-grained and lesser coarse-grained constituent is 15% or more: <b>with Sand or with Gravel<sup>5</sup></b>	5% to 12% fine-grained: <b>with Silt or with Clay<sup>3</sup></b> 15% or more of a second coarse-grained constituent: <b>with Sand or with Gravel<sup>5</sup></b>

<sup>1</sup>All percentages are by weight of total specimen passing a 3-inch sieve.  
<sup>2</sup>The order of terms is: *Modifying Major with Minor*.  
<sup>3</sup>Determined based on behavior.  
<sup>4</sup>Determined based on which constituent comprises a larger percentage.  
<sup>5</sup>Whichever is the lesser constituent.

**MOISTURE CONTENT TERMS**

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

**STANDARD PENETRATION TEST (SPT) SPECIFICATIONS**

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm
	NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.
	NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

**PARTICLE SIZE DEFINITIONS**

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

**RELATIVE DENSITY / CONSISTENCY**

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

**WELL AND BACKFILL SYMBOLS**

	Bentonite		Surface Cement Seal
	Cement Grout		Asphalt or Cap
	Bentonite Grout		Slough
	Bentonite Chips		Inclinometer or Non-perforated Casing
	Silica Sand		Vibrating Wire Piezometer
	Perforated or Screened Casing		

**PERCENTAGES TERMS<sup>1,2</sup>**

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

<sup>1</sup>Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

<sup>2</sup>Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.
















Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**SOIL DESCRIPTION AND LOG KEY**

November 2016

32-1-02546

**UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)**  
**(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)**

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Gravel (less than 5% fines)	GW 	Well-Graded Gravel; Well-Graded Gravel with Sand
		Silty or Clayey Gravel (more than 12% fines)	GP 	Poorly Graded Gravel; Poorly Graded Gravel with Sand
			GM 	Silty Gravel; Silty Gravel with Sand
			GC 	Clayey Gravel; Clayey Gravel with Sand
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Sand (less than 5% fines)	SW 	Well-Graded Sand; Well-Graded Sand with Gravel
		Silty or Clayey Sand (more than 12% fines)	SP 	Poorly Graded Sand; Poorly Graded Sand with Gravel
			SM 	Silty Sand; Silty Sand with Gravel
			SC 	Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML 	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
		CL 	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay	
	Silts and Clays (liquid limit 50 or more)	Organic	OL 	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
		Inorganic	MH 	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH 	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH 	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor	PT 	Peat or other highly organic soils (see ASTM D4427)	

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

- Dual symbols (symbols separated by a hyphen, i.e., SP-SM, Sand with Silt) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).
- Borderline symbols (symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand) indicate that the soil properties are close to the defining boundary between two groups.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**SOIL DESCRIPTION  
AND LOG KEY**

November 2016

32-1-02546

 SHANNON & WILSON, INC.  
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**FIG. 3**  
Sheet 2 of 3

**GRADATION TERMS**

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

**CEMENTATION TERMS<sup>1</sup>**

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

**PLASTICITY<sup>2</sup>**

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASTICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

**ADDITIONAL TERMS**

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

**PARTICLE ANGULARITY AND SHAPE TERMS<sup>1</sup>**

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

**ACRONYMS AND ABBREVIATIONS**

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q <sub>u</sub>	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

**STRUCTURE TERMS<sup>1</sup>**

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

2013 BORING-CLASS3 02546 GINT.GPJ SWNEW.GDT 11/17/16

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<sup>2</sup>Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**SOIL DESCRIPTION AND LOG KEY**

November 2016

32-1-02546

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**FROST CLASSIFICATION**  
 (after Municipality of Anchorage, 2007)

GROUP		0.02 Mil.	P-200*	USC SYSTEM (based on P-200 results)
NFS	Sandy Soils	0 to 3	0 to 6	SW, SP, SW-SM, SP-SM
	Gravelly Soils	0 to 3	0 to 6	GW, GP, GW-GM, GP-GM
F1	Gravelly Soils	3 to 10	6 to 13	GM, GW-GM, GP-GM
F2	Sandy Soils	3 to 15	6 to 19	SP-SM, SW-SM, SM
	Gravelly Soils	10 to 20	13 to 25	GM
F3	Sands, except very fine silty sands**	Over 15	Over 19	SM, SC
	Gravelly Soils	Over 20	Over 25	GM, GC
	Clays, PI>12			CL, CH
F4	All Silts			ML, MH
	Very fine silty sands**	Over 15	Over 19	SM, SC
	Clays, PI<12			CL, CL-ML
	Varved clays and other fined grained, banded sediments			CL and ML CL, ML, and SM; SL, SH, and ML; CL, CH, ML, and SM

PI = Plasticity index

P-200 = Percent passing the number 200 sieve

0.02 Mil. = Percent material below 0.02 millimeter grain size

\*Approximate P-200 value equivalent for frost classification.  
Value range based on typical, well-graded soil curves.

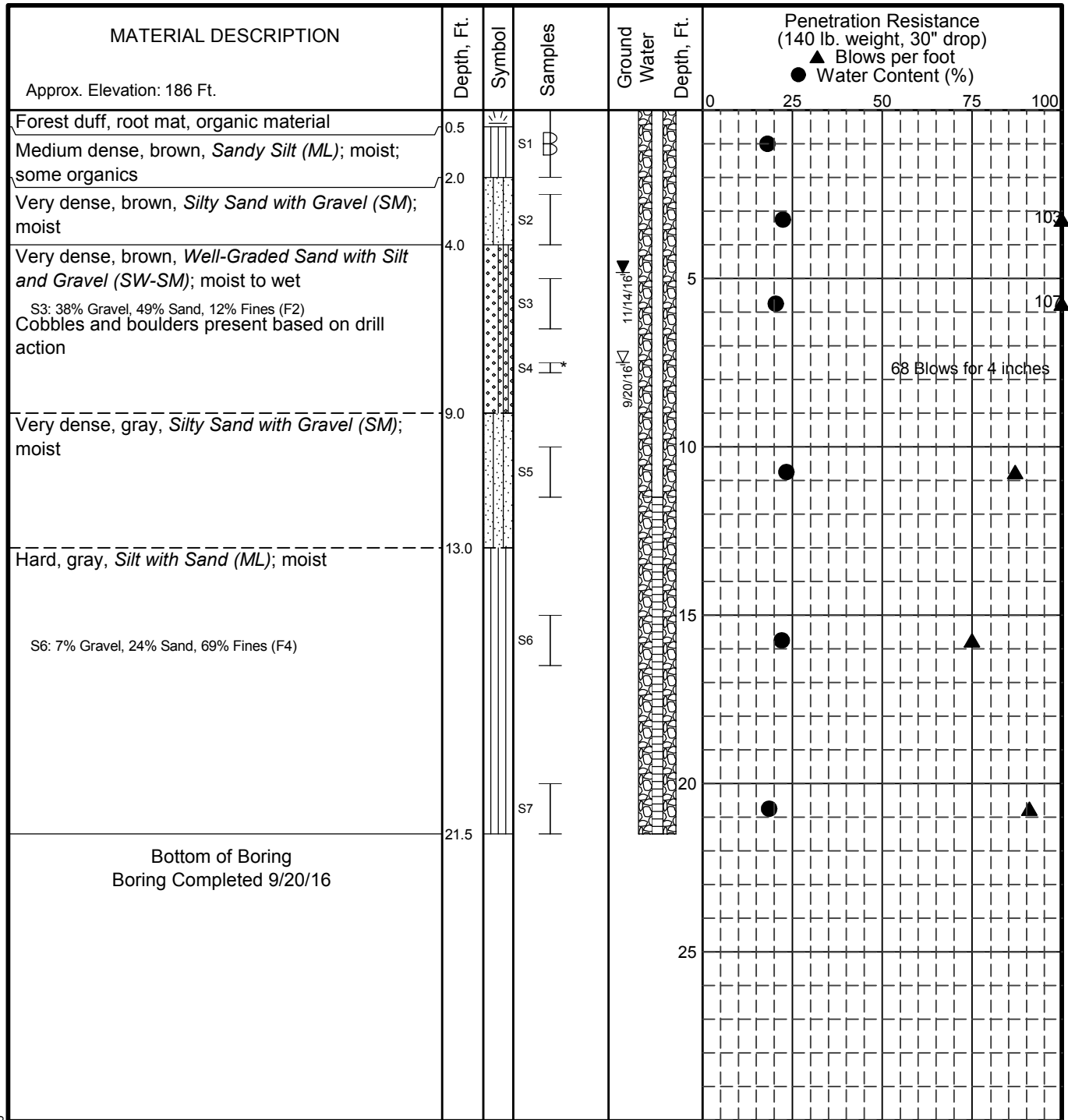
\*\* Very fine sand : greater than 50% of sand fraction passing the number 100 sieve

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**FROST CLASSIFICATION LEGEND**

November 2016

32-1-02546



**LEGEND**

- \* Sample Not Recovered
- B Auger Cuttings
- ┌ 2" O.D. Split Spoon Sample
- ▽ Ground Water Level At Time Of Drilling
- ▼ Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill

- Water Content (%)
- Plastic Limit —●— Liquid Limit
- Natural Water Content

**NOTES**

- The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
- The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
- Water level, if indicated above, is for the date specified and may vary.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**LOG OF BORING B-1**

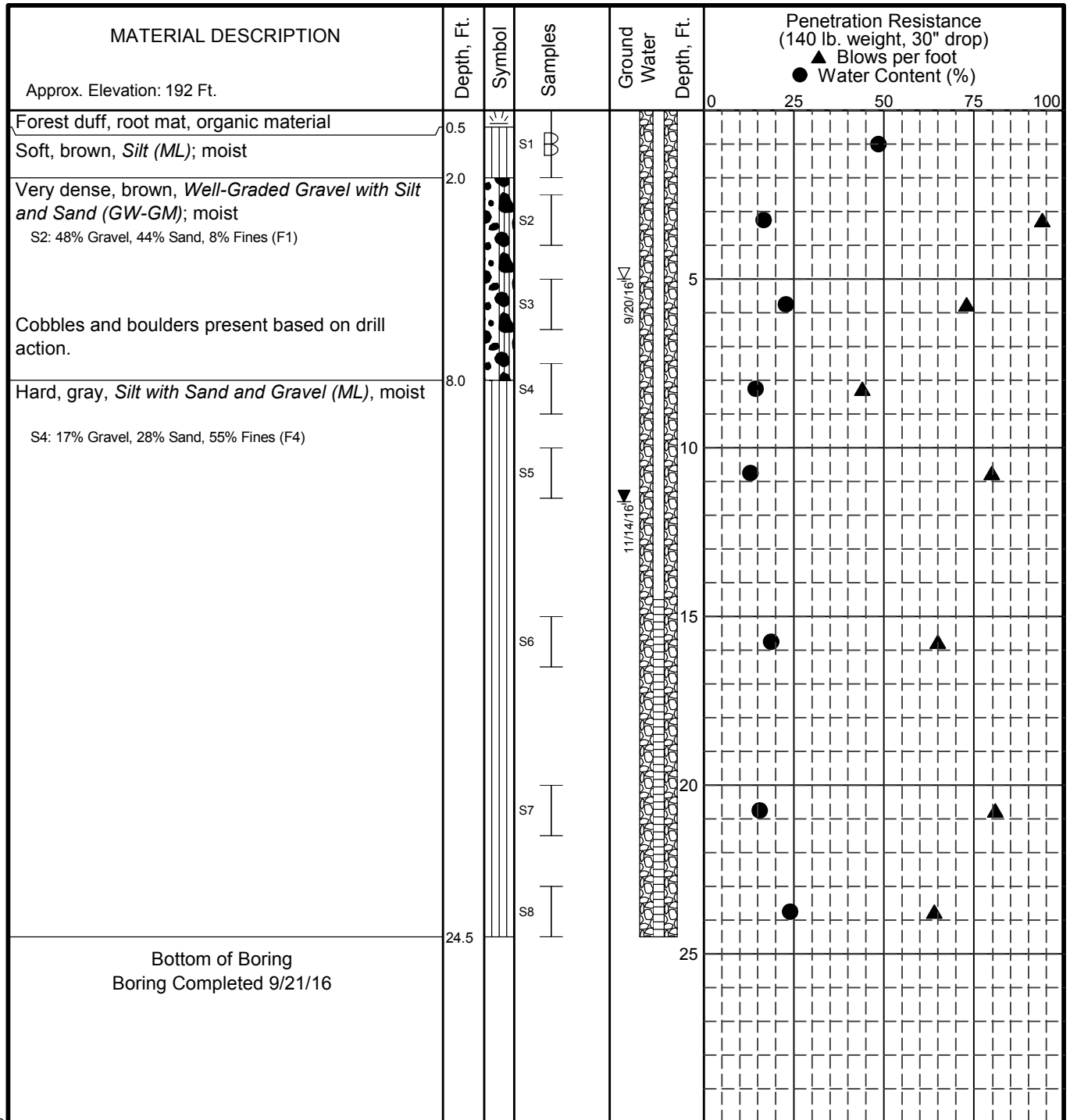
November 2016

32-1-02546

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**FIG. 5**

GEOTECHNICAL LOG 02546 GINT.GPJ S&W GEO1.GDT 11/17/16



**LEGEND**

- \* Sample Not Recovered
- B Auger Cuttings
- ┌ 2" O.D. Split Spoon Sample
- ▽ Ground Water Level At Time Of Drilling
- ▼ Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill

- Water Content (%)
- Plastic Limit —●— Liquid Limit
- Natural Water Content

**NOTES**

- The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
- The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
- Water level, if indicated above, is for the date specified and may vary.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**LOG OF BORING B-2**

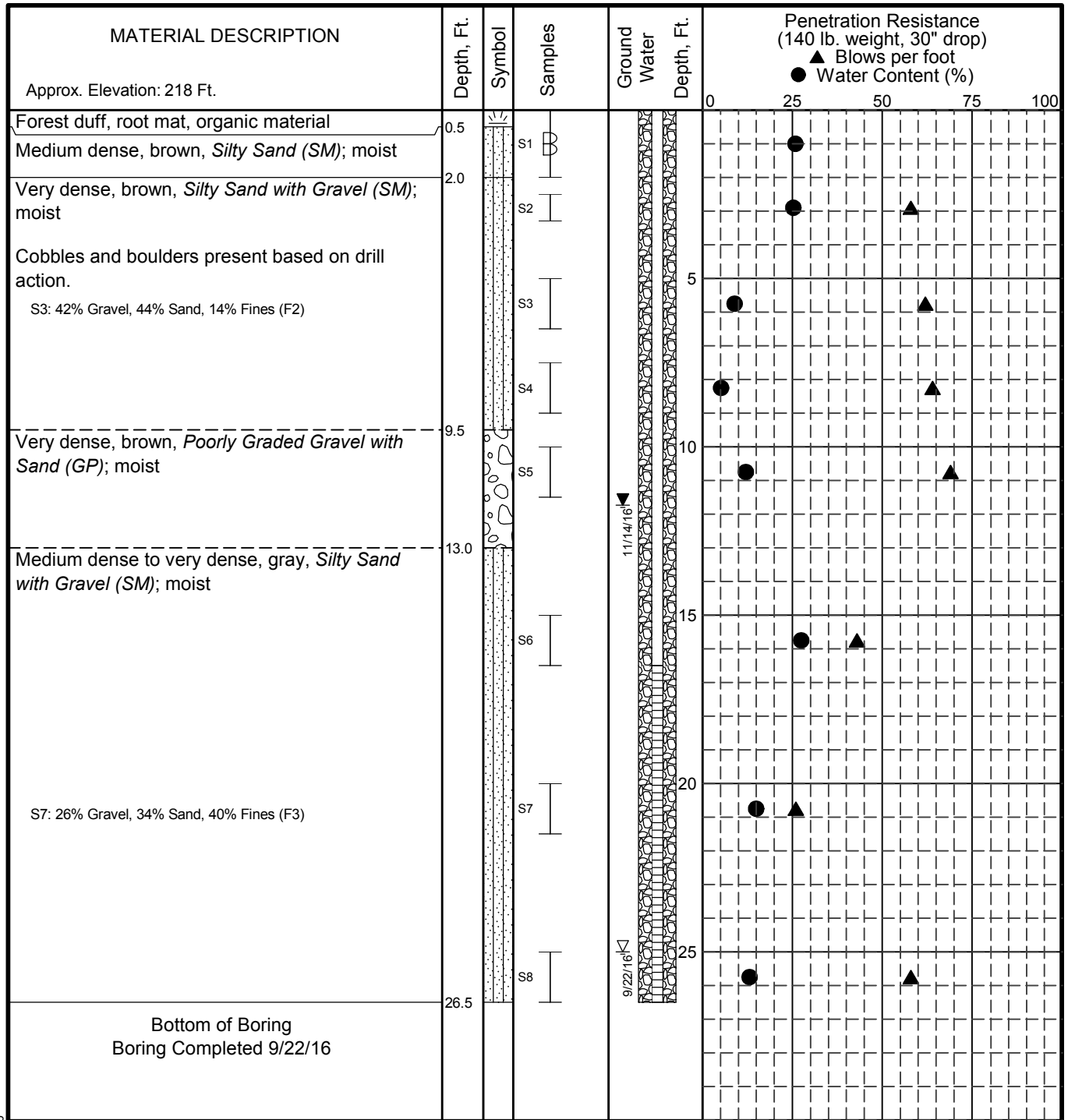
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**FIG. 6**

GEOTECHNICAL LOG 02546 GINT.GPJ S&W GEO1.GDT 11/17/16



**LEGEND**

- \* Sample Not Recovered
- B Auger Cuttings
- ┌ 2" O.D. Split Spoon Sample
- ▽ Ground Water Level At Time Of Drilling
- ▼ Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill

- Water Content (%)
- Plastic Limit —●— Liquid Limit
- Natural Water Content

**NOTES**

- The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
- The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
- Water level, if indicated above, is for the date specified and may vary.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**LOG OF BORING B-3**

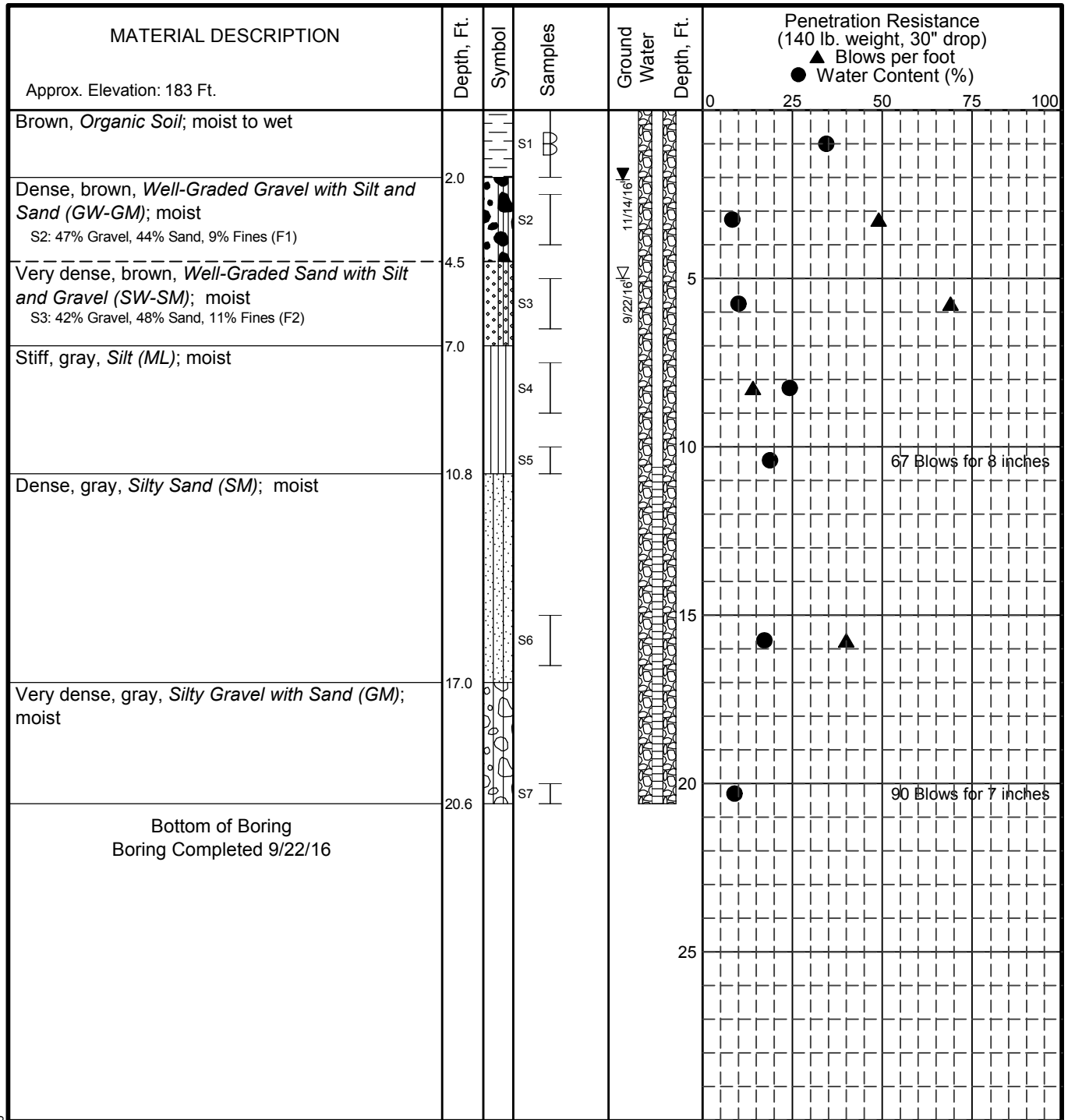
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**FIG. 7**

GEOTECHNICAL LOG 02546 GINT.GPJ S&W GEO1.GDT 11/17/16



**LEGEND**

- \* Sample Not Recovered
- B Auger Cuttings
- ┌ 2" O.D. Split Spoon Sample
- ▽ Ground Water Level At Time Of Drilling
- ▼ Static Water Level
- Blank Section, Cuttings Backfill
- Slotted Section, Cuttings Backfill
- Water Content (%)
- Plastic Limit —●— Liquid Limit
- Natural Water Content

**NOTES**

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**LOG OF BORING B-4**

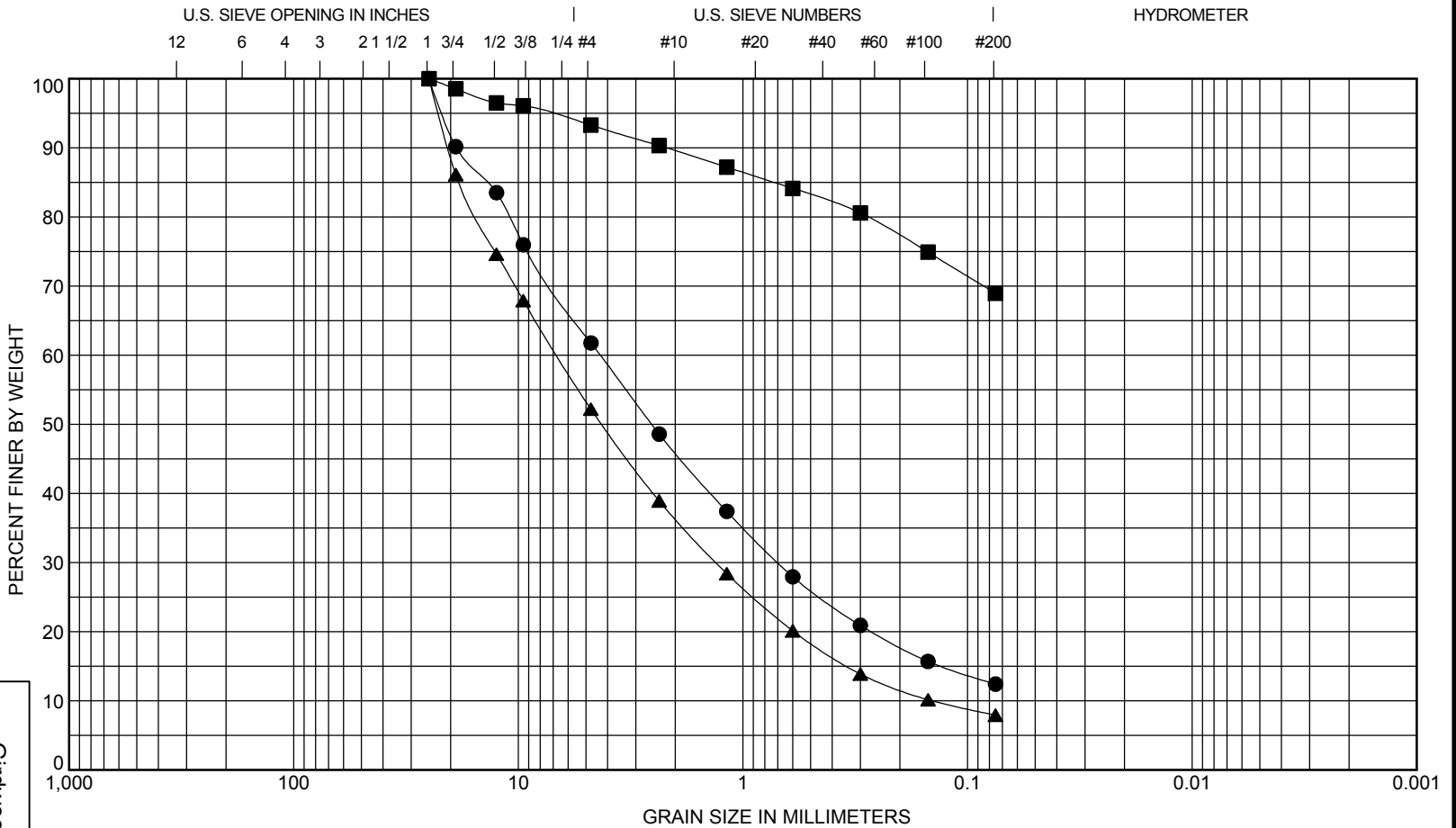
November 2016

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**FIG. 8**

GEOTECHNICAL LOG 02546 GINT.GPJ S&W GEO1.GDT 11/17/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

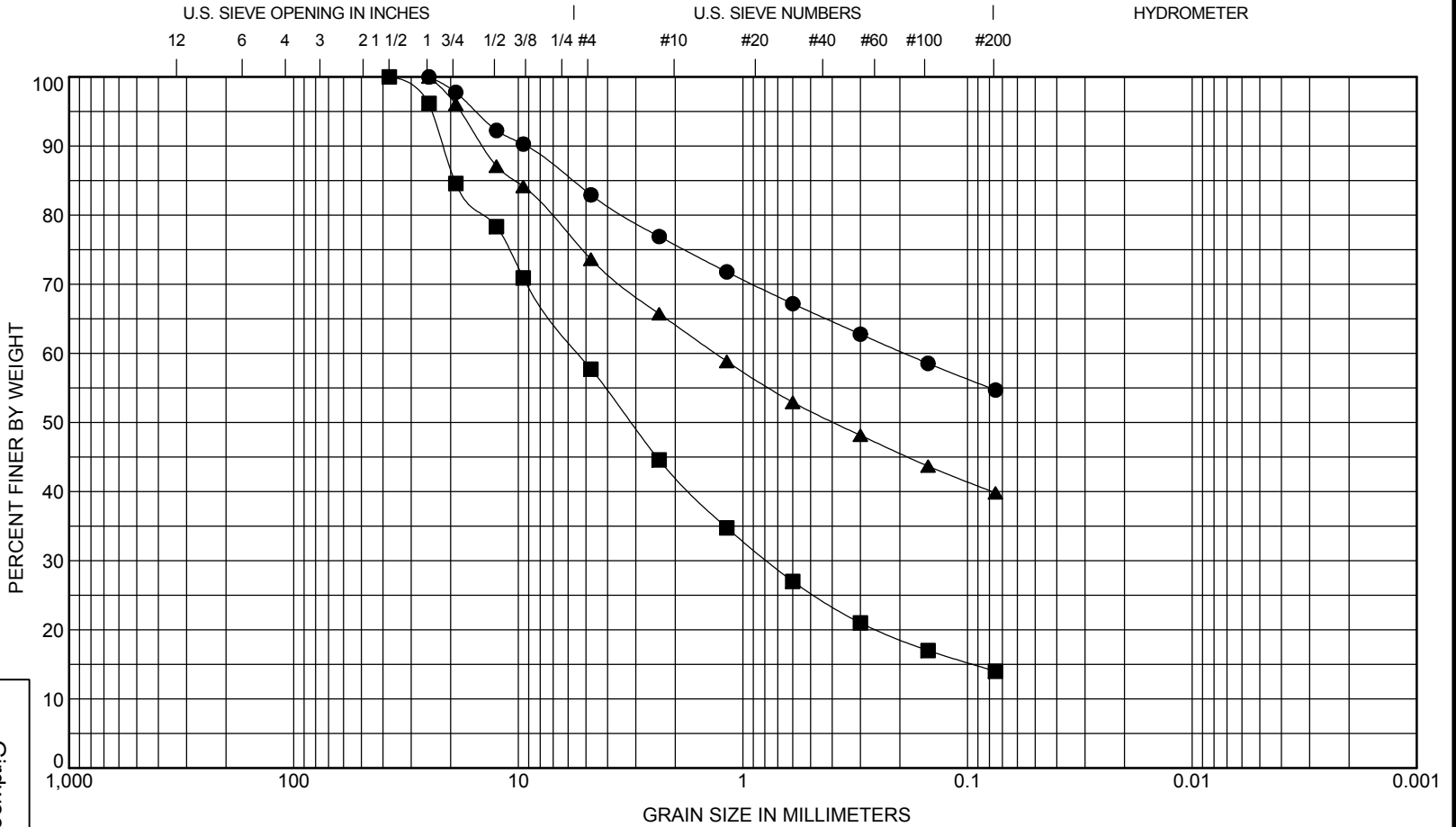
Sample	Depth, Ft	Classification					LL	PL	PI	Cc	Cu
● B-1 S3	5.0 - 6.5	Well-Graded Sand with Silt and Gravel (SW-SM)								2.5	96.0
■ B-1 S6	15.0 - 16.5	Silt with Sand (ML)									
▲ B-2 S2	2.5 - 4.0	Well-Graded Gravel with Silt and Sand (GW-GM)								1.8	46.9
Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-1 S3	5.0 - 6.5	25	4.32	0.7	0.14	38	49	12			
■ B-1 S6	15.0 - 16.5	25	6.7	1.31	0.14	7	24	69			
▲ B-2 S2	2.5 - 4.0	25	6.7	1.31	0.14	48	44	8			

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**GRAIN SIZE CLASSIFICATION**

November 2016

32-1-02546



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Depth, Ft	Classification					LL	PL	PI	Cc	Cu
● B-2 S4	7.5 - 9.0	Silt with Sand and Gravel (ML)									
■ B-3 S3	5.0 - 6.5	Silty Sand with Gravel (SM)									
▲ B-3 S7	20.0 - 21.5	Silty Sand with Gravel (SM)									
Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-2 S4	7.5 - 9.0	25	0.19	0.78		17	28	55			
■ B-3 S3	5.0 - 6.5	37.5	5.35			42	44	14			
▲ B-3 S7	20.0 - 21.5	25	1.33			26	34	40			

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

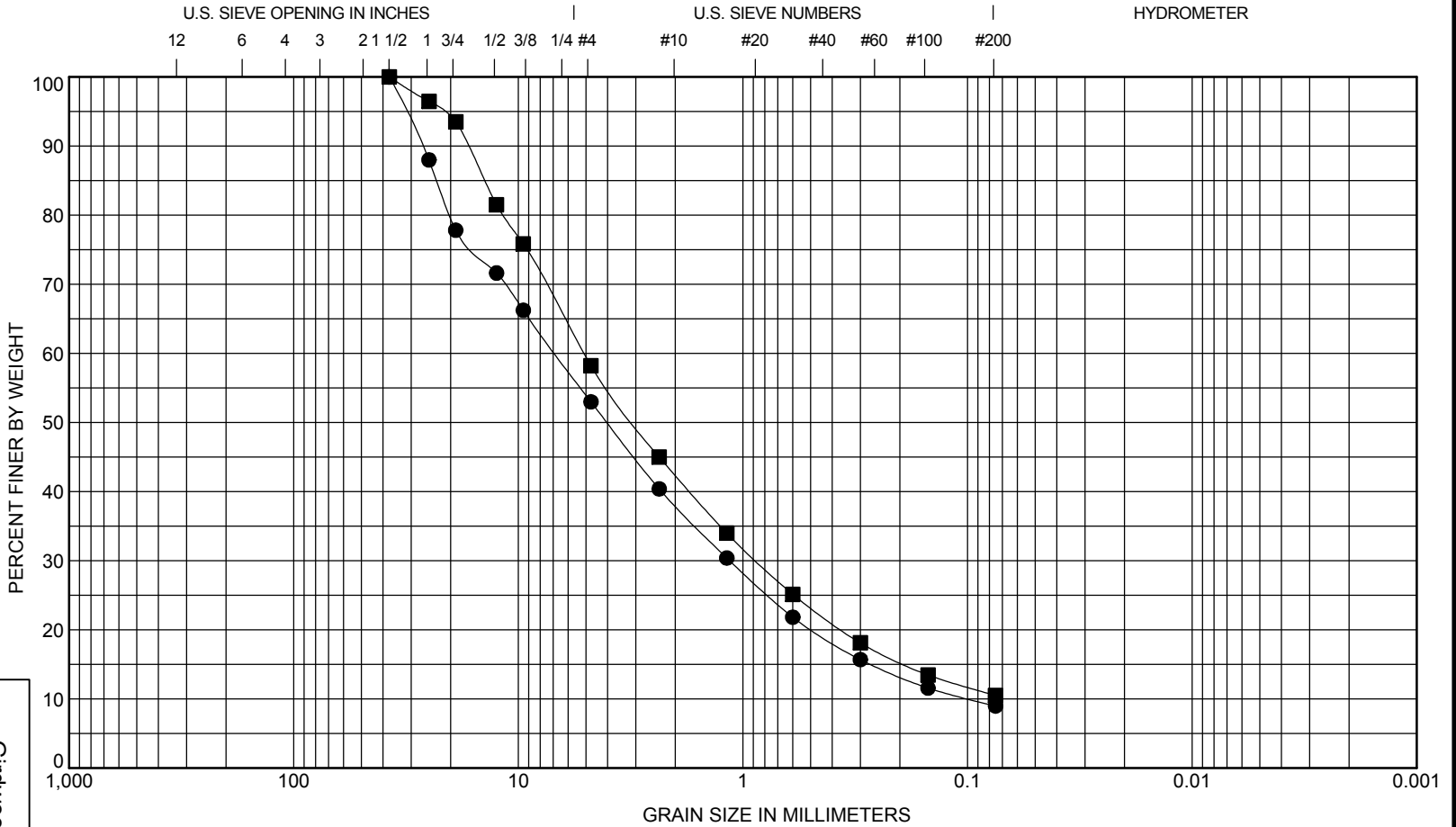
**GRAIN SIZE CLASSIFICATION**

November 2016

32-1-02546

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**FIG. 9**  
Sheet 2 of 3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Depth, Ft	Classification					LL	PL	PI	Cc	Cu
● B-4 S2	2.5 - 4.0	<b>Well-Graded Gravel with Silt and Sand (GW-GM)</b>								1.9	69.6
■ B-4 S3	5.0 - 6.5	<b>Well-Graded Sand with Silt and Gravel (SW-SM)</b>								2.2	76.5

Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-4 S2	2.5 - 4.0	37.5	6.86	1.14	0.1	47	44	9	
■ B-4 S3	5.0 - 6.5	37.5	5.1	0.87		42	48	11	

Girdwood Cemetery Feasibility Study  
Girdwood, Alaska

**GRAIN SIZE CLASSIFICATION**

November 2016

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32-1-02546

FIG. 9  
Sheet 3 of 3

**APPENDIX A**

**IMPORTANT INFORMATION ABOUT YOUR  
GEOTECHNICAL/ENVIRONMENTAL REPORT**



Date: November 2016  
To: CRW Engineering Group, LLC  
Re: Girdwood Cemetery Feasibility Study,  
Girdwood, Alaska

## **Important Information About Your Geotechnical/Environmental Report**

### **CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.**

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

### **THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.**

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

### **SUBSURFACE CONDITIONS CAN CHANGE.**

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

### **MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.**

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

## **A REPORT'S CONCLUSIONS ARE PRELIMINARY.**

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

## **THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.**

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

## **BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.**

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

## **READ RESPONSIBILITY CLAUSES CLOSELY.**

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the  
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland