Memo

Date:	Thursday, January 22, 2015
Project:	Palmer Volcanogenic Massive Supplied Project
To:	Darwin Green, Constantine Metal Resources Ltd.
From:	Zach Halstead, HDR Inc.
Subject:	Expanded Wetland Mapping for the Palmer VMS Project

In August of 2013, HDR, Inc. (HDR), under contract to Constantine Metal Resources Ltd. (Constantine), prepared a Jurisdictional Determination Report (JDR) for a potential access road and exploration site for Constantine's Palmer Volcanogenic Massive Sulphide (VMS) mineral exploration project, located north of Haines, Alaska (HDR 2013). The JDR identified the locations of wetlands and other waters of the U.S. under jurisdiction of the U.S. Army Corps of Engineers (USACE) within a 233-acre project area based on aerial imagery interpretation and field work conducted by HDR in the summer of 2013.

At Constantine's request, HDR has mapped wetlands and other waters of the U.S. within an additional area at the western end of the original mapping corridor, as shown in the attached figure and described in this memorandum. This new office-based mapping effort is based on the field data and mapping presented in the 2013 JDR; no additional fieldwork was performed for this effort. The area was mapped in a Geographic Information System (GIS) database using the methods described in the 2013 JDR. Polygons were attributed with National Wetland Inventory (NWI) codes based on the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). A full description of mapping methods and results can be found in the 2013 JDR (HDR 2013).

Office- Based Mapping Results

The 2015 mapping area comprises an additional 55.1 acres, extending northwest up the steep slope from Glacier Creek and encompassing the area originally mapped in 2013. The attached figure shows the 2015 mapping area, the 2013 mapping area, mapped wetlands and other waters of the U.S., and 2013 data collection points. The field data and photographs collected at these points can be found in the 2013 JDR. No wetlands were mapped in the additional area. Table 1 presents acreages of streams and other waters of the U.S. mapped in the new mapping area, as well as the NWI codes attributed to each.

Table 1. Wetland/Waterbody and Upland Mapping Summary

Mapping Code (NWI)	Description	Acreage Within 2015 Mapping Area
R3UBH	Upper Perennial Stream (Glacier Creek)	1.37
R3USA	Gravel Bars (Glacier Creek)	3.98
	Total wetlands and other waters of the U.S.	**5.35**
U	Uplands (non-wetland, non-water)	49.79
	Total Area	**55.14**

The majority of the new mapping area is comprised of uplands on a steep, southeast-facing slope above Glacier Creek. The vegetation on this steep slope consists of dense alder (*Alnus sinuata*) thickets, mesic herb communities, (dominated by fireweed [*Chamerion angustifolium*] and cow-parsnip [*Heracleum lanatum*]), and bare, rocky ground. Photo 1, taken from a helicopter at point 072, and the background of Photo 2, taken at point 059, show the dense vegetation and steep topography. Based on a 2013 helicopter flyover of the area, lack of any visible indicators of saturation or surface water, and the steep topography, HDR wetland scientists determined there are no wetlands present on this slope within the study area.

Photo 1: Taken from helicopter above point 072.

Photo 2: Taken from point 059.

The 2015 mapping area contains approximately 1.37 acres of Glacier Creek (R3UBH), as well as approximately 3.98 acres of associated gravel bars (R3USA). As described in the 2013 JDR, Glacier Creek is a tributary to the Klehini River, which flows into the Chilkat River and Chilkat Inlet.

In addition to streams mapped as polygons, streams too small to be mapped as polygons on the aerial photography were mapped as line features. There are two streams mapped as line features within the 2015 mapping area comprising approximately 1,760 linear feet. These intermittent streams are classified as R4SBC (seasonally flooded intermittent riverine streambed). These streams were sections of streams previously identified in the 2013 mapping that were also present in the new area. The majority of these streams were found on the steep slope, while a single stream extended into the new mapping area on the south side of Glacier Creek.

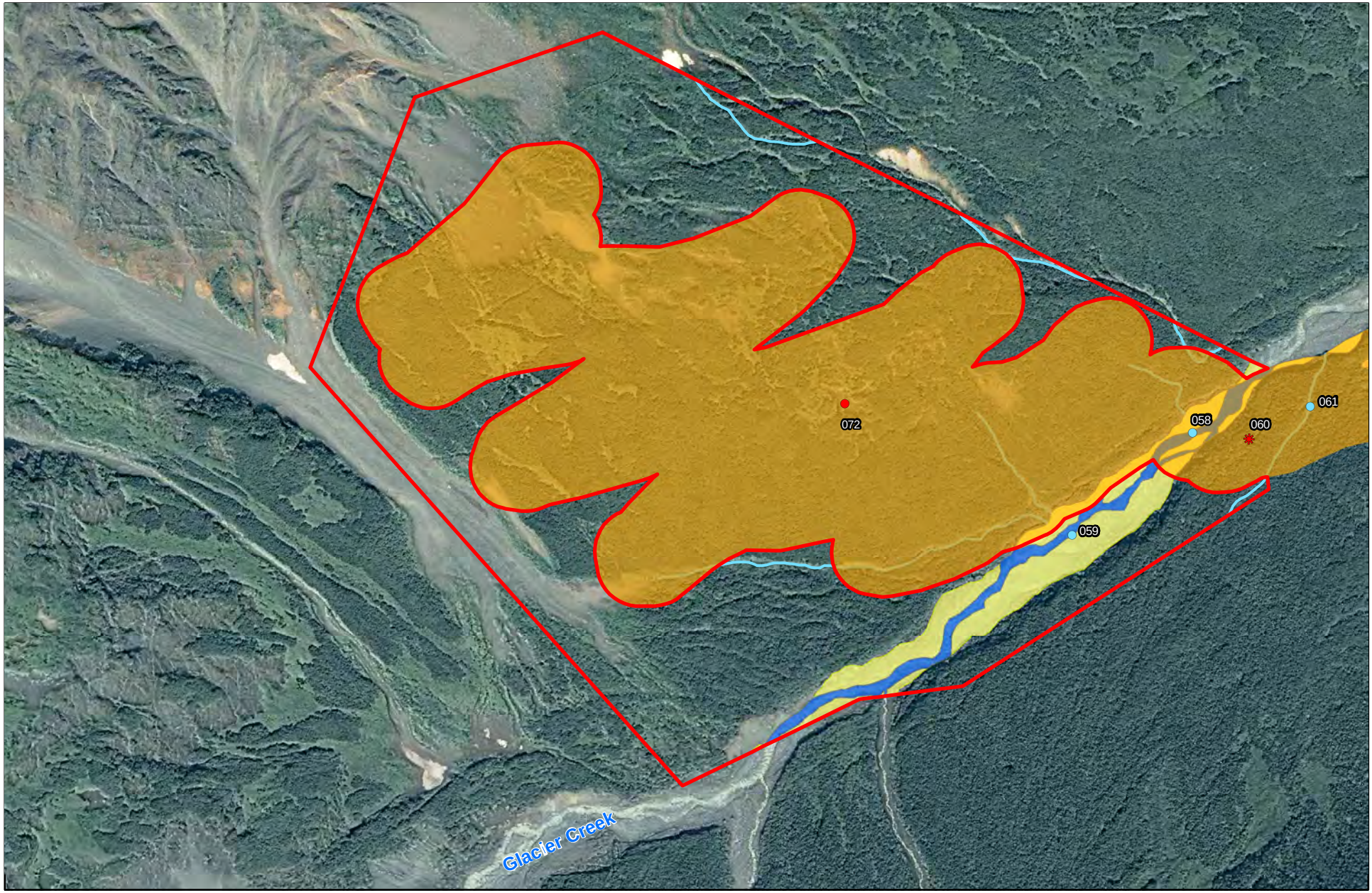
Jurisdictional Status

The 5.35 acres of waters of the U.S. (Glacier Creek and associated gravel bars), as well as the 1,760 linear feet of intermittent streams within the 2015 mapping area are considered relatively permanent waters with a direct surface water connection to Chilkat Inlet, a Section 10 waterbody. All waters of the U.S. mapped within the additional area would be considered subject to USACE jurisdiction under Section 404 of the Clean Water Act.

References

Cowardin, L.M., Carter, V., Golet, F.C., and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, U.S. Fish and Wildlife Service, FWS/OBS-79-31. Washington, D.C.

HDR, Inc. 2013. Wetland and Waterbody Jurisdictional Determination Report, Palmer VMS Project. Prepared for Constantine Metal Resources Ltd. August 2013.



LEGEND

- 2013 Mapping Area (HDR 2013)
- 2015 Mapping Area
- R3UBH - Perrennial Stream
- R3USA - Gravel Bars
- R4SBC - Intermittent Stream

2013 Field Data Points

- Data Form - Upland
- Photo Point - Stream
- Photo Point - Upland

N
W E
S

Feet
0 250 500 1,000

Wetland and Waterbody Mapping
2015 Mapping Area

Palmer VMS Project
Constantine Metals Resources Ltd.
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Prepared by HDR