

## 27. GEOLOGY

### 27.1 Introduction

This chapter discusses the baseline study of geology characteristics for the Cook Inlet drainages study area. The study area is in the southern part of the Alaska Range physiographic division, as defined by Detterman and Reed (1973). The Cook Inlet drainages study area is shown on Figure 1-4 in Chapter 1.

The geology study in the Cook Inlet drainages was based on a review of published information, a previous offshore site investigation program, and a surficial geology assessment using interpretation of aerial photographs. The offshore site-investigation program included primarily the collection of geological data from drillholes and geophysical surveys in Iniskin and Iliamna bays.

### 27.2 Results and Discussion

#### 27.2.1 Surficial Geology

U.S. Geological Survey mapping indicates that the study area consists of predominantly exposed bedrock from the shoreline to the ridge tops, with scattered talus deposits on the slopes. There are scattered moraine deposits on the upper slopes from Pleistocene glaciation and Holocene glaciers. Mass movement deposits of talus and rubble are scattered on the exposed bedrock of the upper slopes. Holocene alluvial deposits are located in the Y Valley, which runs through the peninsula between Iliamna and Iniskin bays. The northernmost shoreline of Iliamna Bay and the shoreline north of Knoll Head have Holocene estuarine silt deposits in the tidal flat area, where bedrock does not make up the shoreline (Detterman and Reed, 1973).

Surficial geology along the existing road from Pile Bay to Williamsport is composed of predominantly lake-terrace deposits and alluvium, with some weathered bedrock and talus deposits at the base of the valley slopes. Weathered bedrock and talus become the predominant deposits encountered at the coastline.

Geophysical measurements and samples of the surficial and subsurface materials taken by the U. S. Army Corps of Engineers at Williamsport and Iliamna Bay indicate that the depth to bedrock ranges from approximately 130 to 200 feet in the tidal flat area and is mainly overlain by fine-grained sediments. The depth to bedrock in the vicinity of the existing landing at Williamsport is shallower, ranging from approximately 65 to 130 feet deep (USACE, 1995).

Iliamna Bay tidal deposits consist primarily of clays, silts, and fine sands. The deposits are black in color, indicating the presence of organic matter. These tidal deposits also contain angular gravel, as well as occasional cobbles and boulders. The existing tidelands have scattered, large boulders protruding from the tidal flats and also have higher gravel content closer to the existing

landing at Williamsport. A gravelly subgrade is exposed along the natural tidal-drainage channels. The coastline of Iliamna Bay consists of weathered bedrock and talus deposits.

The surface and subsurface materials in Iniskin Bay are composed of unconsolidated sediments that increase in thickness from the shoreline to the main channel. Coarse-grained sediment with cobbles and boulders mantle the shoreline. Sediment in the main channel was interpreted to be medium to fine-grained. The measured thickness of unconsolidated sediment ranges from 30 to 35 feet in the main channel and 10 to 15 feet along the shoreline; however, the depth to bedrock may be deeper because the maximum range of measurement of the side-scan sonar survey was 15 feet in unconsolidated, fine-grained sediments and 35 feet in unconsolidated, coarser sediments. There was no evidence of rock outcrops on the bay floor (Golder, 2005).

### **27.2.2 Bedrock Geology**

The exposed bedrock that makes up the rugged mountains along the Cook Inlet shoreline is predominately Middle and Late Jurassic sedimentary rocks. The sedimentary rocks are marine in origin and contain numerous fossils. These rocks are part of the Tuxedni Group and the Chinitna and Naknek Formations (Detterman and Reed, 1973).

### **27.2.3 References**

- Detterman, R.L., and B.L. Reed. 1973. Surficial Geology of the Iliamna Quadrangle, Alaska. U.S. Department of the Interior. Geological Survey Bulletin # 1368-A.
- Golder Associates Inc. 2005. Bathymetric and Geophysical Survey—Iniskin Bay, Alaska. Ref. No. 053-5727. August.
- U.S. Army Corps of Engineers (USACE). 1995. Navigation Channel Feasibility Report and Environmental Assessment, Williamsport, Alaska. Anchorage, Alaska. December.

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Bedrock outcrop in Cook Inlet drainages study area.



Tidal flats in Iliamna Bay.