



ENVIRONMENTAL BASELINE STUDIES

PRELIMINARY SUMMARY STUDIES PERFORMED BY HDR ALASKA, INC. WETLANDS STUDIES, TRANSPORTATION CORRIDOR

The Pebble Project wetlands study was initiated in April of 2004 when Northern Dynasty Mines Inc. (NDM) contracted with Three Parameters Plus (3PP) of Palmer, Alaska, to perform studies of the area surrounding the potential mine location and with HDR Alaska Inc. (HDR) of Anchorage to perform studies of the potential transportation corridor. To help ensure consistency across the two study areas, 3PP developed the methods and support tools that both 3PP and HDR use. The studies for the area surrounding the mine are described in a separate summary prepared by 3PP.

Understanding the location and types of wetlands and other “waters of the United States,” as defined under Section 404 of the Clean Water Act (404), is an important component of planning any development in Alaska. The regulations in Section 404 require an extensive analysis of development options to determine the range of practicable alternatives for each project component. Proponents of large developments must provide mapping of areas in and around their development, as well as documentation to support that mapping.

The objective of the wetlands study for the transportation corridor and port is to collect baseline data necessary to prepare and submit a legally defensible preliminary jurisdictional determination to the regulatory branch of the U.S. Army Corps of Engineers (USACE). This document will be prepared and submitted to the USACE when project plans and alternatives have been adequately defined and evaluated. Another important objective is to collect the information needed to assess effects to wetlands that might result from development and operation of the road and port.

1. MAPPING OF JURISDICTIONAL WETLANDS, VEGETATION, AND HYDROGEOMORPHIC CLASS

Pebble Project wetland scientists are preparing a detailed basemap layer in the project geographical information system (GIS) by delineating major vegetation types on a digital ortho-rectified, true-color aerial photography base. Each polygon of vegetation that is delineated is assigned codes which reflect its

regulatory status under the Clean Water Act, its vegetation type according to the Alaska vegetation classification system, its wetland hydrogeomorphic (HGM) class, and its wetland Cowardin class. This GIS layer, when completed, is expected to have literally tens of thousands of polygons, because of the complexity of the terrain and the mosaic nature of the vegetation in this area of Alaska.

2. STUDY AREA

The wetlands study area for the transportation corridor and port consists of an approximately 3,300-foot-wide corridor centered on the preferred road alignment and potential port sites and adjacent potential development areas in Iniskin and Iliamna bays (Figure HDR-5). More than 30,000 acres will be mapped in detail as part of the wetlands assessment of the transportation corridor.

For the purpose of baseline data collection, the transportation corridor was divided between two consultants—HDR and 3PP. The dividing line is at the Newhalen River, with HDR studying the corridor from the Newhalen River to the preferred port site at Cook Inlet.

The study area also includes several alternative routes, and baseline data were collected along all the following alternative routes:

- A northern route (Alternative D) from the Newhalen River to Roadhouse Mountain.
- A southern route (Alternative E) from the Newhalen River to Roadhouse Mountain.
- One route from Roadhouse Mountain to the Pile Bay area (Alternative F).
- A southern route (Alternatives H, I, J, and K) from the Pile Bay area to Iliamna Bay of Cook Inlet, with two variations, a western route (Alternative J) and an eastern route (Alternative I).
- A northern route (Alternative G) from the Pile Bay area to Iniskin Bay of Cook Inlet.

3. FIELD DATA COLLECTION AND MAP VERIFICATION

Each summer since the program began, two-person teams consisting of wetland scientists (including specialists in the fields of botany, soil science, and hydrology) and field technicians have collected site-specific data across a variety of vegetation types and landforms across the study area. While a number of different types of evaluations or plot types are used, most areas sampled yield the following types of data:

- Vegetation composition—detailed lists of plants found, percent-cover estimates.
- Soil descriptions—soil-survey type detail for the top 20 to 24 inches of soil.
- Hydrologic observations—indicators of flooding, saturation, etc.
- Wildlife observations—trails, sign, direct observations.
- Engineering concerns—thixotropic soils, steep grades, organic soils, etc.
- Wetland status according to the 1987 USACE manual and, for areas evaluated during the 2006 field season, wetland status according to both the 1987 and 2006 Alaska Interim Regional Supplement delineation manuals.
- Photographs of vegetation, soils, and where present, hydrologic features.

- For areas that meet the regulatory definition of a wetland, additional data are collected related to the primary functions that the wetland provides. These include classifying the wetland according to its hydrogeomorphic class, water pH data, and in the mine study area, specific conductivity of water to document its source.

4. INTEGRATED RELATIONAL DATABASE APPLICATION

Data collected as part of the Pebble Project wetlands study are entered into a web-based relational database, which is integrated with other project data. The wetlands application will ultimately provide regulators and other project data reviewers with an efficient platform to evaluate and query the thousands of field data forms and tens of thousands of site photographs. Currently data in the database are extracted to support GIS mapping and analysis; however, in time the two may be more directly integrated. However, all wetland scientists working on the mapping effort have direct access to field photographs and the basic data about each site at their fingertips during the mapping process.

5. QUANTITATIVE FUNCTIONAL ASSESSMENT

Wetland functional-assessment data are being collected using a methodology proposed by the NDM team and approved for use by the USACE project manager. The method being used is based on each wetland's hydrogeomorphic classification and evaluates the degree to which each wetland currently contributes to eight individual functions with which wetlands in glacial terrain are typically associated. Each wetland evaluated receives a rating for the associated function, also called the functional capacity index, which can then be multiplied by the size of the wetland to get a total "score" for that function. Site-specific data will not be collected in every wetland in the mapping area; however, every wetland will be rated and scored by extrapolating results from field-evaluated areas to areas with the same HGM class, vegetation type, landform, and other site-specific characteristics. In the event a particular wetland would be lost due to mine development, compensatory mitigation, typically in the form of the specific function lost, will ultimately be proposed to offset that loss. This undertaking, while only in its beginning stages, is referred to as the project's compensatory mitigation plan.