



**DRAFT ENVIRONMENTAL BASELINE STUDIES  
2005 STUDY PLANS**

**CHAPTER 17. VISUAL AESTHETICS**

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## ACRONYMS

AASHTO	American Association of State and Highway Transportation Officials
ABA	acid base accounting
ACHP	Advisory Council on Historic Preservation
ACLS	alternative cleanup levels
ADEC	Alaska Department of Environmental Conservation
agl	above ground level
AHRS	Alaska Heritage Resource Survey
APE	area of potential effect
ARD/ML	acid rock Drainage/metal leaching
ASCI	Alaska Stream Condition Index
BEESC	Bristol Environmental & Engineering Services Corporation
BMR	baseline monitoring report
CAD	computer-aided drafting
CC	comprehensive stations with continuous stage monitoring
CIR	color infrared
CWOC	comprehensive stations without continuous Stage monitoring
DECD	Alaska Department of Economic and Community Development
DEM	digital elevation model
DNR	State of Alaska Department of Natural Resources
DO	dissolved oxygen
DOT&PF	State of Alaska Department of Transportation & Public Facilities
DQOs	data quality objectives
EC	environmental consequences
EIS	environmental impact statement
EPA	Environmental Protection Agency
EBD	environmental baseline document
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FSP	field sampling plan
GIS	geographic information system
GPS	global positioning system
HGM	hydrogeomorphic
IM	initial monitoring station
LDN	Land Design North
LDNPP	Lake Clark National Park and Preserve

mg/L	milligrams per liter
mm	millimeters
MRLs	method reporting limits
NDM	Northern Dynasty Mines Inc.
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic & Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
ORP	oxidation reduction potential
PJD	preliminary jurisdictional determination
PSD	prevention of significant deterioration
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
SHPO	State Historic Preservation Officer
SOPs	standard operating procedures
SWANCC	Solid Waste Agency of Northern Cook County v. U.S. Army Corp of Engineers
SWE	snow-water equivalent
TIN	triangulated irregular network
TPH	total petroleum hydrocarbons
USACE	United States Army Corp of Engineers
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
WMP	water monitoring plan

## 17. VISUAL AESTHETICS

This section describes the visual aesthetics assessment being undertaken by Land Design North (LDN) to determine impacts of proposed facilities and infrastructure improvements proposed by Northern Dynasty Mines Inc. (NDM). Facilities and infrastructure generally include the mine and its associated operation and storage areas, processing facilities, tailings ponds, roadways, and possible slurry pipeline. Two other major elements are an access road and port on Cook Inlet, and a power-transmission line.

### 17.1 Objectives of Study

The objective of the visual aesthetics assessment is to collect data concerning existing visual conditions and the context of those conditions and to combine that information with an evaluation of the sensitivity of the residents and visitors (constituents) to provide a baseline for the analysis of the potential impacts that the Pebble Project may have on visual aesthetics.

### 17.2 Proposed Study Plan

#### 17.2.1 Study Area/Scope

The scope of the project includes all areas that are affected by the proposed project and those areas which potentially have views of areas disturbed by site construction or operations. In general, this will include the coastline of Cook Inlet including the Iniskin Peninsula, communities along the proposed road and power-transmission-line corridor; the proposed area of the mine and appurtenant structures; and communities and recreation sites along the coastline of Lake Iliamna and along the Newhalen River, Upper and Lower Talarik creeks, and the South Fork Koktuli River. Also, Port Alsworth and communities and recreation sites along Lake Clark and Sixmile Lake will be studied, as will locations along the southern edge of Lake Clark National Park and Preserve.

#### 17.2.2 Methods/Approach

The study will employ methods for scenery management assessment that are typically used by the U.S. Department of Agriculture (USDA), Forest Service as described in *Landscape Aesthetics: A Handbook for Scenery Management* (Agriculture Handbook Number 701). This handbook provides for definition of landscape units based on landscape character types, evaluation of scenic integrity, and evaluation of scenic attractiveness. Residents and visitors to the study area are evaluated for their sensitivity to changes in the landscape, and their location relative to specific viewed areas is determined in terms of landscape visibility or “distance zones.” The evaluations will be mapped using a geographic information system (GIS) to correlate mapped information with that of other studies.

As an additional step in the evaluation, project elements will be simulated using computer-aided drafting (CAD) and graphic software to approximate what project elements might look like should the project be constructed. This will provide the ability to determine the relative disturbance to landscape aesthetics from key viewpoints.

## 17.2.3 Major Activities

### 17.2.3.1 Collection of Information (Complete)

Digital elevation model (DEM) information has been collected, and from that a triangulated irregular network (TIN) has been constructed in an ARCVIEW GIS. This will be used to model viewsheds/shadowing from the mine and from various viewpoints that are determined through the constituent analysis. Also, the TIN will serve for the mapping, analysis, and presentation of other landscape visibility information.

### 17.2.3.2 Determination of Constituents (Partially Complete)

LDN has and will continue to interview NDM personnel most familiar with the project area to determine key constituencies that could be affected by project construction or operation. LDN will seek to determine the sensitivity that each constituent or constituent group may have towards changes to landscape that may result from the project. Key constituents could include, but are not limited to, the following:

- Visitors to Lake Clark National Park and Preserve (LCNPP).
- Other recreational visitors to the affected area.
- Communities within the affected area.
- Lodges.
- Air traffic.
- Boat traffic.
- Subsistence users.

Beyond discussions with NDM personnel, LDN personnel will contact other resource analysts (such as socioeconomic and subsistence analysts) on the project team to identify users in these or other categories that may be sensitive to changes to the landscape that may result from the project.

### 17.2.3.3 Site Visit and Documentation (Partially Complete)

Based on the identification of constituents and key viewpoints, LDN personnel have flown the mine site, transportation route, port site, and other key areas to document existing features and key viewpoints. That site visit included helicopter travel to the following sites and documentation of landscape character and views at each respective site:

- Nondalton/Iliamna Road at a height characteristically used by those traveling via airplane.
- Possible road routes from the Newhalen River to the proposed mine site.
- Ridges overlooking the mine site.
- Elevations above the proposed locations of mine-site facilities (e.g., pit, mill, tailings ponds) where air traffic might occur.
- Upper and Lower Talarik creeks.

- Northern Lake Iliamna shoreline at an altitude typically used by guides/sightseers.
- Pedro Bay.
- Islands south of Pedro Bay.
- Proposed road alignment between Pedro Bay and Pile Bay.
- Pile Bay.
- Pile Bay to Williamsport Road.
- Four potential port sites.
- Proposed northern road route (Iliamna River) option.
- Ridge above the termination of Knutson Creek in LCNPP.
- Ridge between Canyon Creek and Chekok Creek in LCNPP.
- Unnamed ridge west of Chekok Creek in LCNPP.
- Roadhouse Mountain.

The site visit to and documentation of the alternative power-transmission corridor that would cross the Iniskin Peninsula remains to be done. LDN personnel will fly to the location and document existing visual conditions along the proposed route from the proposed landing point for the submarine power line at Seal Point, up the Fitz Creek drainage, and to the port site. Photography will be done using a digital camera and GPS unit.

#### **17.2.3.4 Evaluation and Mapping**

The landscape of the project area and the potentially affected constituencies will be evaluated and mapped with respect to a number of criteria. The criteria used will be based on the USDA Forest Service *Landscape Aesthetics: A Handbook for Scenery Management*. Evaluation will be done with respect to landscape units. Following is a description of the specific components of the analysis.

**Landscape Units** are areas of land that have similar existing landscape attributes with similar ownership and land use. Mapping will reflect differences in these specific attributes. This will be correlated with mapping of vegetation and habitat by other disciplines.

**Scenic Integrity** refers to the condition of or deviations/alterations from the existing landscape character that is valued for its aesthetic appeal. A high scenic-integrity level is a landscape that is unaltered or is at the preservation level. Low or very low scenic integrity is when a landscape has been heavily altered or has maximum modification.

**Concern Level** refers to the degree of public importance placed on landscapes viewed from travel corridors and use areas. There are three levels of concern:

- 1 represents the highest concern.
- 2 is moderate concern.
- 3 represents the lowest level of concern.

Concern levels can also be indicators of the level of interest that people are likely to have in the surrounding landscape or setting.

*Scenic Attractiveness and Landscape Visibility* are the two scenic classes. Scenic attractiveness measures the scenic importance of a landscape based on human perceptions of the intrinsic beauty of a landform, vegetation pattern, and cultural land use. There are three classes of scenic attractiveness: A —distinctive, B — typical or common, and C — indistinctive.

Landscape visibility (or distance zones) refers to the distance from which a view can be seen. There are three distance zones: foreground (fg), middleground (mg), and background (bg). At the immediate foreground of 0 to 300 feet, people can distinguish individual leaves, flowers, twigs, bark texture, and small animals and can notice movements of vegetation in light wind. At the foreground distance of 0 to 0.5 miles, people can distinguish tree trunks, large branches, individual shrubs, wildflowers, medium-sized animals and medium to large birds. At the middleground (0.5 to 4 miles), people can distinguish individual tree forms. At the background distance (4 miles to the horizon), people can distinguish groves or stands of trees, and the landscape has been simplified at this distance. Landscape visibility can be evaluated to a large extent using computers and documenting seen and unseen areas and the distance zones from locations of sensitivity.

#### **17.2.3.5 Examination of Proposed Changes to Affected Environment**

The TIN that was created from the digital elevation model will be modified to reflect changes in the proposed project. This will allow an evaluation of how alterations to the existing features may or may not be seen by specific constituents. As an example, though an area may not be seen from the air under existing conditions, the area may be seen once a dam and lake are constructed. The TIN will be modeled to reflect proposed changes.

Changes to the existing environment will be described in terms of their visual context, examining issues of massing, color, contrasts, textures, and patterns. This will include an evaluation both of the existing landscape character and of the proposed facilities in these terms.

A second step of this evaluation will be an interview of appropriate NDM personnel to gain an understanding of impacts that may be generated by routine operations. Issues of concern include generation of fugitive dust at the site and on the roads, steam or other plumes, and movement that may be detectable at far distances, though the source of the movement may not be readily apparent. Movement may be a specific issue with respect to LCNPP lands and air traffic that have only distant views of public facilities.

#### **17.2.3.6 Simulation of Proposed Changes**

LDN will provide visual simulation of up to six images of project facilities from key viewpoints. Simulations will be based on project photos taken from the initial field trip. Project images will be either hand- or computer-constructed images of the project facilities imposed over the existing landscape for key photo locations. This step will require coordination and review of the rendered images with NDM personnel. Also, the extent and number of images will require discussion prior to the development of the images.

### **17.2.3.7 Evaluation of Visual Impacts**

The evaluation of changes to the existing landscape character will include an examination of proposed project components with respect to the ability of the landscape to accept change. This evaluation is based on the “seen areas” and distance zones as determined by computer analysis, the scenic integrity, and the magnitude of change to existing scenic attractiveness. Within this will be an analysis of vegetation, soils colors, and other landscape attributes, an analysis the ability of these components to accept change, a description of the effect of the change, and a description of the effect to constituents.

As part of this analysis, LDN will assist NDM with evaluation of avoidance, minimization, and mitigation options. Work will include the evaluation of seen areas from different viewpoints, analysis of the location of facilities and infrastructure, and the evaluation of design options to minimize impacts. This will be provided on an as-needed basis as facility design progresses.

## **17.3 Deliverables**

The following deliverables will be prepared:

- 2004 progress report.
- 2005 plan of study.
- Initial environmental evaluation report.