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Memorandum

Date: July 15, 2008

To: Alan Schuler, ADEC

From: Courtney Taylor and Pete Miller, ENSR

Subject: NPT No. 18-3001-14-2A

Task 1: Task 1 Deliverable - Summary of Terrain Data Coverage for Alaska

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	<u>(ENSR)</u>	<u>(ADEC)</u>		

ENSR Corporation (ENSR) has been contracted by the Alaska Department of Environmental Conservation (ADEC) to test a beta version of the American Meteorological Society/United States Environmental Protection Agency Regulatory Model (AERMOD) terrain processor, AERMAP (hereafter referred to as AERMAP Beta). Unlike the current guideline version of AERMAP (dated 06341) which is capable of reading in only 7.5 minute and 1 degree native format Digital Elevation Model (DEM) data, AERMAP Beta is designed to use 15-minute native format DEM as well as seamless National Elevation Dataset (NED) digital terrain data.

The first project task is to determine the coverage of terrain data readily available for Alaska. For Task 1 ENSR investigated coverage of both DEM and NED data. Both datasets are produced by the United States Geological Survey (USGS).

Table 1 provides a summary of the Task 1 findings. Additional discussion is provided below.

Data Coverage

Data coverage for 7.5-minute and 15-minute DEM data was reviewed using a mapping “viewer” produced by the USGS¹ (note that data are not available for download at this site). The viewer depicts a map of the coverage of DEM data, allowing the user to select the DEM data type (7.5 minute, etc.), and indicates the quality of data available (Level 1, which is the lowest quality, Level 2, etc²). The accuracy of the viewer was spot checked by randomly selecting DEM files to download (see Table 1 for a listing of web sites where data are available for download).

¹ <http://statgraph.cr.usgs.gov/viewer.htm>

² Information on DEM data quality can be found at <http://rockyweb.cr.usgs.gov/nmpstds/demstds.html>

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NED coverage was investigated using the USGS seamless website¹ where data can also be downloaded. NED data is derived from DEMs. However, NED has been heavily processed to remove boundary errors, unify the coverage and coordinate system (e.g. “seamless”), and filtered to reduce banding artifacts common in DEM data.

7.5-minute DEM Data

Based on information from the USGS viewer, limited areas of Alaska have 7.5 minute DEM data coverage, namely the area surrounding Anchorage and Tyonek. Data quality for these DEMs is Level 1.

15-minute DEM Data

Based on information from the USGS viewer, the majority of Alaska has 15-minute DEM data coverage. The Alaska mainland has high-quality Level 2 DEM coverage. Small areas of the state are only Level 1 data quality coverage: namely the southeast portion of the Alaska Peninsula (Juneau and Ketchikan region), and the coastal area surrounding Kotzebue Sound. There are no 15-minute DEMs for the Aleutian Islands west of Unalaska Island. Additionally, it appeared that small areas along the Canadian border may have data gaps where a DEM block ends a mile or two before the Canadian border and no Alaska DEM spans the border.

1-degree DEM data

ENSR was unable to find any on-line viewers that show 1-degree DEM data coverage. To get an idea of data coverage a map of 1-degree topographic map block names (see Figure 1 and the attached higher-resolution figure) was used to randomly select 1-degree DEMs for download from the USGS website. Of the 154 possible blocks in Alaska, 25 were randomly downloaded to verify that the entire block was available. All of the 25 randomly-selected blocks were covered by 1-degree DEMs, indicating that there is 1-degree DEM data coverage for virtually the entire state. However, from previous project work ENSR is aware of at least two gaps in 1 degree DEM coverage (Phillip Smith Mountains Central and East). In addition, there are areas over the Aleutian Islands where part of the 1-degree block is not available, but these areas do not fall over landmasses.

National Elevation Data

A review of the national seamless data website indicates that there is full NED data coverage over the entire state of Alaska. Trial downloads of NED data demonstrate that this data is easily available and has full coverage, although it is slower to download than DEM data.

Summary

Due to the paucity of 7.5-minute DEM data for Alaska, the use of the guideline version of AERMAP is currently constrained to areas with 1-degree DEM coverage. Based on our review, it appears that there is generally very good coverage of 1-degree DEM data throughout the state, with the Phillip Smith Mountains blocks being the only exception identified in this review. There is the possibility that additional areas exist which lack 1-degree DEM data that were not identified in our review. There is

¹ http://seamless.usgs.gov/faq/ned_faq.php

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generally sufficient coverage of 15-minute DEM data for the Alaska mainland; however, coverage is sparse over the western Aleutian Islands. The entire state of Alaska has NED data coverage.

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Table 1: Summary of available Alaska digital elevation data

Data Type	Resolution	Quality ¹	Coverage	Available From:
7.5 minute DEM	30-meter	Level 1	Limited to areas near Anchorage and Tyonek	Data: http://agdc.usgs.gov/data/usgs/to_geo.html Viewer: http://statgraph.cr.usgs.gov/viewer.htm
15-minute DEM	3 arc-seconds (longitude) by 2 arc-seconds (latitude)	Level 2 (most of AK) Level 1 (areas near Kotzebue Sound and Juneau-Ketchikan region)	Entire state except for small areas near AK-Canada border and Western Aleutian Islands	Data: http://agdc.usgs.gov/data/usgs/to_geo.html Viewer: http://statgraph.cr.usgs.gov/viewer.htm
1-degree DEM	3 arc-seconds (longitude) by 6 arc-seconds (latitude) (between 50 N and 70 N), or 9 arc-seconds (latitude) (above 70 N)	Unknown	Almost the entire state. ENSR is aware of only two areas where 1 degree DEM data are not available (Philip Smith Mountains East and Central).	Data: http://agdc.usgs.gov/data/usgs/to_geo.html Data: http://edcftp.cr.usgs.gov/pub/data/DEM/250/Alaska/ Data: http://www.webgis.com/terr_pages/terr_dem1_ak.html Viewer: not available
NED	2 arc-seconds	Dependent on original DEM data used to construct NED dataset	Entire state	Data: http://seamless.usgs.gov/ Viewer: http://seamless.usgs.gov/

¹ DEM Data: see <http://statgraph.cr.usgs.gov/viewer.htm> and <http://rockyweb.cr.usgs.gov/nmpstds/demstds.html>. DEM data quality may vary depending on whether the data file was originally in native DEM format, or was converted from Spatial Data Transfer Standard (SDTS) format to native format.

NED Data: http://seamless.usgs.gov/faq/ned_faq.php

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Figure 1: Map showing Alaska 1-degree block names

