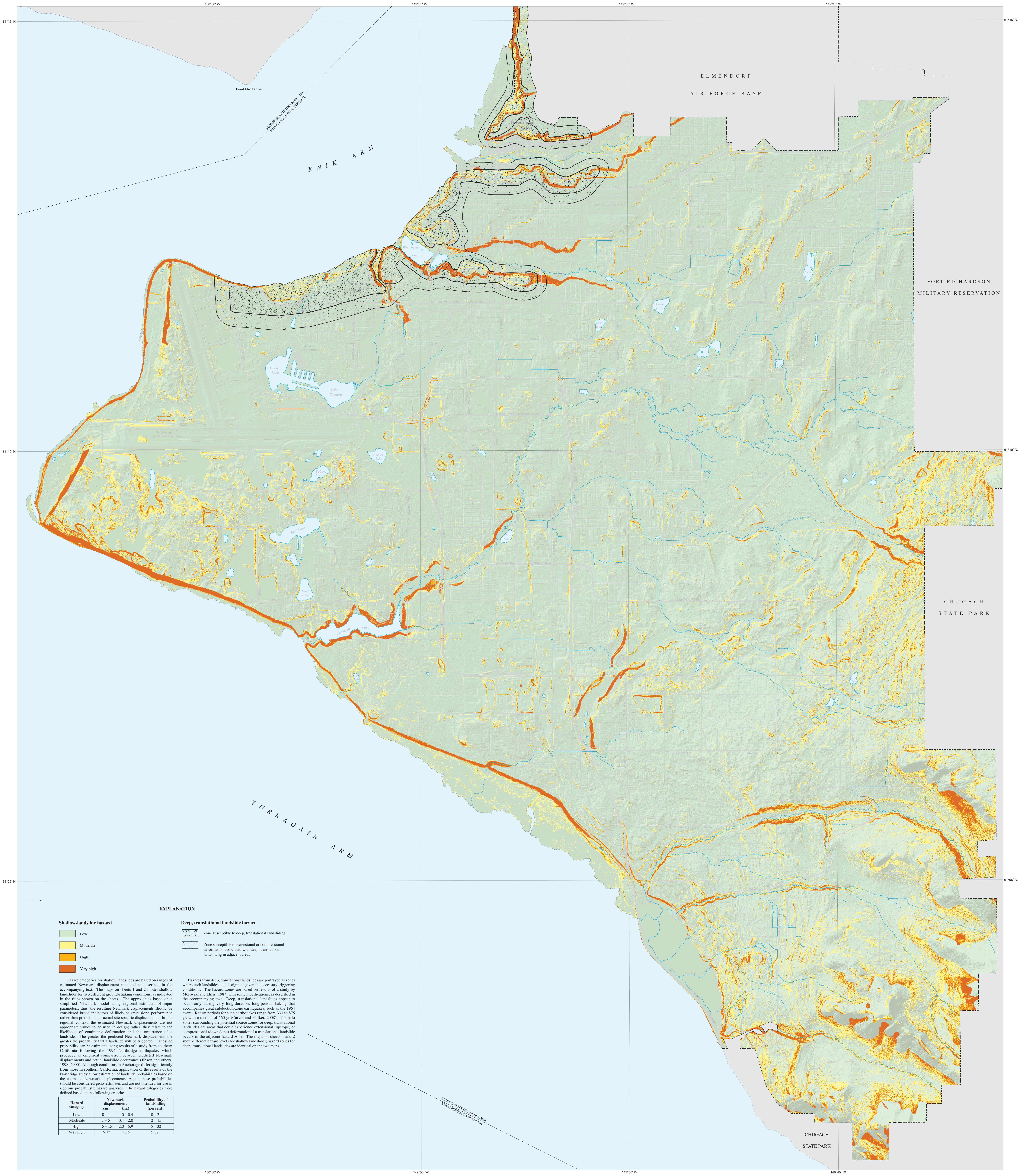
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

SCIENTIFIC INVESTIGATIONS MAP 3077
SHEET 1 OF 2
Version 1.1
Pamphlet accompanies map


150°00′ W.
149°55′ W.
149°50′ W.
149°45′ W.
61°15′ N.
61°10′ N.
61°05′ N.
Point MacKenzie
MATANUSKA-SUSITNA BOROUGH
MUNICIPALITY OF ANCHORAGE
KNIK ARM
ELMENDORF
AIR FORCE BASE
Government Hill
Merrill Field Airport
Westchester Lagoon
Turnagain Heights
FORT RICHARDSON
MILITARY RESERVATION
Lake Hood Strip Airport
Hood Lake
Lake Spenard
Ted Stevens Anchorage International Airport
Goose Lake
Lake Otis
Cheney Lake
Conners Lake
DeLong Lake
Sand Lake
Jewel Lake
Taku Lake
Campbell Lake
Campbell Airstrip
CHUGACH
STATE PARK
TURNAGAIN ARM
MUNICIPALITY OF ANCHORAGE
KENAI PENINSULA BOROUGH
CHUGACH
STATE PARK

EXPLANATION

Shallow-landslide hazard

🟩 Low

🟨 Moderate

🟧 High

🟥 Very high

Deep, translational landslide hazard

▨ Zone susceptible to deep, translational landsliding

░ Zone susceptible to extensional or compressional deformation associated with deep, translational landsliding in adjacent areas

Hazard categories for shallow landslides are based on ranges of estimated Newmark displacement modeled as described in the accompanying text. The maps on sheets 1 and 2 model shallow landslides for two different ground-shaking conditions, as indicated in the titles shown on the sheets. The approach is based on a simplified Newmark model using regional estimates of input parameters; thus, the resulting Newmark displacements should be considered broad indicators of likely seismic slope performance rather than predictions of actual site-specific displacements. In this regional context, the estimated Newmark displacements are not appropriate values to be used in design; rather, they relate to the likelihood of continuing deformation and the occurrance of a landslide. The greater the predicted Newmark displacement, the greater the probability that a landslide will be triggered. Landslide probability can be estimated using results of a study from southern California following the 1994 Northridge earthquake, which produced an empirical comparison between predicted Newmark displacements and actual landslide occurrance (Jibson and others, 1998, 2000). Although conditions in Anchorage differ significantly from those in southern California, application of the results of the Northridge study allow estimation of landslide probabilities based on the estimated Newmark displacements. Again, these probabilities should be considered gross estimates and are not intended for use in rigorous probabilistic hazard analyses. The hazard categories were defined based on the following criteria:

Hazard category	Newmark displacement (cm)	Newmark displacement (in.)	Probability of landsliding (percent)
Low	0 – 1	0 – 0.4	0 – 2
Moderate	1 – 5	0.4 – 2.0	2 – 15
High	5 – 15	2.0 – 5.9	15 – 32
Very high	> 15	> 5.9	> 32

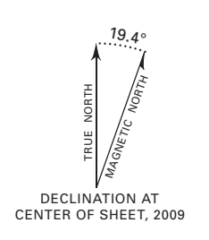
Hazards from deep, translational landslides are portrayed as zones where such landslides could originate given the necessary triggering conditions. The hazard zones are based on results of a study by Moriwaki and Idriss (1987) with some modifications, as described in the accompanying text. Deep, translational landslides appear to occur only during very long-duration, long-period shaking that accompanies great subduction-zone earthquakes, such as the 1964 event. Return periods for such earthquakes range from 333 to 875 yr, with a median of 560 yr (Carver and Plafker, 2008). The halo zones surrounding the potential source zones for deep, translational landslides are areas that could experience extensional (upslope) or compressional (downslope) deformation if a translational landslide occurs in the adjacent hazard zone. The maps on sheets 1 and 2 show different hazard levels for shallow landslides; hazard zones for deep, translational landslides are identical on the two maps.

State Plane Coordinate System (SPCS) 1983
SPCS Zone 5004

Transverse Mercator Projection
Longitude of Central meridian 150° W.
Latitude of Projection Origin 54° N.

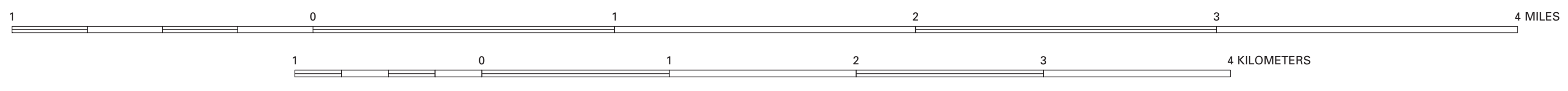
Digital data prepared using ArcGIS 9.2

Base data layers were obtained from the
Municipality of Anchorage, Alaska,
Geographic Information Systems Section
http://munimaps.muni.org/moagis/download.htm


19.4°
TRUE NORTH
MAGNETIC NORTH

DECLINATION AT
CENTER OF SHEET, 2009

SCALE 1:25,000


1
0
1
2
3
4 MILES
1
0
1
2
3
4 KILOMETERS

MAP LOCATION

Shallow Landslides: Peak Ground Acceleration = 0.69 g (2,475-Year Return Period or 2 Percent Probability of Exceedance in 50 Years)
Deep, Translational Landslides: Great Subduction-Zone Earthquake (≈300- to 900-Year Return Period)

MAPS SHOWING SEISMIC LANDSLIDE HAZARDS IN ANCHORAGE, ALASKA

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2009

Manuscript approved for publication April 27, 2009

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