DIGITAL MAPPING TECHNIQUES 2023

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The contents of this document are provisional

See Presentations and Proceedings from the DMT Meetings (1997-2023)

http://ngmdb.usgs.gov/info/dmt/
GEOLoGIC MAP
PRIORITY
DEVELOPMENT OF A QUADRANGLE
RANKING SYSTEM

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GEOLOGIC MAP PRIORITIZATION: DEVELOPMENT OF A QUADRANGLE RANKING SYSTEM

WHAT BROUGHT ABOUT THIS EXERCISE?

- Short term: Need for a long-range plan for GeMS compilation and conversions
- Long term: For new mapping, will need new priority areas
- This report was completed as a Statemap deliverable
Met with our SMAC and presented potential criteria to be considered and received feedback.

Staff collectively:
- Discussed feedback from SMAC
- Developed and categorized criteria
- Selected relevant criteria datasets
- Performed geospatial analysis
- Developed weighted scoring system
Prioritization Criteria

- Natural Resources
  - Mineral Resources
  - Water Resources
- Geologic Hazards
  - Coastal Inundation
  - Earthquakes
  - Landslides
  - Karst
- Social, Environmental, and Economic Factors
  - Social Vulnerability Index
  - Development Vulnerability
  - Population Growth
  - Economic Opportunity Zones
Potential areas for critical minerals: aluminum, arsenic, barite, cobalt, gallium, germanium, graphite, hafnium, manganese, niobium, REEs, tantalum, tin, titanium, tungsten, uranium, zirconium.

Mineral resource polygons developed in 2021 by DGMR Economic Geology section.
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NATURAL RESOURCES: WATER RESOURCES

Projected Water Demand Change from 2020 to 2040
- More than -50%
- -50% to -25%
- -25% to 0%
- 0% to 25%
- 25% to 50%
- 50% to 100%
- More than 100%

Virginia Department of Environmental Quality, 2021, Draft Virginia Water Resources Plan
Intermediate and extreme scenarios for Sewells Point, Virginia from Sweet and others, 2017; USACE, 2021
Active seismic zones identified based on the density of historic earthquakes (Kelly and others, 2017)
Area with slope of 22 degrees or greater (sq km)
- 0.0 - 0.18
- 0.19 - 1.0
- 1.1 - 5.0
- 5.1 - 31
- 32 - 120

Area of 7.5-minute quadrangle (km²) with 22° slope or greater based on 5-meter DEM
Areas underlain by carbonate bedrock or unconsolidated deposits containing carbonate shell or sediment (Weary and Doctor, 2014)
Social Vulnerability Index (SVI)

RPL THEMES
- 0 - 0.25 Lowest
- 0.2501 - 0.5
- 0.5001 - 0.75
- 0.7501 - 1.0 Highest

Social vulnerability in Virginia using the Social Vulnerability Index (CDC, 2018)
Development Vulnerability Model

- Undeveloped or Class I or II
- Class III, IV, or V
- Already Developed

Model of vulnerability to development (VDCR, 2015)
Predicted Population Growth by County from 2020 to 2045

% Change
- ≤-17.326656
- ≤-10.000000
- ≤0.000000
- ≤10.000000
- ≥25.000000
- ≥55.240890

Projected population growth through 2045 (Weldon Cooper Center, 2019, 2020)
Economic Opportunity Zones in Virginia (HUD, 2020)
Mineral Resources

Potential for critical minerals - 0.5
No potential for critical minerals - 0

Water Resources

25% of greater expected water demand increase - 0.5
Less than 25% projected water demand increase - 0

Projected Water Demand Change:
from 2020 to 2040
- More than -6%
- -50% to -25%
- -25% to 0%
- 0% to 25%
- 25% to 50%
- 50% to 100%
- More than 100%
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GEOLOGIC HAZARDS: 0 TO 1 SCORE

**Earthquakes**
- In seismic zone: 0.25
- Not in seismic zone: 0

**Landslides**
- 5 km² or more with 22° slope or greater: 0.25
- Less than 5 km² area with 22° slope or greater: 0

**Karst**
- Presence of carbonate map unit(s): 0.25
- No carbonate map units: 0

**Coastal Inundation**
- Inundation in extreme scenario: 0.25
- No inundation in extreme scenario: 0
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SOCIAL, ENVIRONMENTAL AND ECONOMIC FACTORS: 0 TO 1 SCORE

Social Vulnerability Index
SVI > 0.5 – 0.25
SVI ≤ 0.5 - 0

Development Vulnerability
Class III, IV, V – 0.25
All other categories - 0

Population Growth
Predicted population growth ≥ 10% - 0.25
Predicted population growth < 10% - 0

Economic Opportunity Zones
Presence of an Economic Opportunity Zone – 0.25
No Economic Opportunity Zone – 0
Used to select 7.5-minute GeMS conversions projects completed in 2022 and to be completed in 2024!
New data sets:
- 2020 Census data – Population growth prediction update
- 2020 Social Vulnerability Index
- 2021 new statewide geologic map for Virginia
- 2022 Development Vulnerability Model

Is there any potential for updated data sets to change our scores?
Potential redundancy
Variation in density of data used
3-point system simplicity
Presence/absence and cutoff validity
Other relevant measures overlooked or better datasets
Additional or changing stakeholder/customer needs
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QUESTIONS?

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