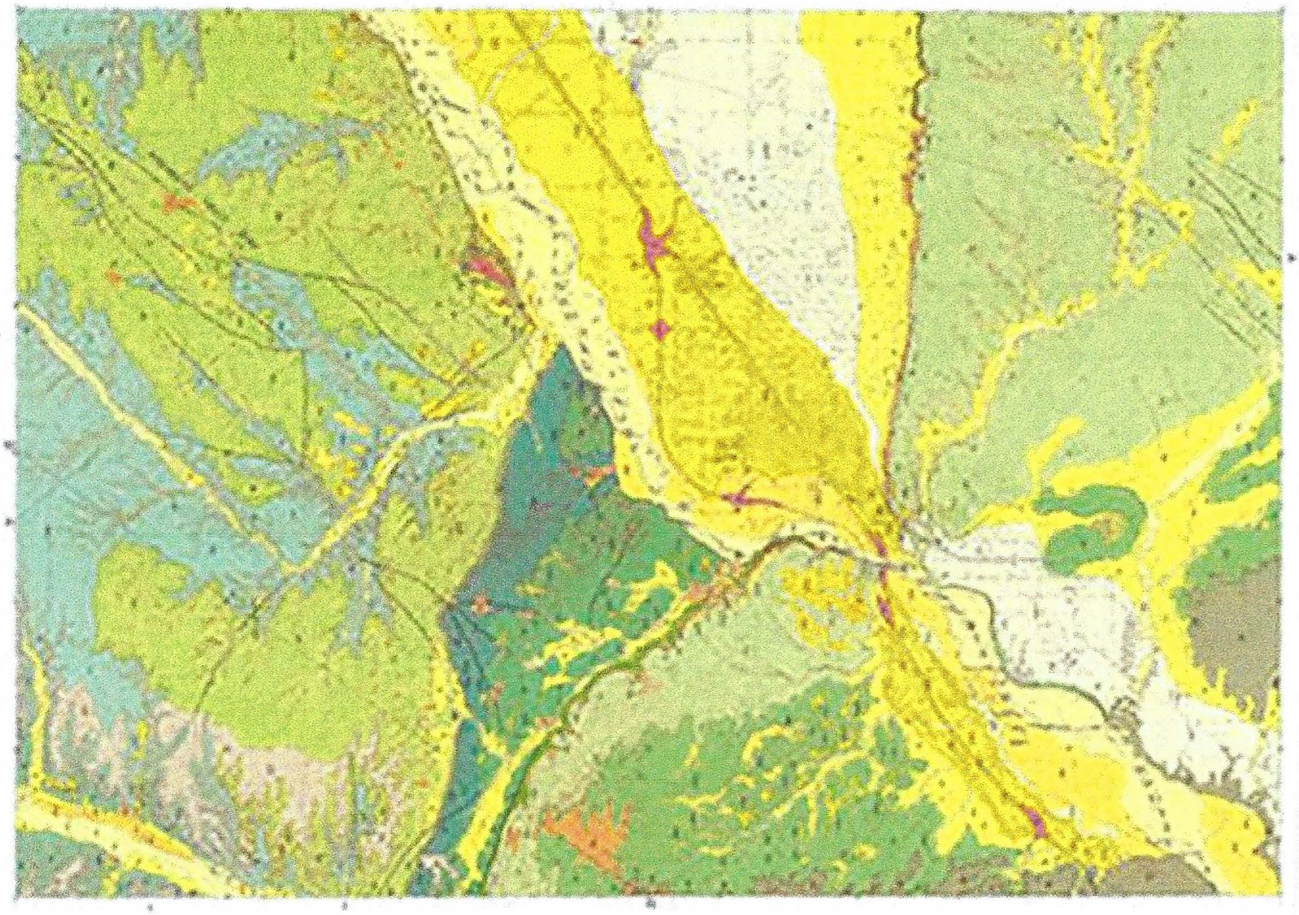


Hazards Map Makes Impact

Just the Facts

October 2003 | Ken Milam, Explorer Correspondent

Most folks are blissfully unaware of geologic hazards until those threats hit home – literally, in the case of rock falls or landslides.

David Lopez, senior research geologist with the Montana Bureau of Mines and Geology, hopes to prevent that from occurring in developing areas of Billings, Mont., where new residential construction can be found in areas that put homeowners close to the edge of geologic forces at work.

His work in helping revise and complete the geologic map of the state made him aware of several hazard areas in his hometown of Billings, and his passion for mapping led him beyond the project's original scope.

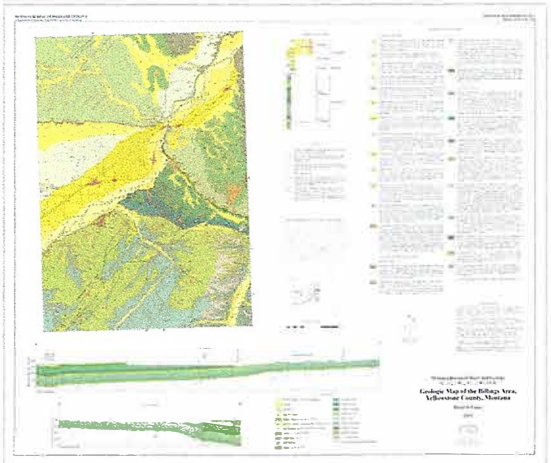


Figure 1. Billings, Montana

He completed a set of maps showing three hazard areas -- rock falls, landslides and bentonite or swelling clay.

One map shows the area's geology and three companion maps show the hazard areas, accompanied by photographs and explanations to help non-geologists understand the documents and the potential problems they illustrate.

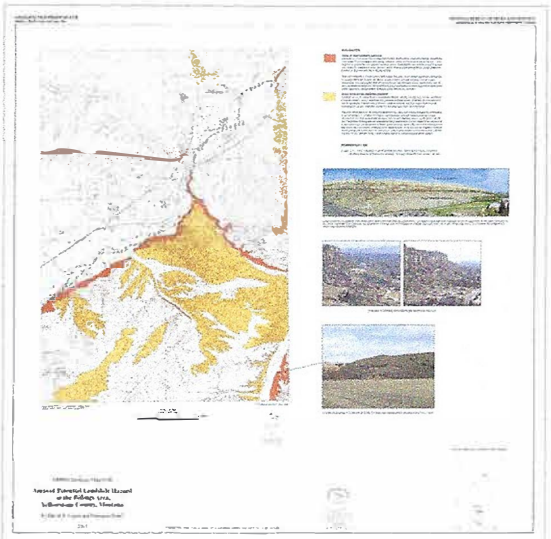


Figure 2. Landslide

Because of the maps, homeowners have a clearer understanding of potential problems before building or buying a house.

"They are absolutely wonderful," said Billings consultant Betsy Campen. "David's main love in life is mapping, and he has done a great job here ... and a great service to Billings."

The dramatic scenery provided by Billings' landmark Rimrocks is the area that has spurred upscale development in areas threatened by rock falls and slides from the 80 million-year-old Eagle Sandstone, which is a major gas-bearing formation in other parts of the state.

Campen said her own home, built in 1982, once was threatened when a huge, square block above and behind her house split and teetered. The rock had to be blasted away, she said.

Lopez said that even when people are aware of the potential dangers, often they are willing to gamble that their homes will escape damage.

Billings is located in central Montana and not prone to earthquakes, but temblors in the western or southwestern parts of the state could trigger rock falls or other events in the area, Lopez said.

As an example of the far-reaching effects of geologic events, Campen cited a 1940s earthquake in Yellowstone that closed a hot spring miles away, effectively shutting down the tourist attraction in the town of Joliet, near Billings.

A Public Service

Lopez got the idea for the hazard maps from a similar project done by a friend in the Golden, Colo., area.

Not everyone was happy with his idea.

For example, when Lopez' maps were being reviewed before release to the public, Bureau lawyers expressed concern that publicizing the information could lower property values in the affected areas, which in turn could perhaps prompt lawsuits against the agency.

Others, however, raised the point that withholding the information would be a public disservice – and also could result in potential liability if damage occurred that might have been avoided, Lopez said.

The legal concerns were eased with minor editing so that photos and text did not identify specific homes or addresses. The photos "just show the facts without editorial comment," Lopez said.

Even so, Lopez said the maps are "30 years too late" for some residential areas. In some areas, the rock fall danger could have been avoided by building just a block away from the base of the cliffs, he said.

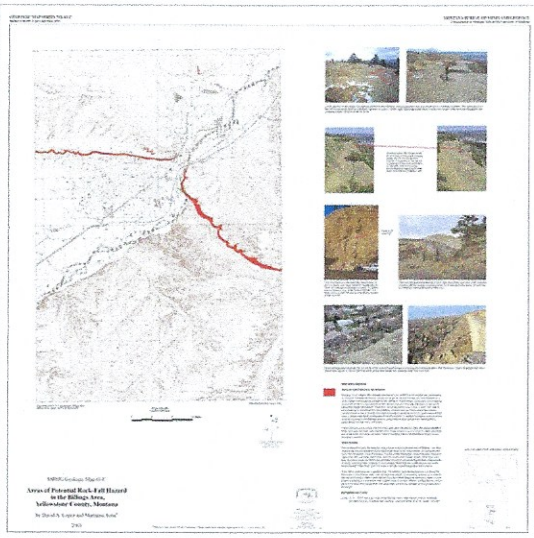


Figure 3. Rockfall

In another instance, the toe of a large landslide was cut away to make room for sport fields. The slide has been reinforced with large, rock-filled wire baskets, Lopez said.

The bentonite problem usually can be avoided by moving the building site or digging out the clay, Lopez said.

While the swelling clay can cause considerable damage to a structure, it also presents a more immediate risk of damage or injury.

Billings has had some "close calls," such as when a truck-size boulder rolled onto a city street as recently as 1994. That and other incidents are pictured on the maps.

A rock fall "could cause the total wipeout of a house ... could cause death," Lopez said.

The falls are continual. The upper Cretaceous sandstone underlain by shale is constantly eroded and shifted by frost and root wedging.

The potential rock fall area is a long but narrow strip. The landslide area is wider but actually affects fewer homes, he said. Several homes were built on the slides and have experienced warping, he said.

Lopez came to the Billings area in 1982, working in the oil industry until joining the Bureau in 1992. He is a 20-year member of AAPG.

Lopez said he decided to produce the hazard maps in 1994 while teaching at Rocky Mountain College in Billings. He gave the project to a student, Marianne Sims, and supervised as she developed it as her senior thesis. Lopez then reworked the explanations and added photos for the Bureau version, sharing credit with Sims.

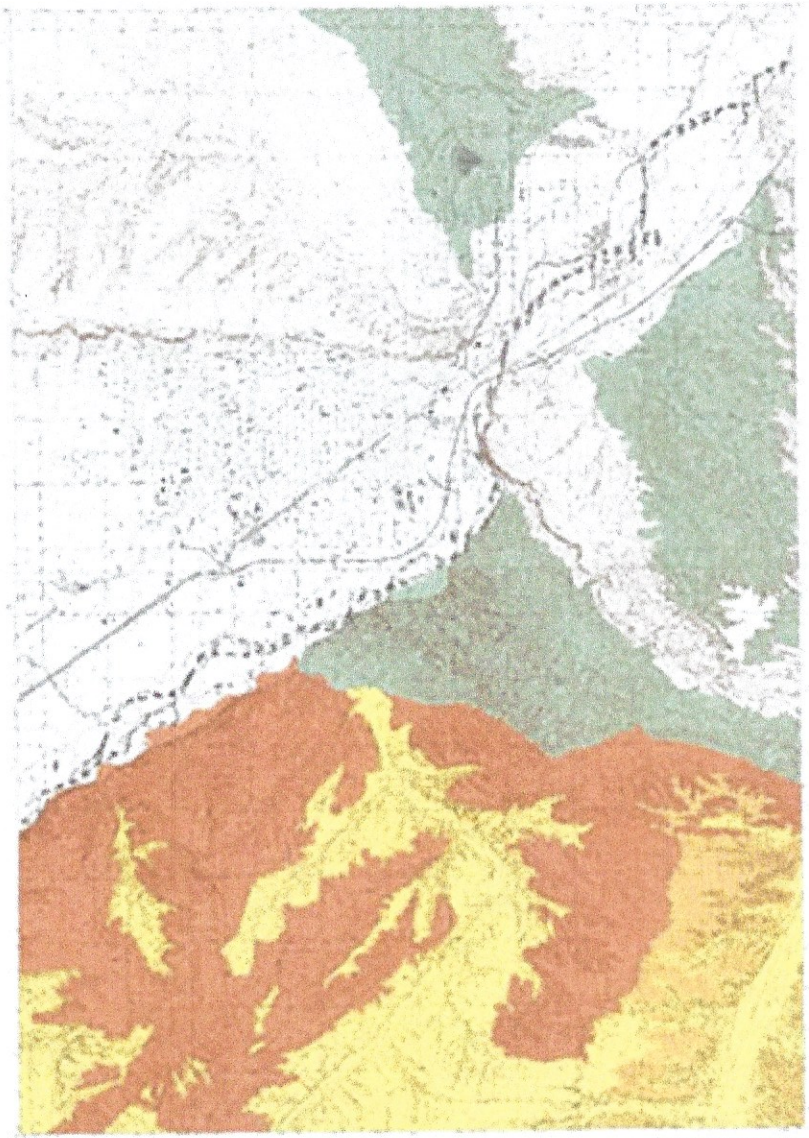
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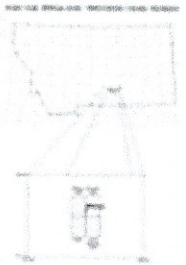
These maps are low resolution JPEGS and do not reflect the actual quality of the originals.

Extended reading







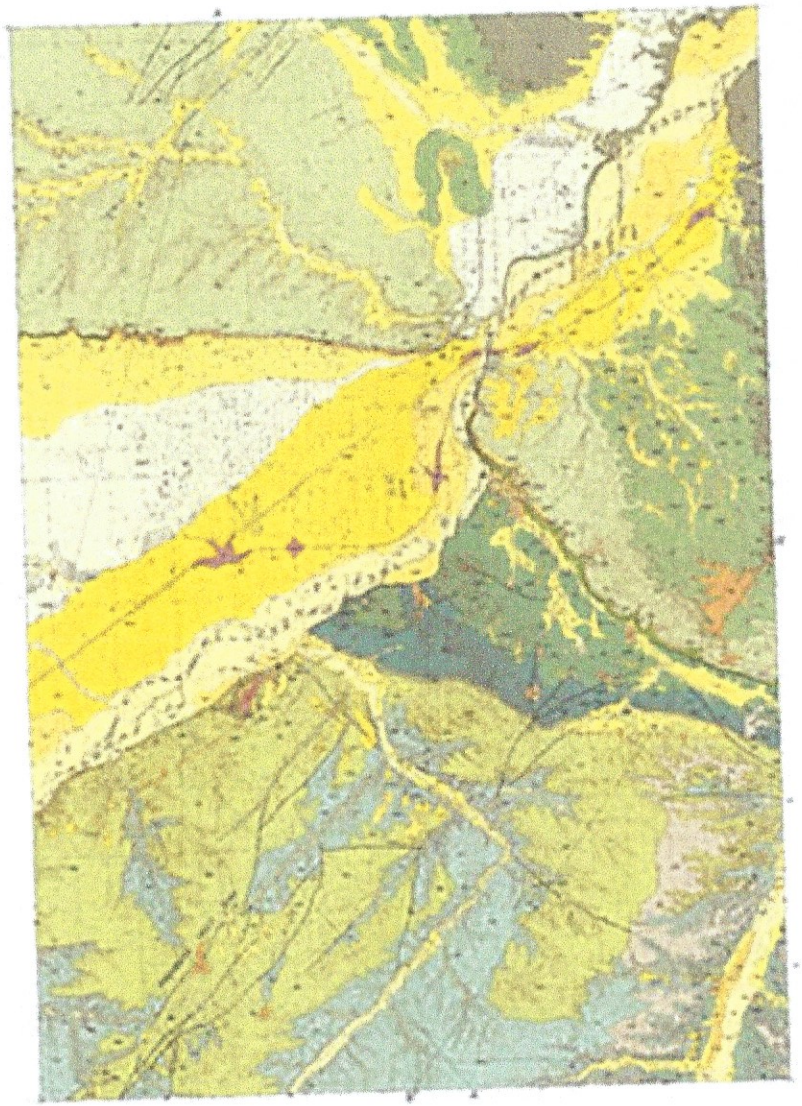


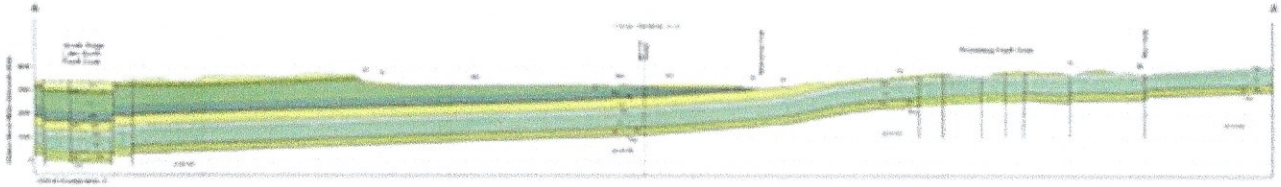
MBMG Geologic Map 44-D

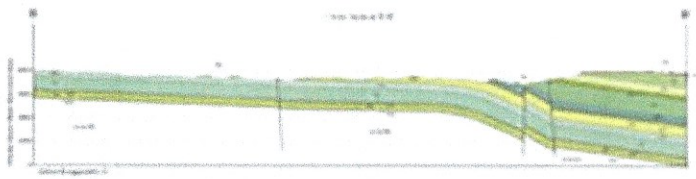
Areas of Potential Swelling-Clay Hazard in the Billings Area, Yellowstone County, Montana

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2003







Montana Bureau of Mines and G
Geologic Map Series No. 4[illegible]

Geologic Map of the Billi[illegible]gs Area, Yellowstone County, Montana

David A. Lopez

2002









MBMG Geologic Map 61-B

Areas of Potential Landslide Hazard in the Billings Area, Yellowstone County, Montana

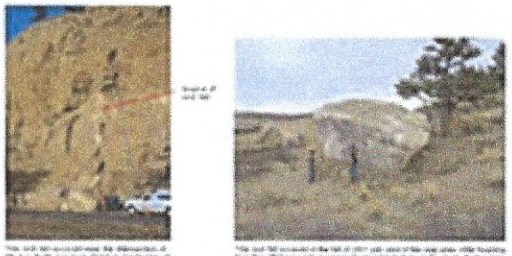
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MBMG Geologic Map 61-C

Areas of Potential Rock-Fall Hazard in the Billings Area, Yellowstone County, Montana

By David A. Lopez and Marvanne Sens*

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