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A geological model based on structural interpretations of multidisciplinary data from the rockslide, western Norway

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Åknes is known as the most hazardous potential rockslide area in Norway at present times. It is one of the most investigated rockslide areas in the world and an exceptional natural laboratory. The main aim for Stranda municipality where the area is situated is to establish a state of readiness for if and when the potential rockslide will evolve into a rock avalanche. This project, called the Åknes/ Tafjord project, has been ongoing since 2004 and involves many participants and aspects in geohazard. This study focuses is on structural geology and the usage of geophysical methods to interpret and understand the structural geometry of the rockslide area.

The Åknes rockslide is located in the Western Gneiss Region. Structural mapping of the area indicate that the foliation of the gneiss play an important role in the development of this potential rockslide. Both regional and local folding have developed in the area. The local, small-scale folds are close to tight with short wavelength in the upper part of the slope, while the foliation is gentler dipping (30-35˚) and parallel to the topography further down-slope. The development of the main back fracture is controlled by and parallel to the pre-existing, steep foliation planes. Where the foliation is not favorably orientated in regard to the extensional trend the back fracture follows an existing fracture set or forms a relay structure. The foliation also controls the development of several sliding surfaces. These crop out at least at two levels and have been mapped down-slope. Fault rocks occur along sliding planes, indicating activity along the planes. The sliding surfaces are sub-parallel to the topographic slope and

along mica-rich layers in the foliation, thus increasing the hazard risk (Braathen et al. 2004, Henderson et al. 2006).

Geophysical surveys using 2D resistivity, GeoRadar (GPR) and refraction seismic give an coherent understanding of undulating sliding surfaces in the sub-surface, which crop out at different levels of the slope (Rønning et al. 2006). The surface geophysics map the subsurface in great detail to a depth from 30-40 meters for GPR to $\sim$125 meters depth for 2D resistivity. This gives a good control on the depth and lateral extend of the sliding surfaces. Drill cores and borehole monitoring give important information in regards to geological understanding of the sub-surface. Fracture frequency, fault rock occurrence, geophysical properties and ground water conditions have been mapped.

Further work that needs to be addressed: The exact location of the sliding surfaces could be found through borehole monitoring. A more thorough understanding of the ground water network and its influence on the sliding surfaces is also required.

References

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