

PLANNING AND PROJECT ENGINEERING ON THE BASIS OF PLANAR GEO DATA (LASER DATA) IN COMBINATION WITH NEWEST WORKING SOFTWARE (CIVIL-3D, ARC-GIS, NUMERICAL SIMULATION MODELS) BY THE EXAMPLE OF THE CATCHMENT KARGRABEN (SALZBURG, AUSTRIA)

A STUDY OF THE FOREST TECHNICAL SERVICE OF TORRENT AND AVALANCHE CONTROL IN AUSTRIA

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INTRODUCTION

The Kargraben with a drainage basin of about 3.4 km² located in the district of Lungau, in the southern part of Salzburg (Austria), discharges into the river Zederhausbach. Large mass movements, with results from an unstable geological formation lead to a considerable debris potential. Thus, a high hazard potential for the settled fan Tafern, the motorway rest station and the park surface prevails.

HISTORICAL DATA AND CATCHMENT CHARACTERISTIC

A Large debris flow event in a tributary dates back from the year 1966. After this event the construction of technical mitigation measures began and up to now, in the tributary Schrovingraben numerous check dams have been built. However, the transit section of the tributary is partly safe, but in the mainstream Kargraben large mass movements represent debris sources within the upper catchment. A field study shows that the debris potential of 22.000 cubic meters and the catchment look like a “sleeping torrential giant”. Therefore, the former technical protection concept had to be reconsidered.

METHODOLOGY

Based on a field study and by using laser data in combination with three-dimensional planning software different scenarios were defined. By using hydrological and hydraulic simulation models those scenarios were calculated to find the design event. The results were used to derive mitigation measures.

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PROTECTION CONCEPT

The threatened areas on the debris cone and the process characteristic in the middle reach were defined. On the basis of these findings and results, a bundle of active measures were worked out as part of a risk management concept. This concept contains a combination of surface-effective impacts and a function chain of punctually active technical measures.

ACTIVE MITIGATION MEASUREMENTS

The bundle of active measures is concentrated in the middle reach and close to the fan of the village of Tafern. In addition to the existing measures, a debris-sorting dam with a new technical construction for bedload sorting, a debris flow breaker and a deflecting dam are planned. These mitigation measures are the most effective protection against debris flows and sediment transport with a reduction of the high energy level to a lower level under particular energy change and bedload storage in the storage basins. In addition to that, a dam system (deflecting dam) and a watershed management concept with afforestation and draining measures was carried out.

NUMERICAL SIMULATION OF TECHNICAL MEASURES

To point out the effect and the borders of the planned technical measures the debris flow breaker, bed load sorting dam and deflecting dam were integrated in the model. The model was built by the use of laser data in combination with newest tools (Civil-3D, Arc GIS,...) The debris flow scenarios were simulated with the FLO-2D model. The results of the simulated scenarios shows an effective protection against debris flows with a reduction of the high energy level to a lower level and a bedload storage in the storage basin of the bedload sorting dam.

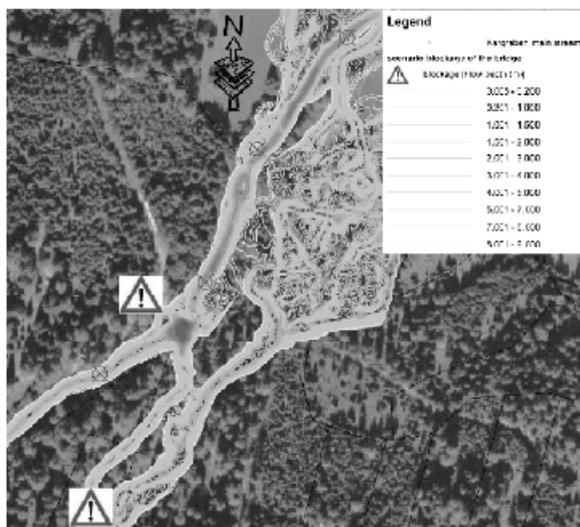


Fig. 1: Scenario without technical measures

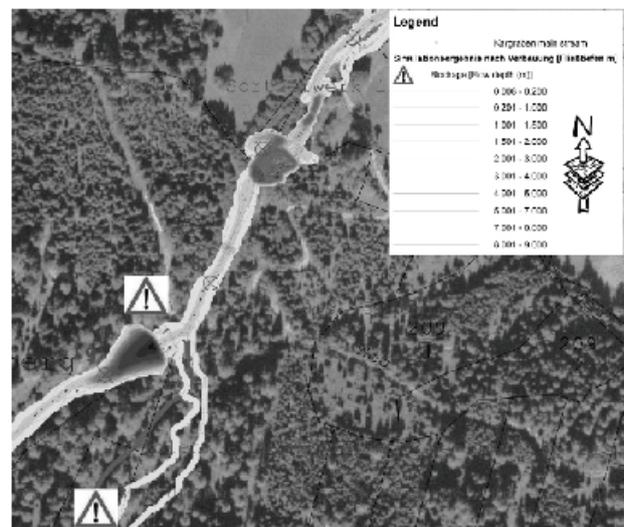


Fig. 2: Scenario with technical measures

Keywords: debris flow, hydraulic simulation, mitigation measures