

optimized discharge, a control of the distribution of the flood peak in the different torrents and a storage of the remaining flood maximum of the torrent Kanker with a required volume of more than 1 million m³. Moreover the different discharge capacity in the torrents in the settlement areas was optimized by a transition channel.

In 2004 the project with costs of about 25 million Euros was started. It is the biggest torrent control measure in Bavaria and will be tangent to many of very important infrastructure issues such as the reconstruction of the ski jump, some important traffic roads, the railway and the waste water disposal in Garmisch-Partenkirchen. The core part in the Kanker-Partnach-project is the transition channel which will be put in operation in summer 2008.

DETAILS ABOUT THE SITUATION AND THE DESIGN

The convincing idea of the solution for the flood protection for Garmisch-Partenkirchen is to use the fact that the peak discharge will not occur during the same precipitation situation in all 3 torrents at the same time. The total catchment area of all 3 torrents Partnach, Kanker and Fauken amounts to about 128 km² and consist of the following parts:

- Partnach: 98 km²; high alpine character, elevation up to about 3000 mNN; length 21 km; situated in the south of Garmisch-Partenkirchen.
- Kanker: 26 km²; length 9 km; stretched shape in an east-west exposition; elevation up to 1200-1300 mNN with an average gradient of 23% in the southeast of the community
- Fauken: 4,4 km²; elevation up to 1780 mNN; length 4km; in the east of the area.

The catchment areas of all torrents had been investigated considering the specific hydrological situation using a precipitation-discharge-model. The results showed some significant differences important for the proposed solution in the design flood with an occurrence of 100 years (HQ100):

- Partnach: maximum HQ₁₀₀ → 93 m³/s, 48 hours rain event; capacity 55 to 75 m³/s
- Kanker: maximum HQ₁₀₀ → 63 m³/s 12 hours rain event; capacity 10 to 23 m³/s
- Fauken: maximum HQ₁₀₀ → 24 m³/s; 3 hours rain event; capacity 24 m³/s

In case of a 12 hours rain event, which is critical for the Kanker, the discharge in the Partnach is only 69 m³/s. Given that the Partnach is trained for a HQ100 there remains a reserve of at least 21 m³/s. This reserve is used by the transition of water from the Kanker to the Partnach. For the Kanker itself there remains a necessary capacity of only 13 m³/s which is possible without any construction measures. From exceeding discharge up to 30 m³/s will be diverted to the Partnach. If the flood discharge is even higher or the capacity of the Partnach will be exceeded the retention basin in the Kanker with a storage volume of 220.000 m³ will be activated. The transition channel connects the retention basin with the Partnach over a length of 1300 m. So the capacity of the bigger Partnach is fully used. Only from the confluence of the Fauken the Kanker has to be reconstructed with a subsurface channel to the Partnach with a higher discharge capacity. Referring to the design calculations this solution can master the design flood HQ100 in the 3 torrents Kanker, Partnach and Fauken.

CONCLUSION AND PERSPECTIVE

A flood protection solution with a precipitation-discharge-model combined by flood storages and discharges is a possibility for a torrent control in dense populated areas.

Keywords: precipitation-discharge-model, flood control, flood storage