Description of engineering considerations and scope

Lock, weir and powerhouse in Obernau were constructed in 1926 to 1930. Because of damages due to age (80 years) the functionality of the lock can no longer be ensured. It was decided to build a new lock adjacent to the old lock. The position of the new lock will be located towards the river Main. Thus a change of the general layout is required: Replacement of the weir, construction of a new guard wall, adaption of the left river bank.

80 % of the core samples were taken from the geological formation "lower Buntsandstein" (lithostratigraphic unit "lower Bunter Sandstone"), a sandstone layer of the Lower Triassic. Close to ground surface the sandstone is fully disintegrated and may be defined as clay-bound sand.

85 % of the investigation points were located in the river bed

Main focus of the laboratory tests was to determine the strength dependency with depth. Four classes of strength (extremely weak to weak, according to DIN EN ISO 14689-1) were defined using unconfined compressive strength UCS ($q_u$):

- Strength class 1 (FG1): $q_u < 1$ MPa (extremely weak)
- Strength class 2 (FG2): $1$ MPa $< q_u < 5$ MPa (very weak)
- Strength class 3 (FG3): $5$ MPa $< q_u < 10$ MPa (weak (1))
- Strength class 4 (FG4): $q_u > 10$ MPa (weak (2))

The lower Buntsandstein is predominantly fully disintegrated and contains numerous fissures. Partially it is classified as "cemented sand-silt-mixture" (FG 1), partially it is clay-bound (FG 2) but may be worked with a knife. Other parts are bound by quartz, cavernous but nevertheless hard (FG 3 or 4).