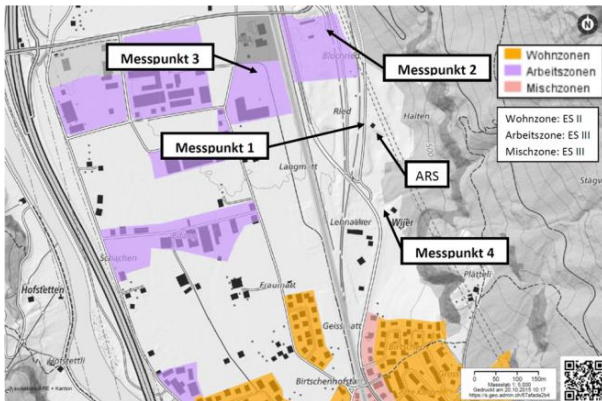
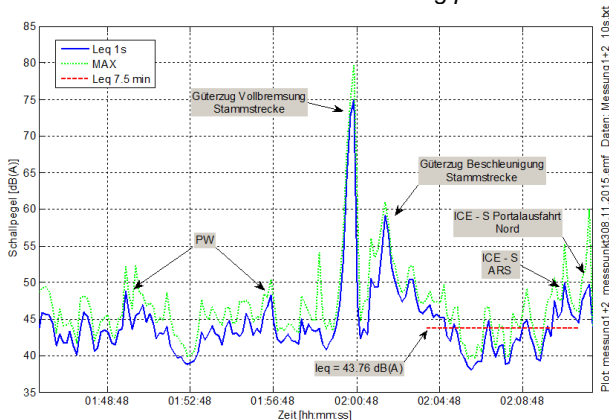


Northern portal of the Gotthard basis tunnel with anti-recirculation shaft (ARS, at the rear)



Plan of zones showing the region around the anti-recirculation shaft with marked measuring points



Noise measurement of working range northwest of the anti-recirculation shaft (measuring point 3)

Interactions with the environment are to be taken into account when designing and constructing underground infrastructure buildings. HBI Haerter realises the relevant parameters and analyses the environmental effects on underground plants with regard to the construction and operation phase. Conversely, HBI analyses the effects of infrastructure buildings on the environment and plans appropriate measures. Relevant environmental-physical services by HBI concern analyses, planning of measures, measurements and simulations.

## Our services

- Noise measurements (e.g. according to the construction noise guideline, noise protection regulations, noise control guidelines, machinery directive)
- Acceleration and vibration measurement (e.g. regarding deflection or load of coverings)
- Occupational medical measurements (air temperature/humidity, explosion hazard with methane etc.) and pollutants (max. allowable concentration MAC: e.g. diesel exhaust gases, oxygen content, dust content)
- Meteorological measurements, analyses and assessments (e.g. crosswind loading of trains or portal pressure difference to design tunnel infrastructures)
- Calculation of noise propagation (e.g. for ventilation systems or portals)
- Numerical simulation of emissions at portals (e.g. fog)
- Numerical simulation of occupational health reference values on construction sites (MAC values, dust content, WBGT value etc.)
- Determination of the cooling water requirements and its recirculation as well as the water temperature on superficial return points
- Consulting for the principal for optimizing the construction process, additional measures or objects to project approval

## Your benefit

- Professional and independent assessment of the emission situation in the vicinity of the infrastructure buildings
- High planning reliability for the principal
- Professional advisory opinions during planning project
- Consideration of cost-effective alternatives to protect against emissions