The modern mining industry in Germany - from the perspective of the mining authority

TAL TECH

SACHSEN-ANHALT

SHORT INTRODUCTION

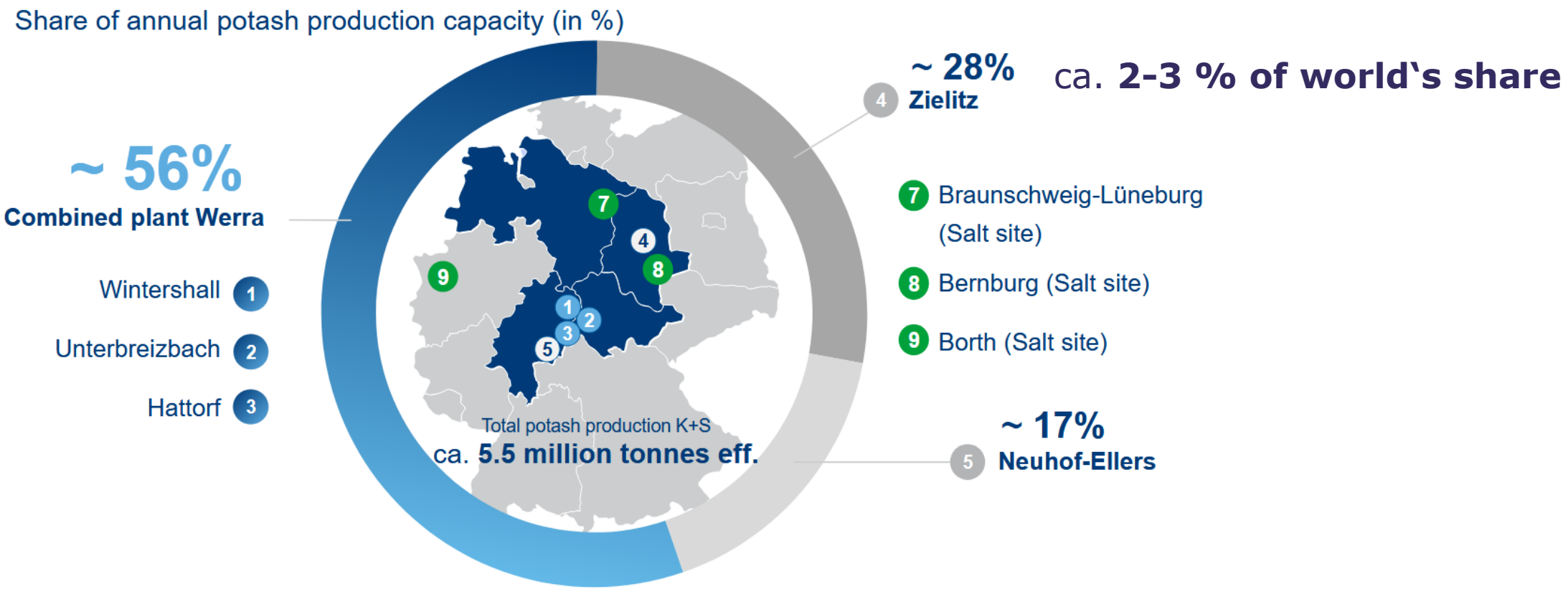
TU Bergakademie Freiberg (Ger.)

- Project management, teaching, R&D
- PhD in Rock Cutting Sensorics & Machine Learning

Mining Authority Saxony-Anhalt (Ger.)

- Deputy / Specialist Officer underground mining
- Mining law / legal issues
- Environmental aspects
- Acceptance issues
- Work safety
- Focus: Potash Mining

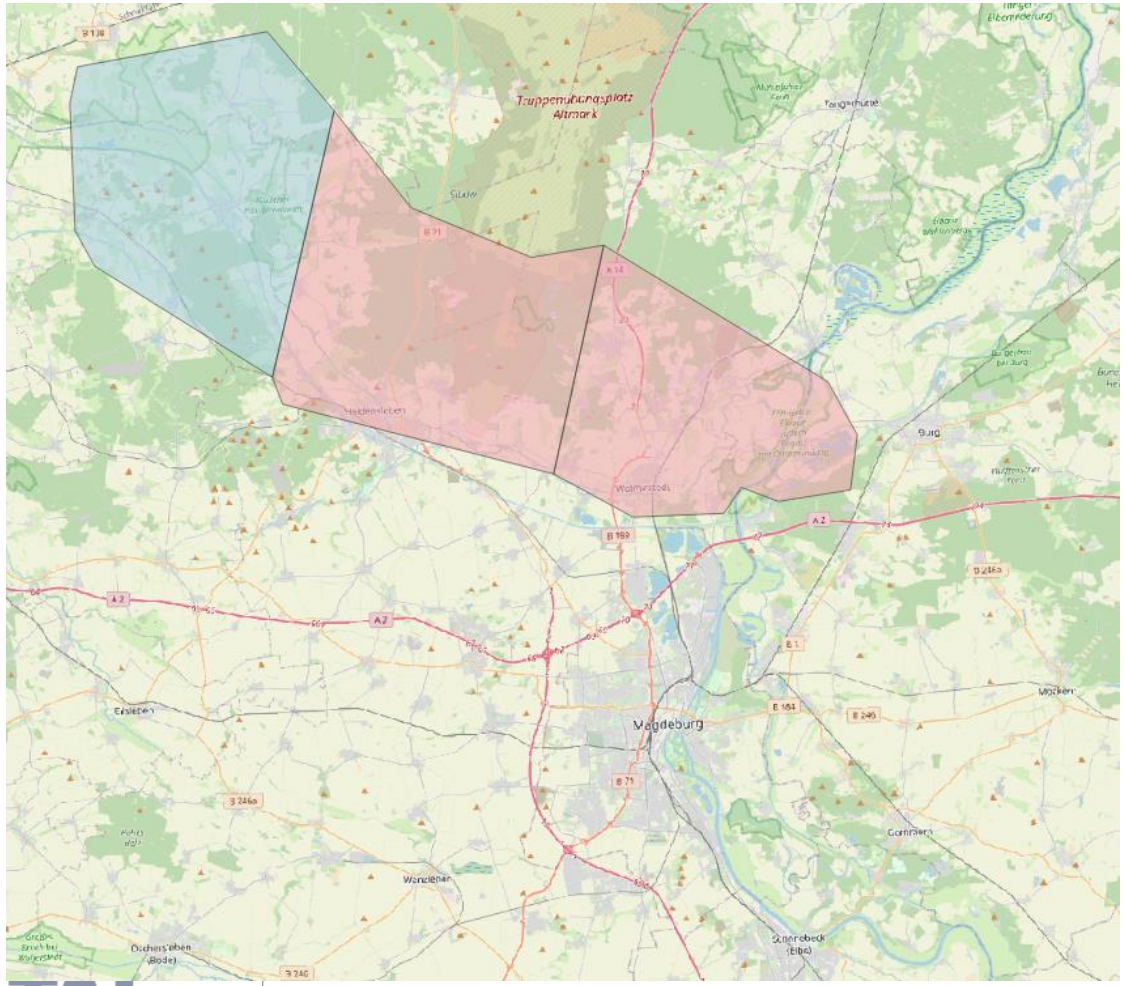
POTASH IN GERMANY

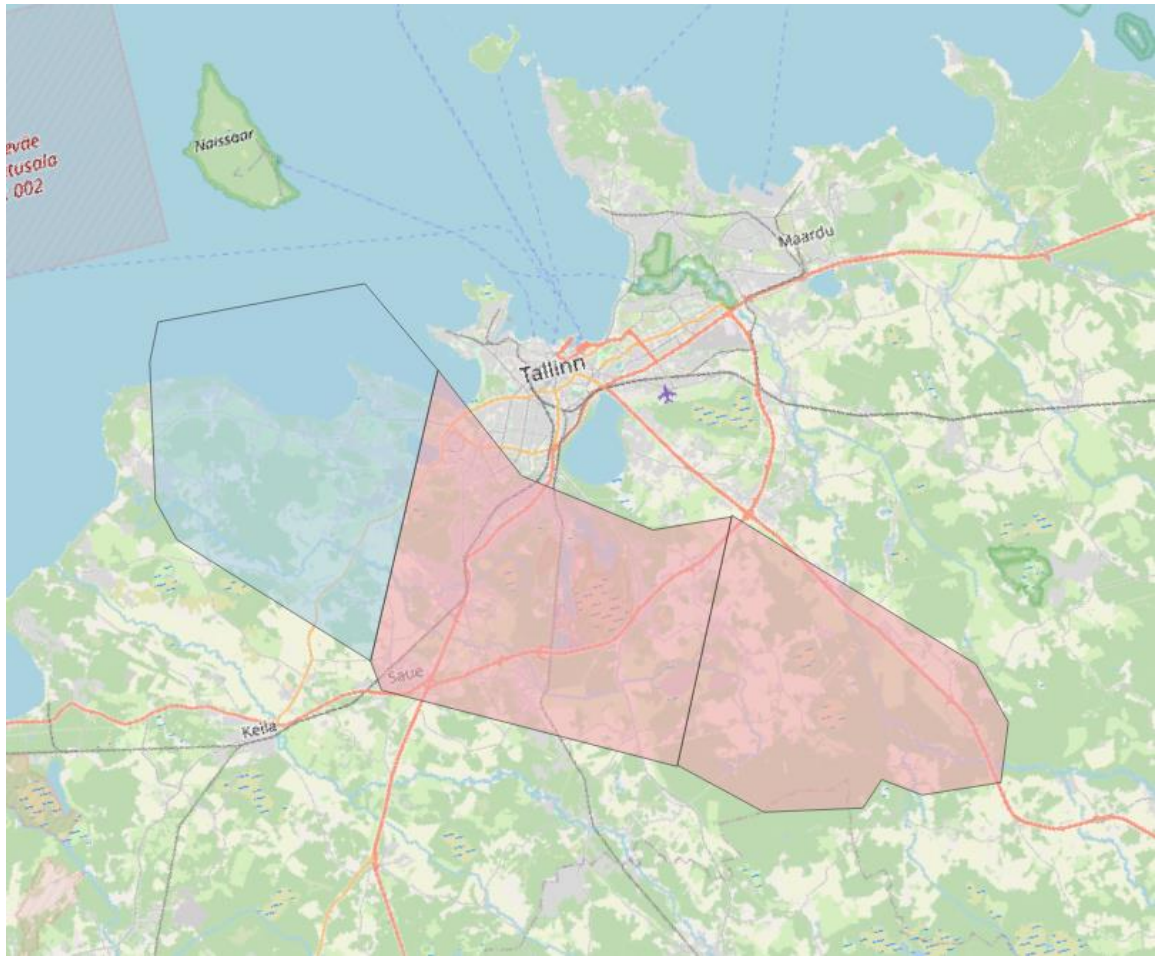


ca. **2-3 % of world's share**

Source: © K+S

ONE OF THE LARGEST MINES IN EUROPE

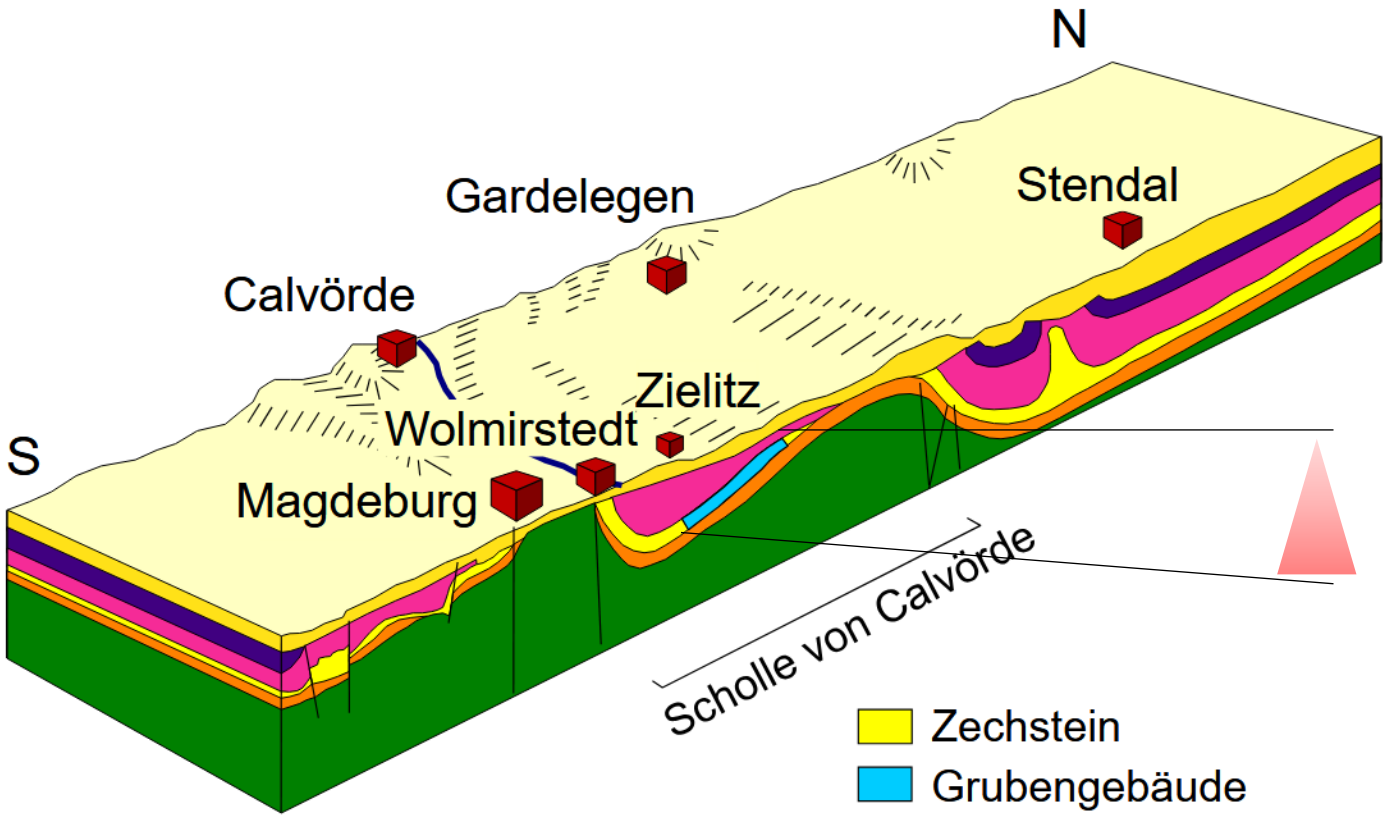




GEOLOGY ZIELITZ

Sylvinit seam „Ronneberg“

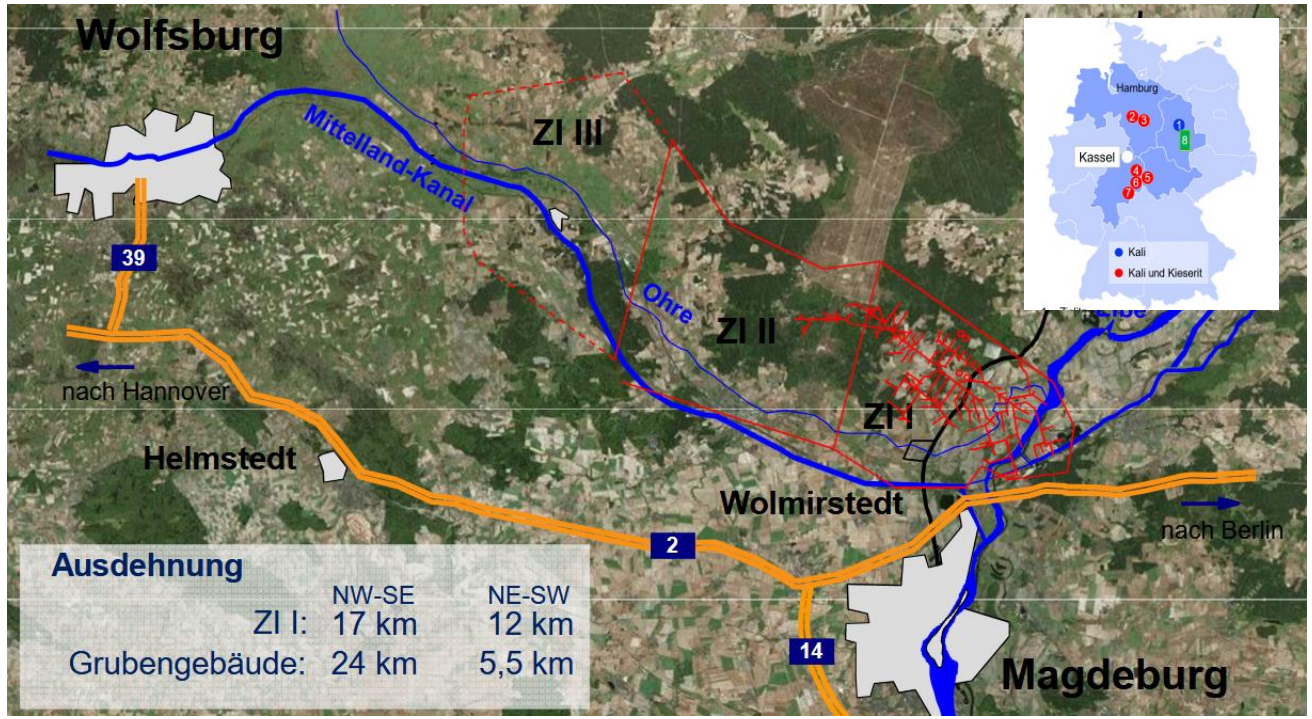
- Thickness: 3-20 , (av. 5.5 m)
- K2O ca. 12 %
- General inclination: 17 %
- 4 shafts



20 °C dry
18°C effective

52 °C dry
27°C effective

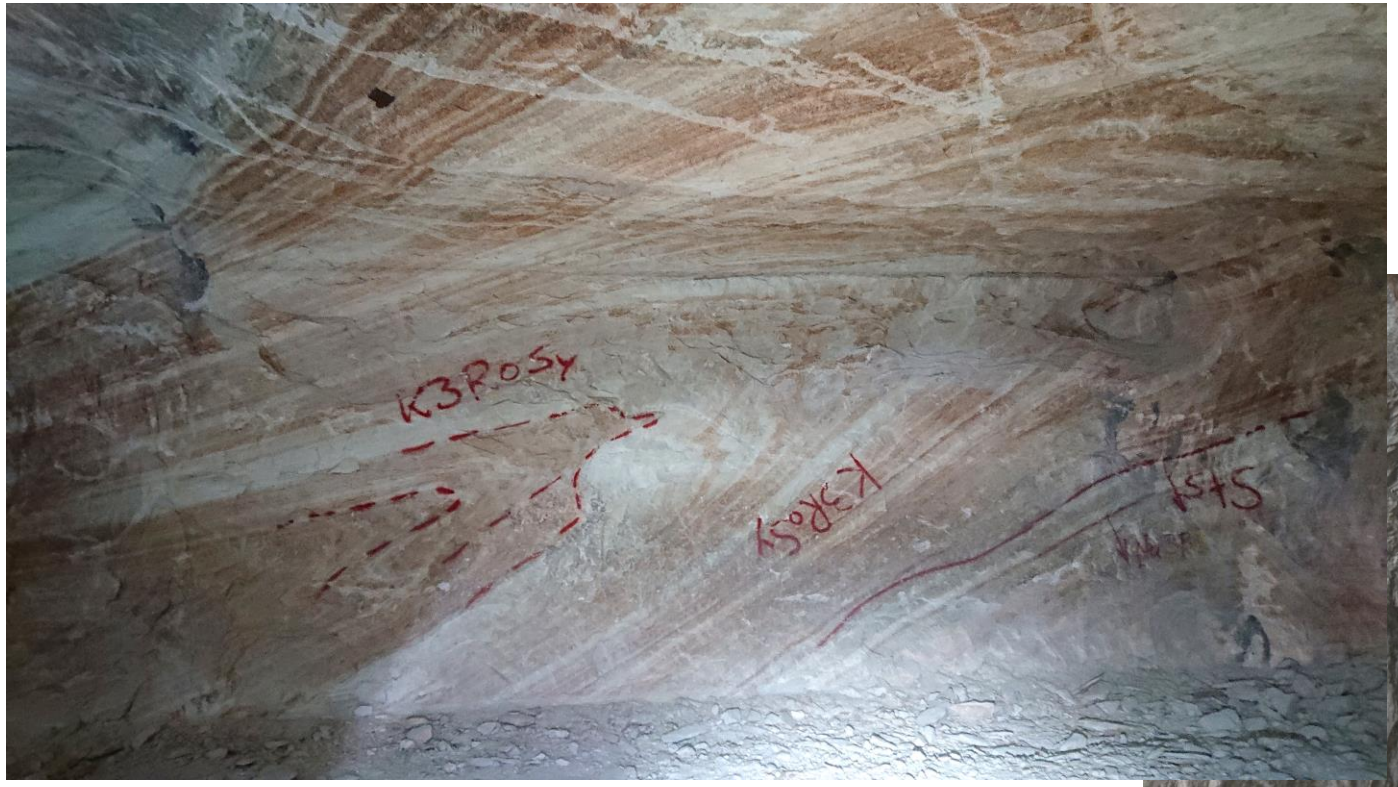
MINE ZIELITZ



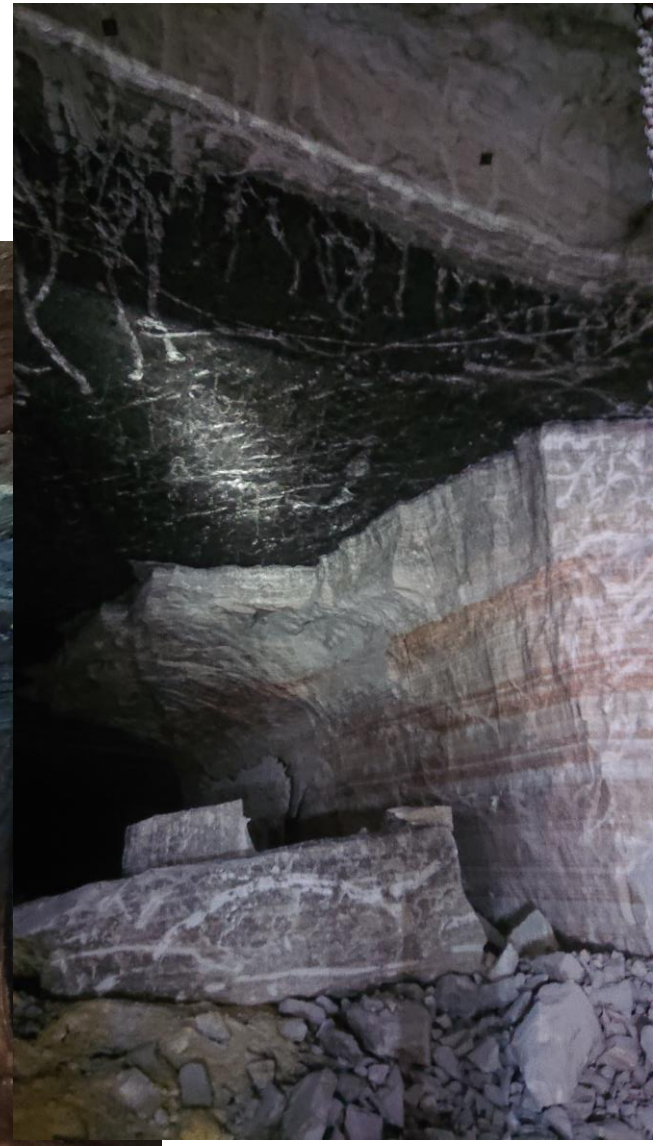
- Mining area: 61 km², extends 19 km SE-NW, 6 km SW-NE.
- Room-and-pillar mining: ~40-70% loss
- Production capacity: nearly 12 Mio t p.a.
- 1.2 Mio t of product

Source: K+S

EXCITING GEOLOGY



EXCITING GEOLOGY



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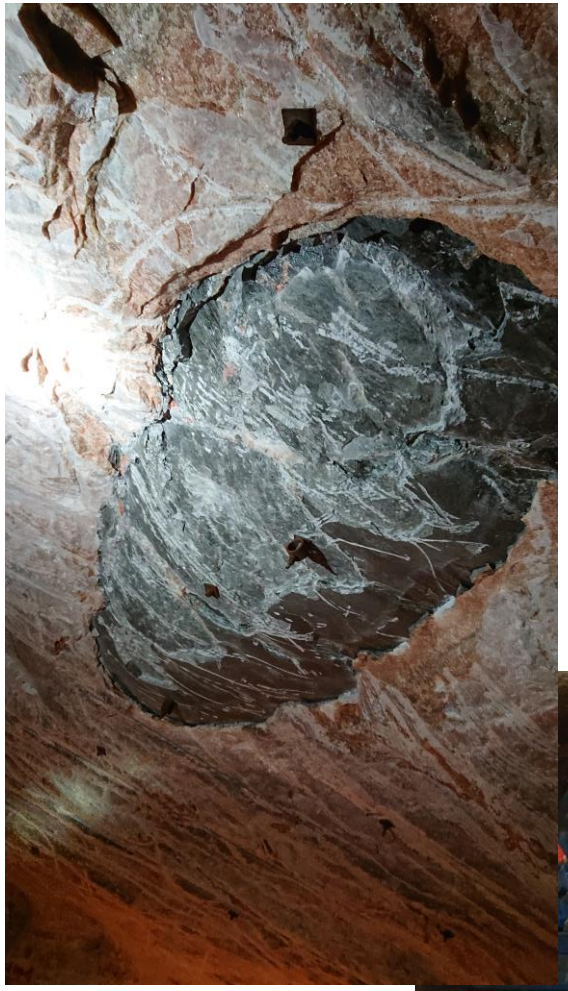
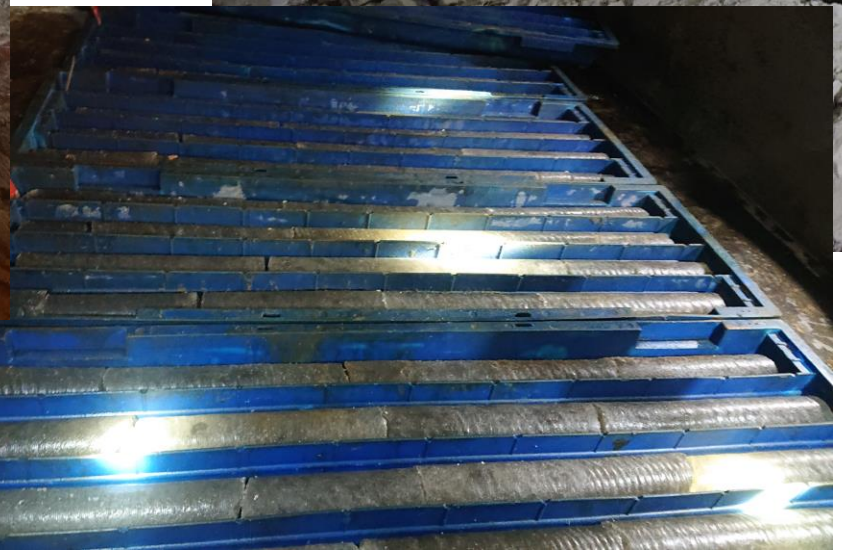




EXCAVATION / ROADHEADING

VENTILATION

ZIELITZ

Waste dumps

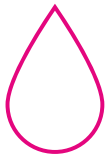
- 12 % KCl → 88 % NaCl
- Dump 1 (GDR times)
- **Dump 2 1990s**
- Dump 2 Extension 1 2005
- Dump 2 Extension 2 2020
- Runtime ~2050

HALDENKAPAZITÄTSERWEITERUNG II
2ND CAPACITY EXTENSION FOR WASTE DUMP

- Application: ~ 5 m of shelf Ca. 10.000 pages
- Permit: 978 pages
- ~10 years review time
- Public formal planning permission procedure
- Tremendous amounts of data
- Key issue = Salt Water Emmissions

SITUATION

- **Mining Law**
  Organise and balance the needs of benefit for society by resource extraction against individual rights
- Minimize impact of mining to the highest *feasible* extent

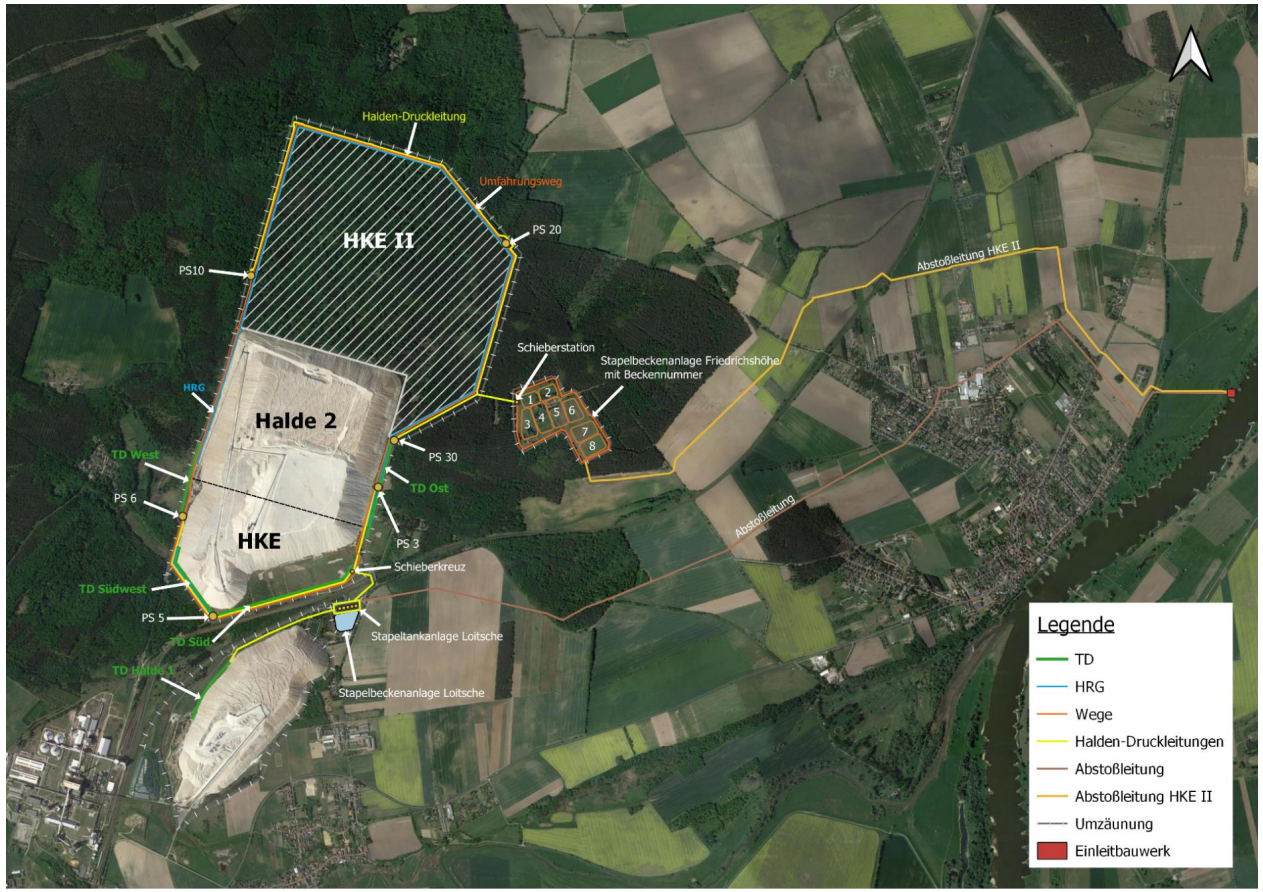


- Necessary to adhere to **4th EU Water directive Framework**

- *People will be impacted*
  → manage impact
- → Court action

HALDENKAPAZITÄTSERWEITERUNG II

2ND CAPACITY EXTENSION FOR WASTE DUMP



- Amount Ca. 10 Mio t/a
- Runtime 34 a
- Space 200 ha

- New pumping stations
- Pipelines
- Infrastrukture
- Buffer basins
- Base sealing
- Surface buffer layer

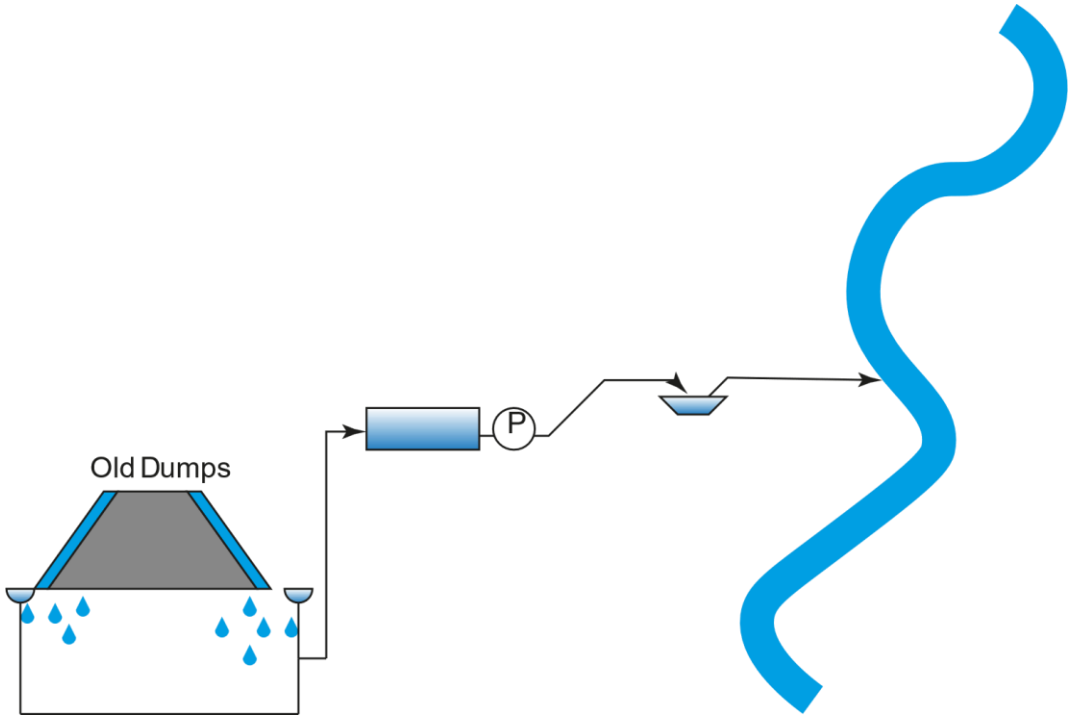
4TH EU WATER DIRECTIVE FRAMEWORK

„non-deterioration principle"

- Actions that cause a **worsening of the ecological/chemical state** of a water body are **prohibited**
- Dump extension = More NaCl → **more NaCl** in Rivers/Groundwater bodies?

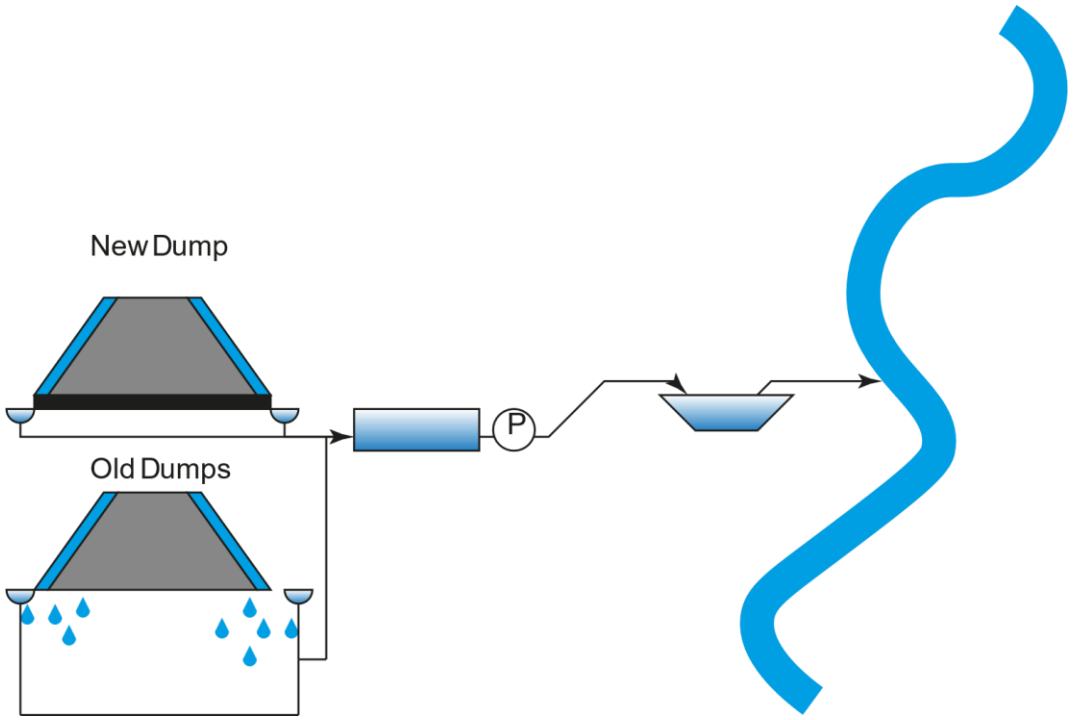
- **Multifold solution** (next slides)

EMISSION MITIGATION CONCEPT



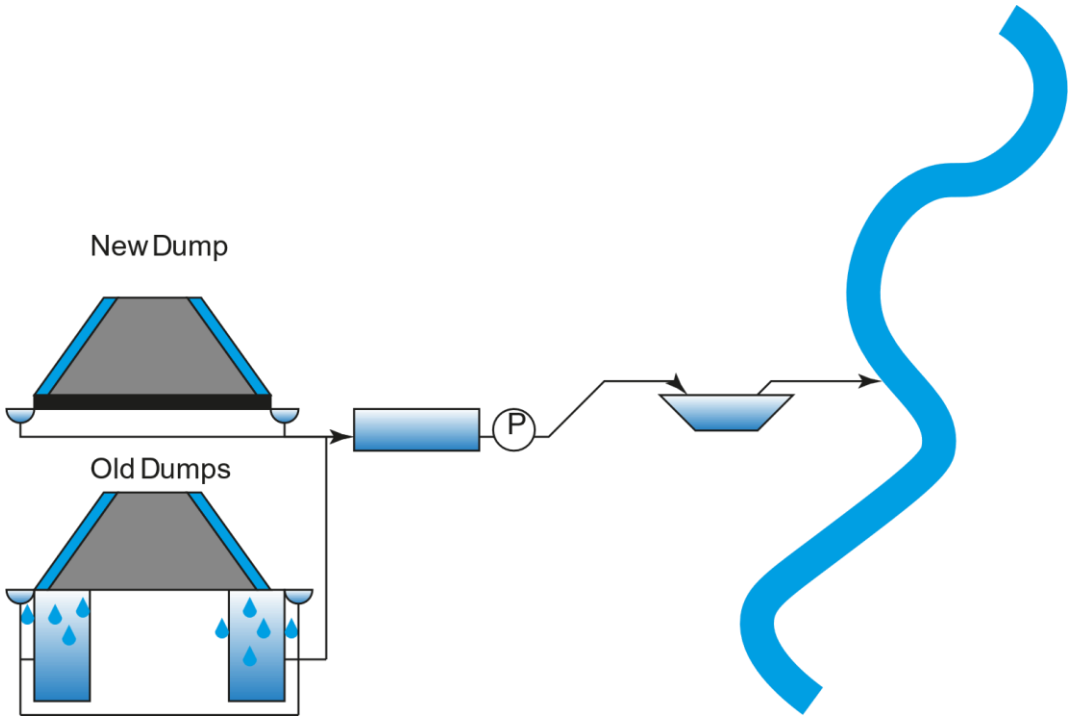
- **Status Quo**
  - X mio m³ seep into groundwater from old dumps

EMISSION MITIGATION CONCEPT



- **New Extension**
  1. New Dump Extension does (almost) not emit additional Saltwater

EMISSION MITIGATION CONCEPT



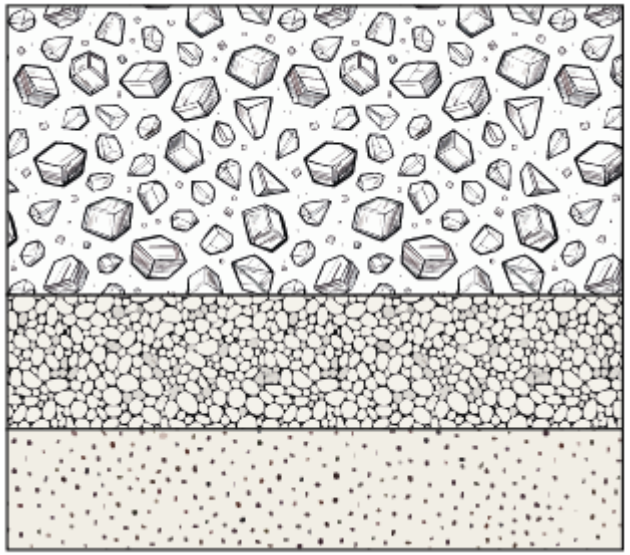
- **New Extension**
  1. New Dump Extension does (almost) not emit additional Saltwater
  2. Mine constructs additional measures to further reduce saltwater emissions from old dumps

- **With the Dump extension, less saltwater goes into Ground, than without!**

- River Elbe can take the additional saltwater that is collected without ecological damage

BASE SEALING

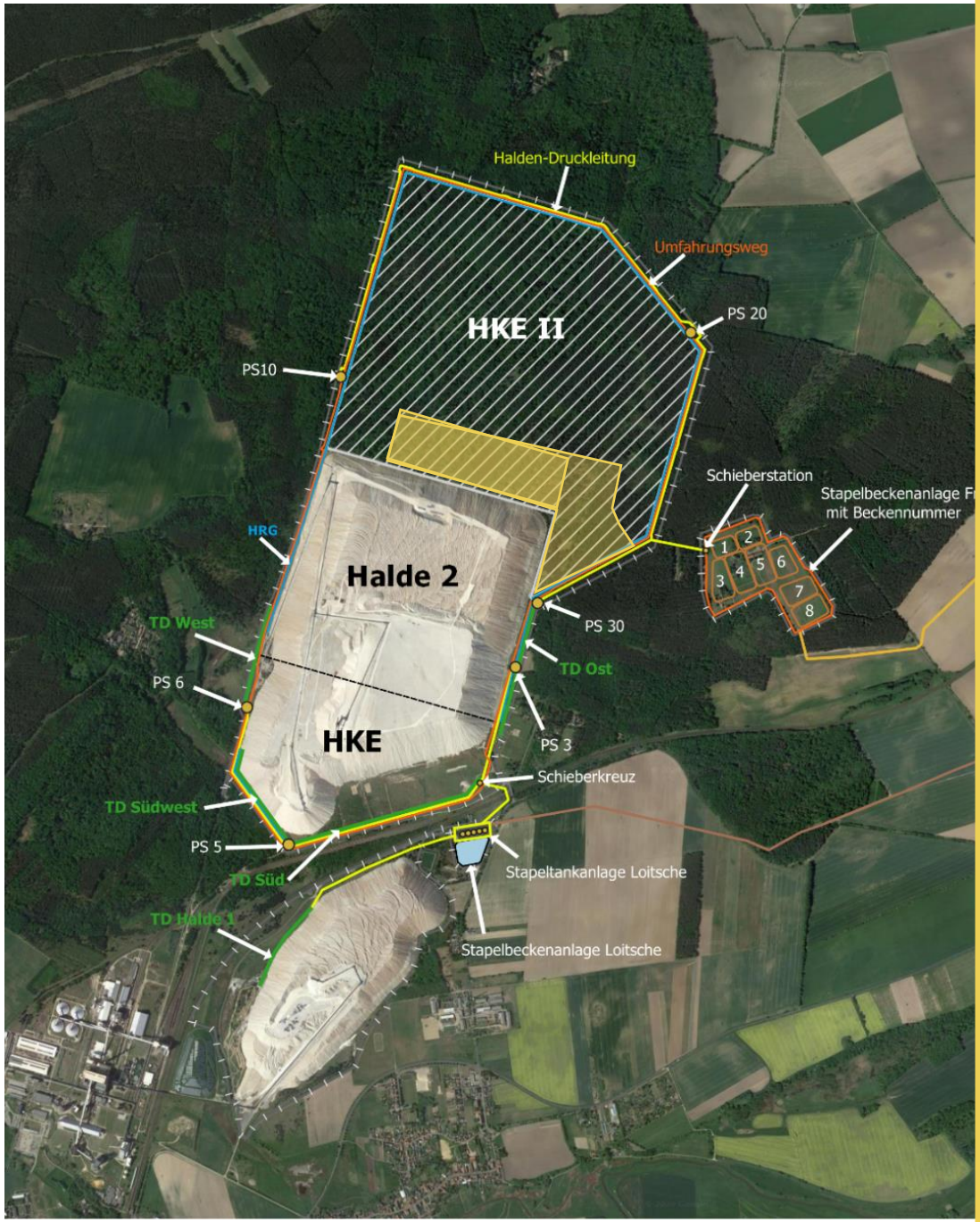
- K_f of the system < $5*10^{-10}$
- Rigerous QM-regime
- Redundant hydraulic safety because salt core of Dump is solidified



---- Protective Salt

---- Sand + Bentonite

---- Fine Sand + Bentonite + Improvement substances


Halden-Druckleitung
Umfahrungsweg
HKE II
PS 20
PS10
Schieberstation
Stapelbeckenanlage F
mit Beckennummer
HRG
Halde 2
1
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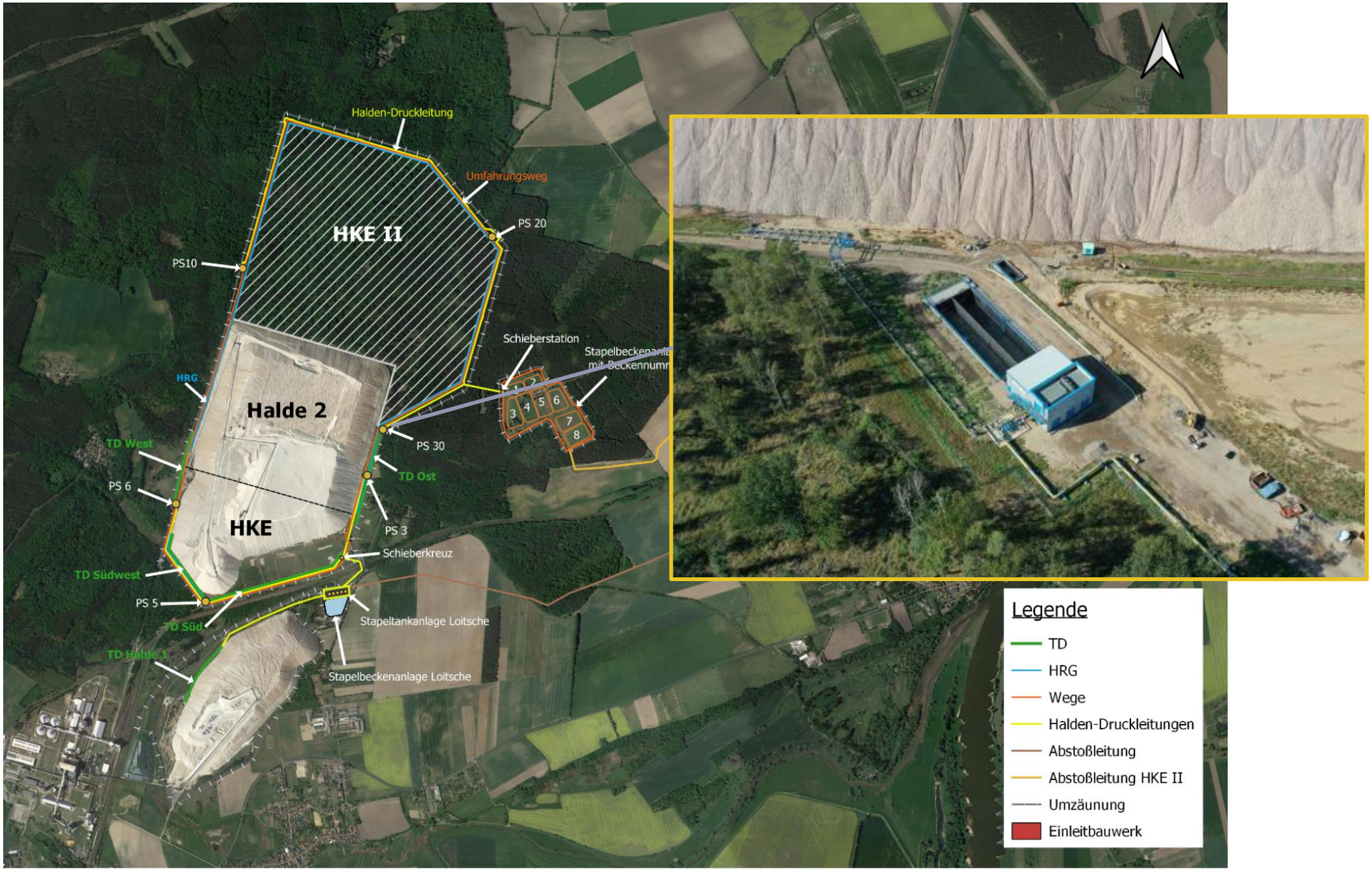
6
7
8
TD West
PS 30
TD Ost
PS 6
HKE
PS 3
Schieberkreuz
TD Südwest
PS 5
TD Süd
Stapeltankanlage Loitsche
TD Halde 1
Stapelbeckenanlage Loitsche


2020


2023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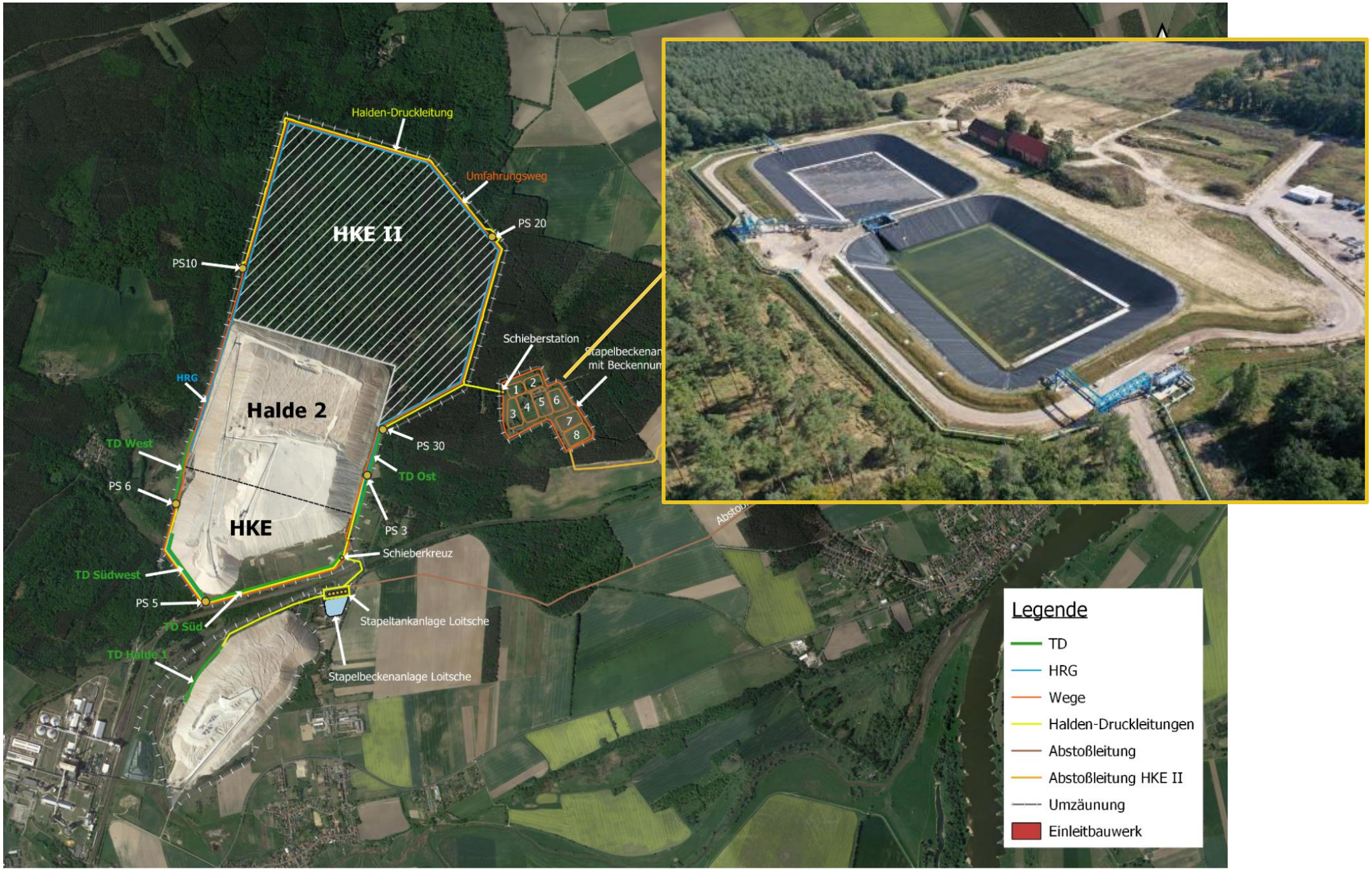
TD Süd
TD Halde 1
Stapelbeckenanlage Loitsche
Legende
TD
HRG
Wege
Halden-Druckleitungen
Abstoßleitung
Abstoßleitung HKE II
Umzäunung
Einleitbauwerk


Halden-Druckleitung
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Halden-Druckleitungen
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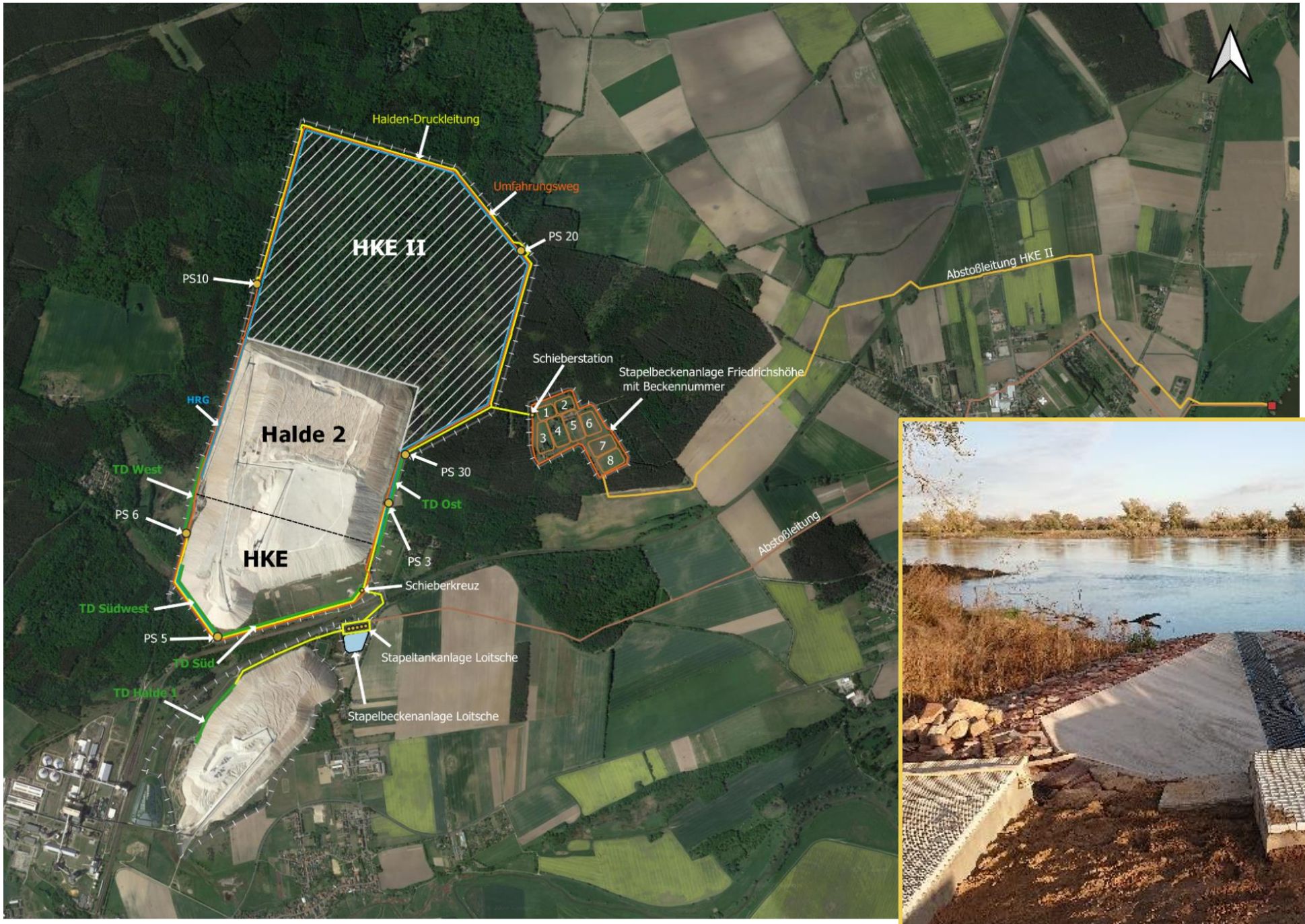
Halden-Druckleitung
Umfahrungsweg
HKE II
PS 20
PS10
Abstoßleitung HKE II
Schieberstation
Stapelbeckenanlage Friedrichshöhe
mit Beckennummer
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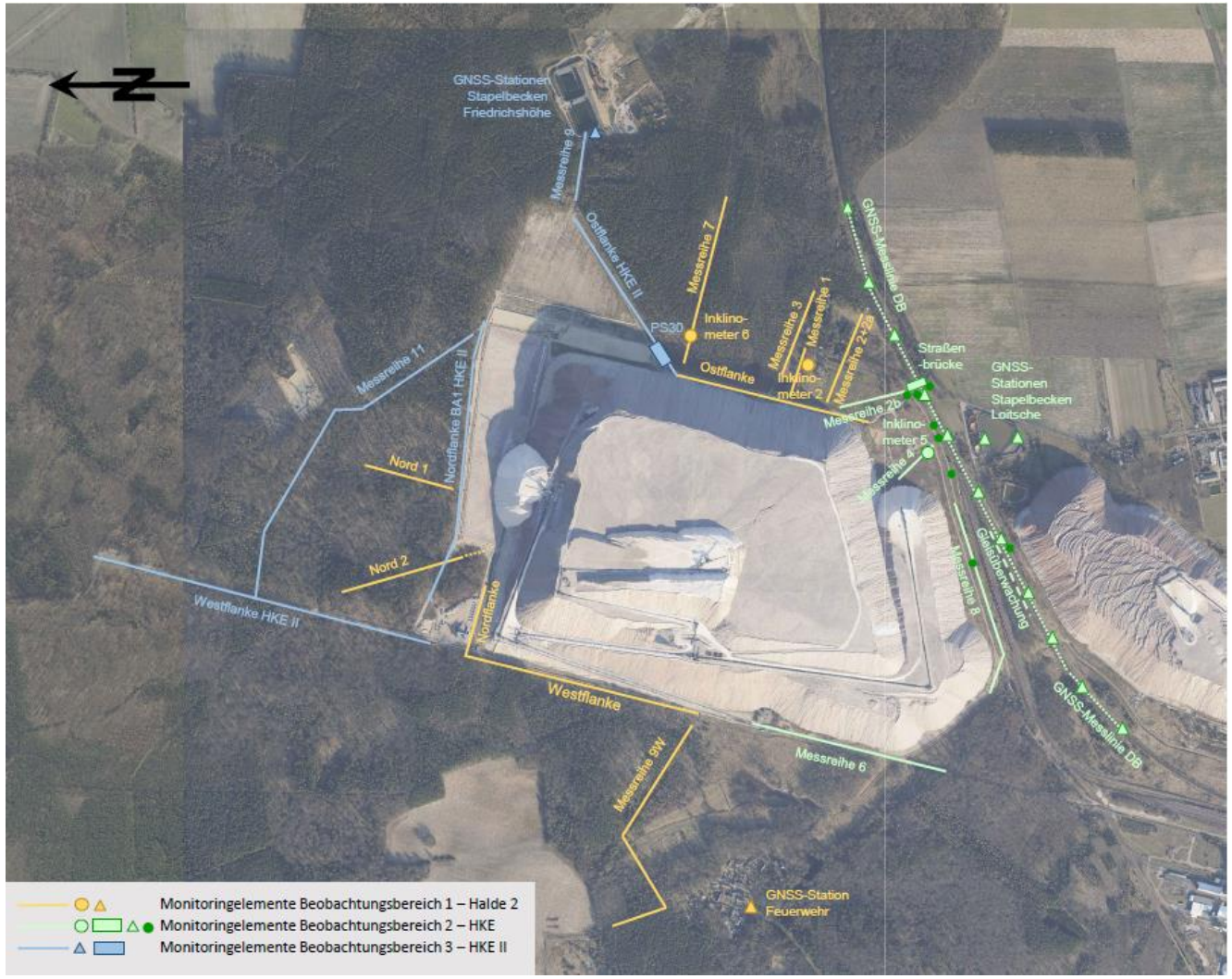
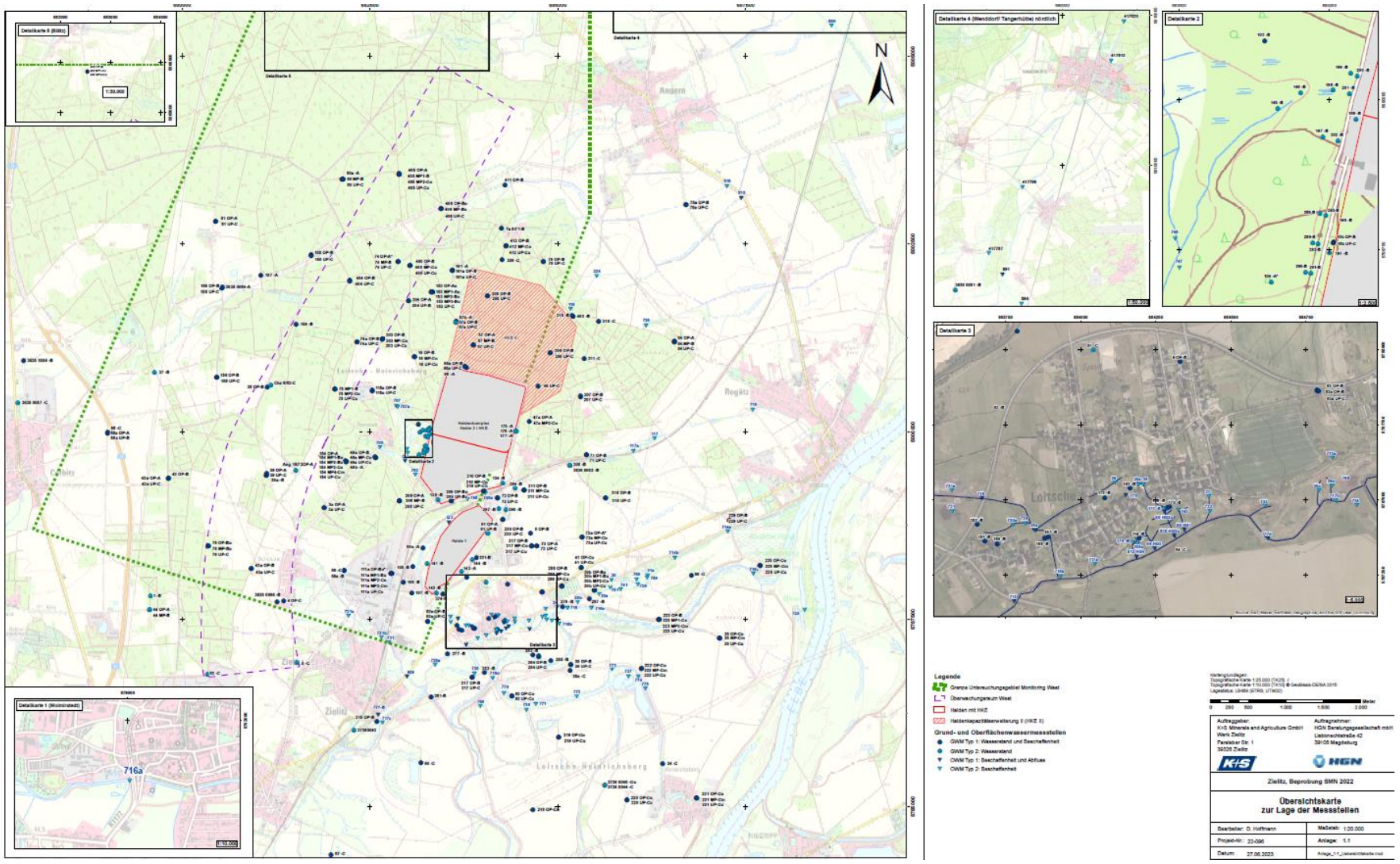
TD Süd
Stapeltankanlage Loitsche
TD Halde 1
Stapelbeckenanlage Loitsche

GEOTECHNICAL MONITORING



- Train line
- Limited construction nearby
- Up to 1,5 m heaving
- Up to 10 m horizontal movement

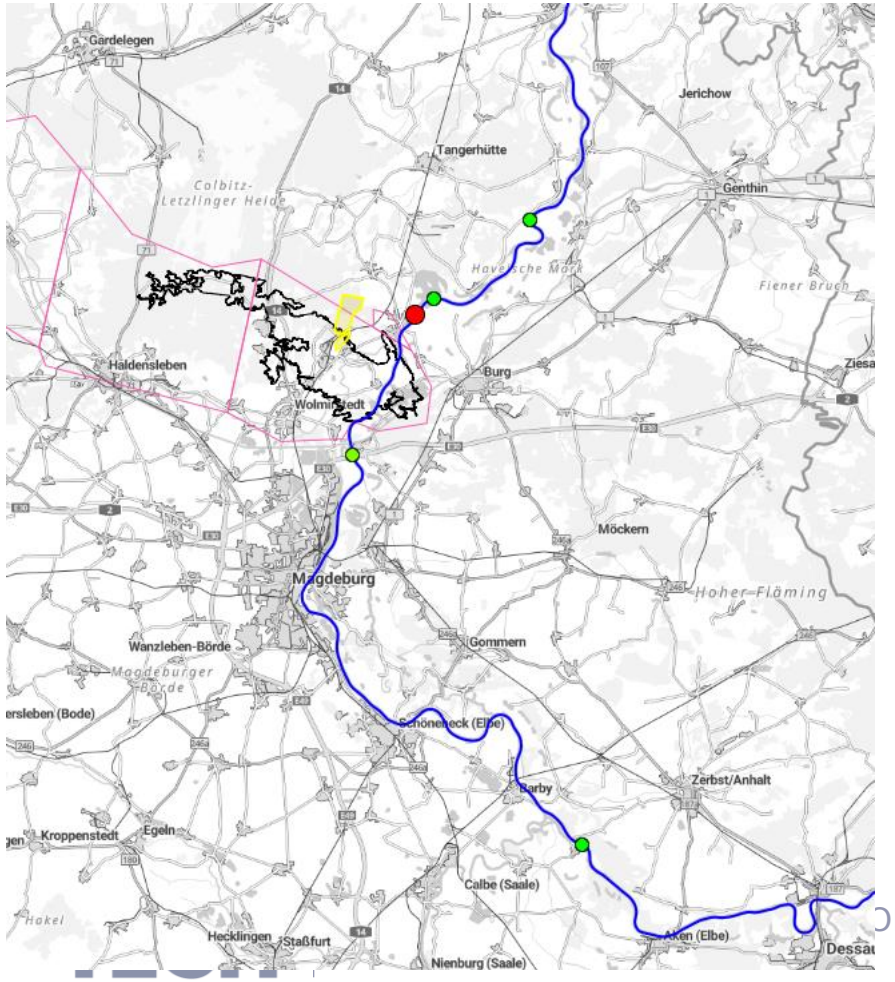
GROUND- AND SURFACE WATER MONITORING I



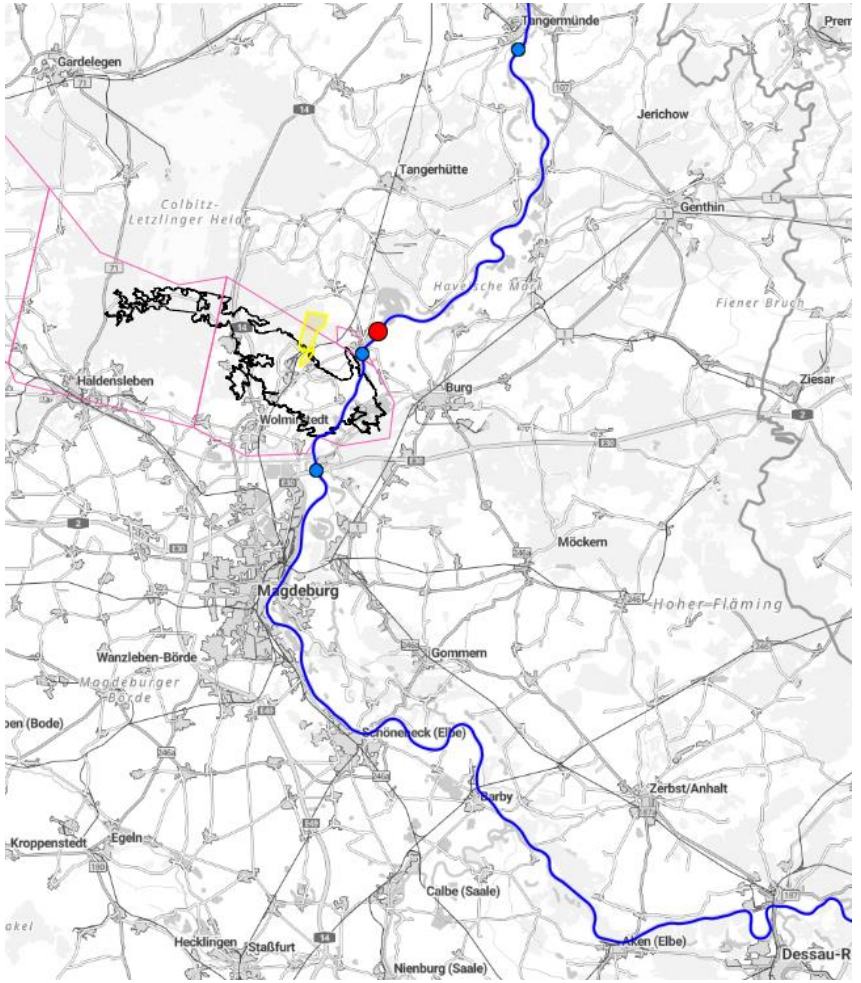
- Over 100 measurement points
- 3 Aquifers
- Drinking water protection area
- Village groundwater downstream direction

SURFACE WATER MONITORING

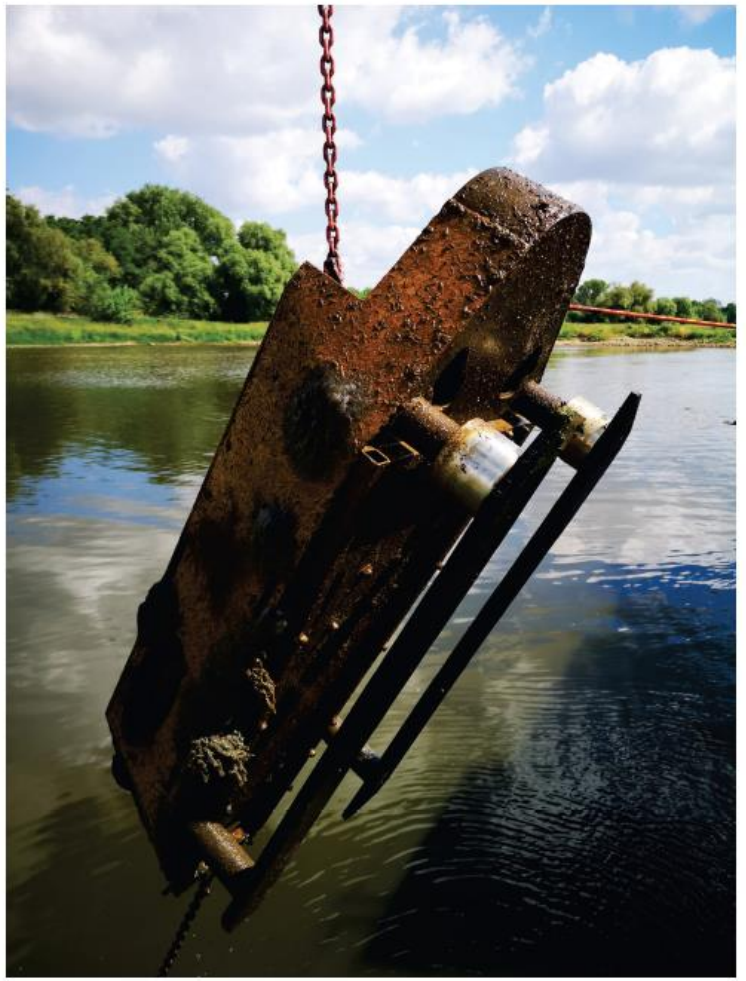
Ecological Measurements



Continuous EC-Measurments

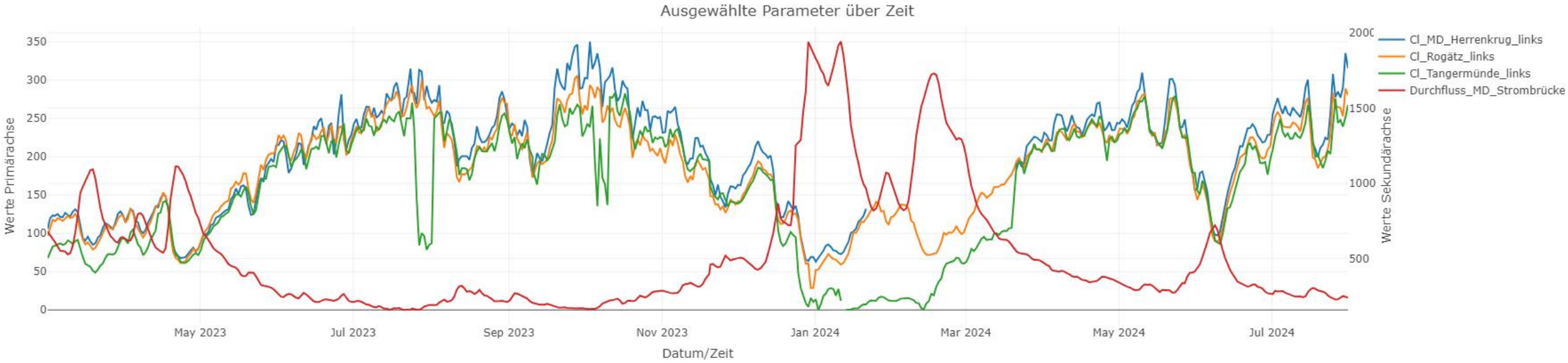


REAL-TIME-WATER ANALYSIS (ELECTRIC CONDUCTIVITY)



Station 01 / Rogätz: Bergung der Bodenstation mittels Tonnenleger, starke Verschmutzungen erkennbar

REAL-TIME-WATER ANALYSIS (ELECTRIC CONDUCTIVITY)

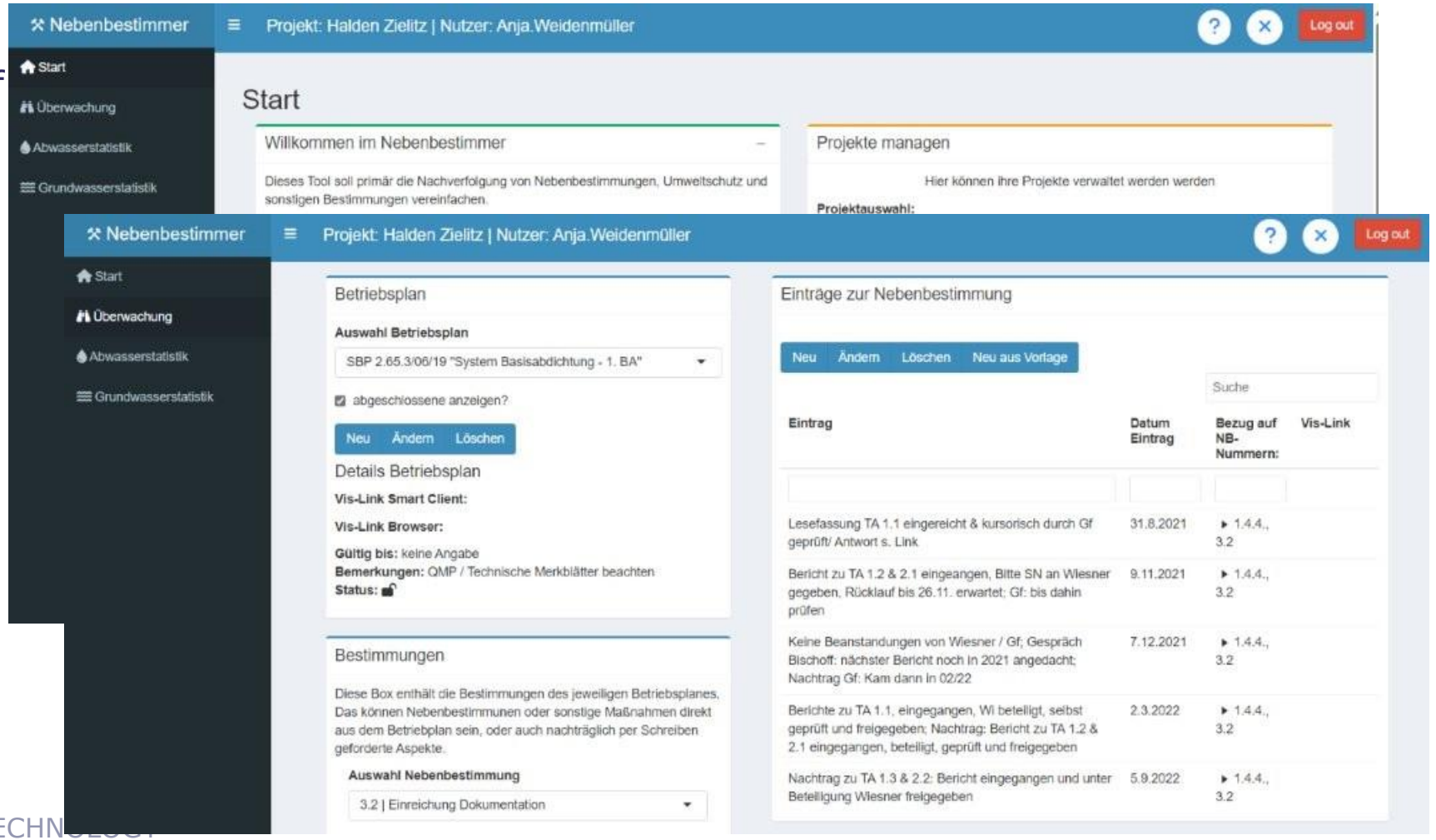


INFILTRATION REDUCTION LAYER

- Shall reduce wastewater from dump by 50%
- 5% additives to final layer of salt
- *Has a major impact on waste water management*

DIGITALIZATION IN THE AUTHORITY

- Dashboard app
- to tackle the sheer amount of information
- Currently
  20 Mining permits
  300 NBs
  100 Notes that are
  connected to many NBs
- Multidimensional connections require multidimensional solutions
- → Database



UNIVERSITIES‘ ROLES

- The whole process was and is heavily supported by German universities
  - TU Freiberg
  - TU Clausthal
  - TU Kassel
  - HTW Cottbus
  - RWTH Aachen

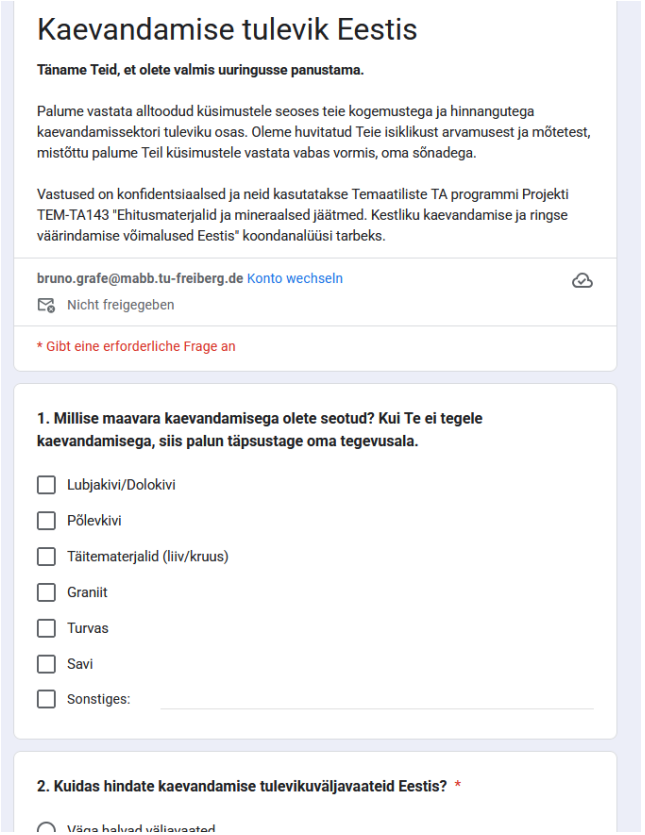
REQUEST

Project TEMTA-143

- Sustainability BUT ALSO **Resource Securing** Questions in the Estonian Mining Sector
- Many things are known within the Circle of Experts
- **Little is documented and quantified**

REQUEST

- We ask you to honestly answer **in your own words as free text**
- 5 Questions, 5 Minutes
- We will read every comment and cluster/quantify
- Obtain a presentable statistic of the sentiment of Estonian resource industry



Kaevandamise tulevik Eestis

Täname Teid, et olete valmis uuringusse panustama.

Palume vastata alltoodud küsimustele seoses teie kogemustega ja hinnangutega kaevandamissektori tuleviku osas. Oleme huvitatud Teie isiklikust arvamusest ja mõtetest, mistõttu palume Teil küsimustele vastata vabas vormis, oma sõnadega.

Vastused on konfidentsiaalsed ja neid kasutatakse Temaatiliste TA programmi Projekti TEM-TA143 "Ehitusmaterjalid ja mineraalsed jäätmed. Kestliku kaevandamise ja ringse väärindamise võimalused Eestis" koondanalüüsi tarbeks.

bruno.grafe@mabb.tu-freiberg.de Konto wechseln

Nicht freigegeben

* Gibt eine erforderliche Frage an

1. Millise maavara kaevandamisega olete seotud? Kui Te ei tegele kaevandamisega, siis palun täpsustage oma tegevusala.

- [ ] Lubjakivi/Dolokivi
- [ ] Põlevkivi
- [ ] Täitematerjalid (liiv/kruus)
- [ ] Graniit
- [ ] Turvas
- [ ] Savi
- [ ] Sonstiges:

2. Kuidas hindate kaevandamise tulevikuväljavaateid Eestis? *

TAL TECH

THANK YOU!