

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



SACHSEN-ANHALT

Mining Authority Saxony-Anhalt (Ger.)

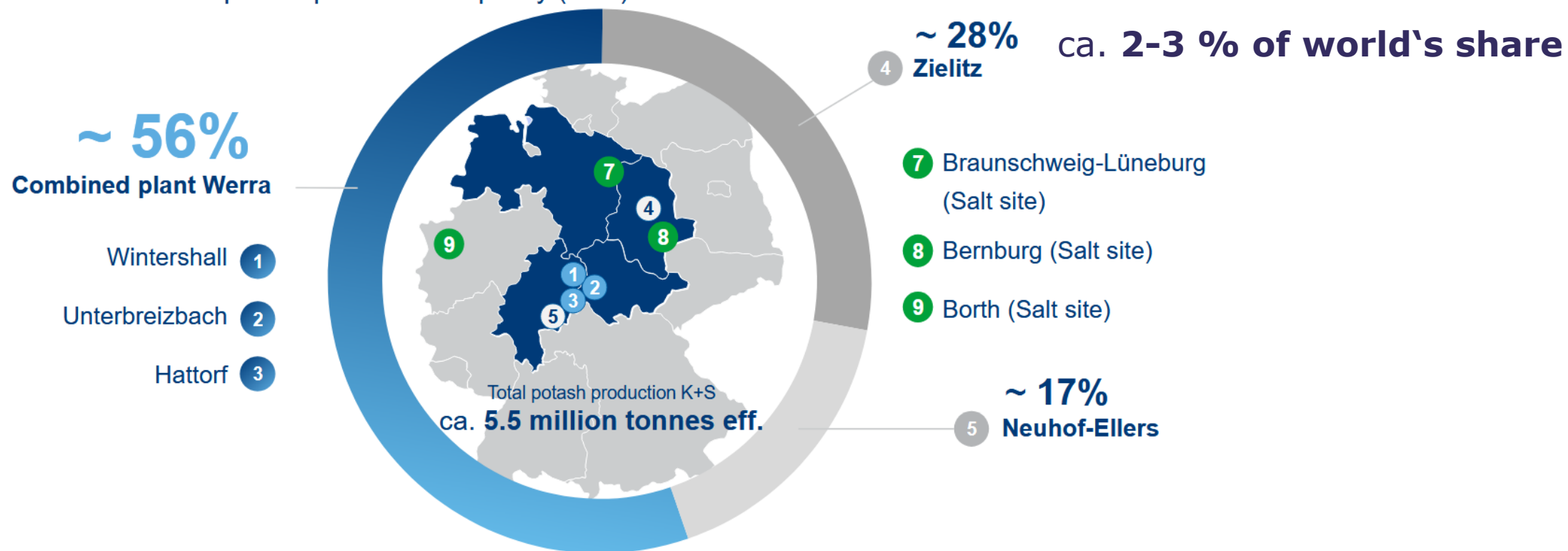
- Deputy / Specialist Officer underground mining
- Mining law / legal issues
- Environmental aspects
- Acceptance issues
- Work safety
- Focus: Potash Mining



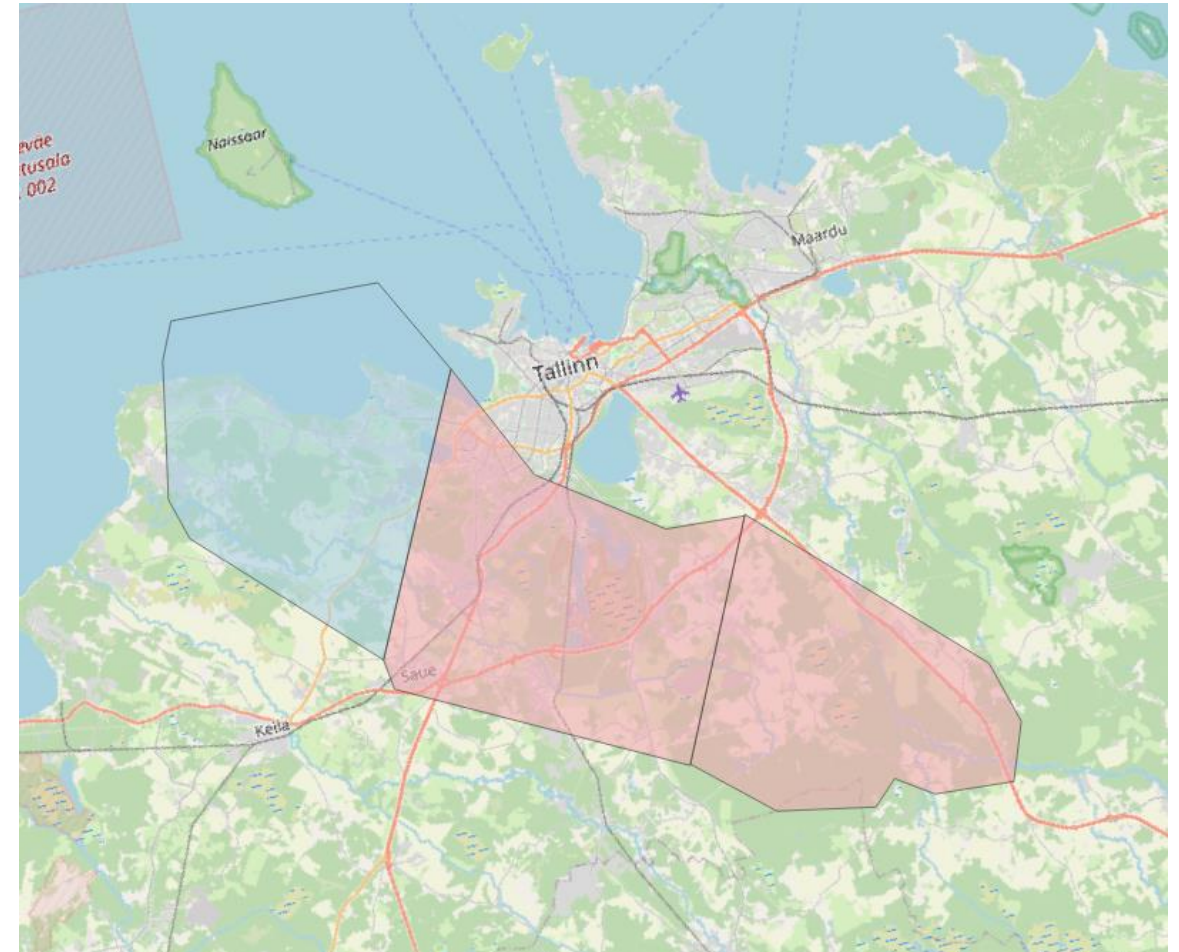
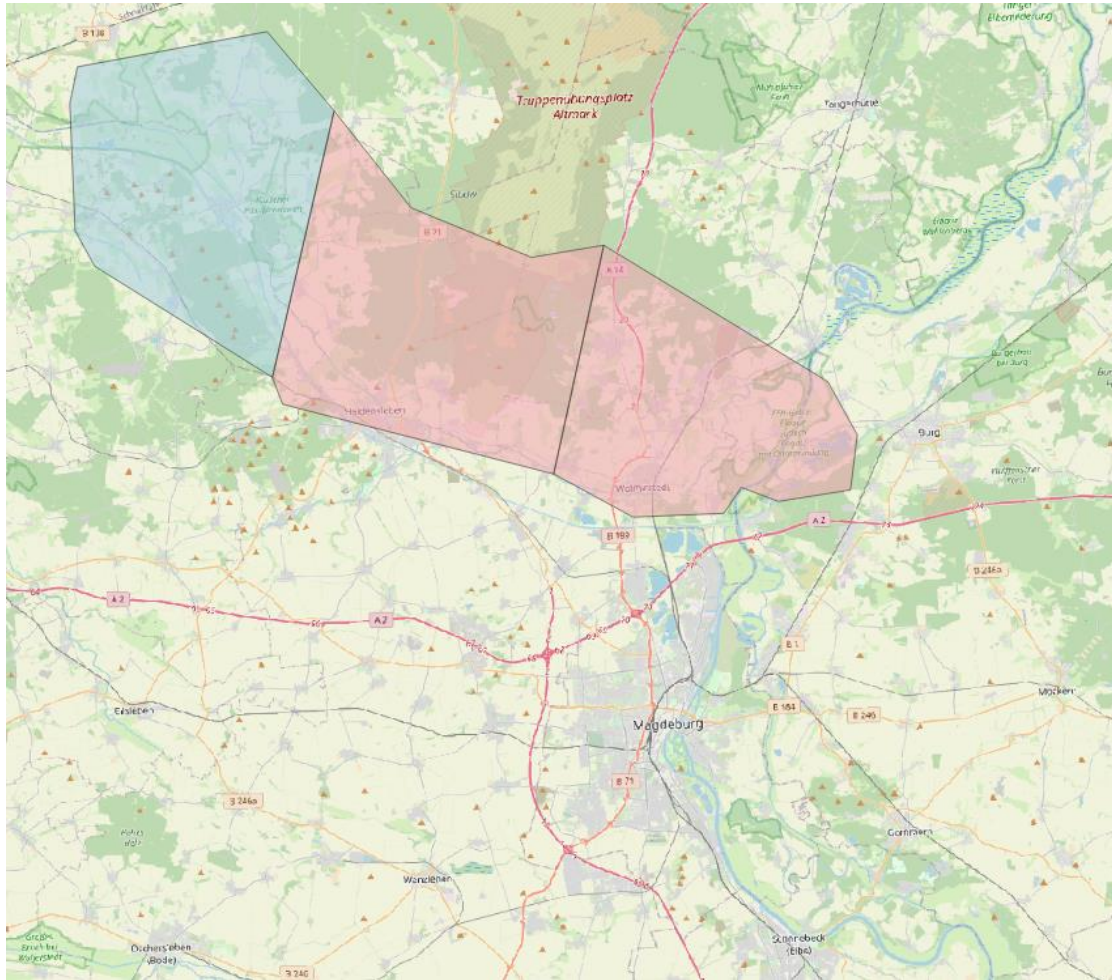
POTASH IN GERMANY



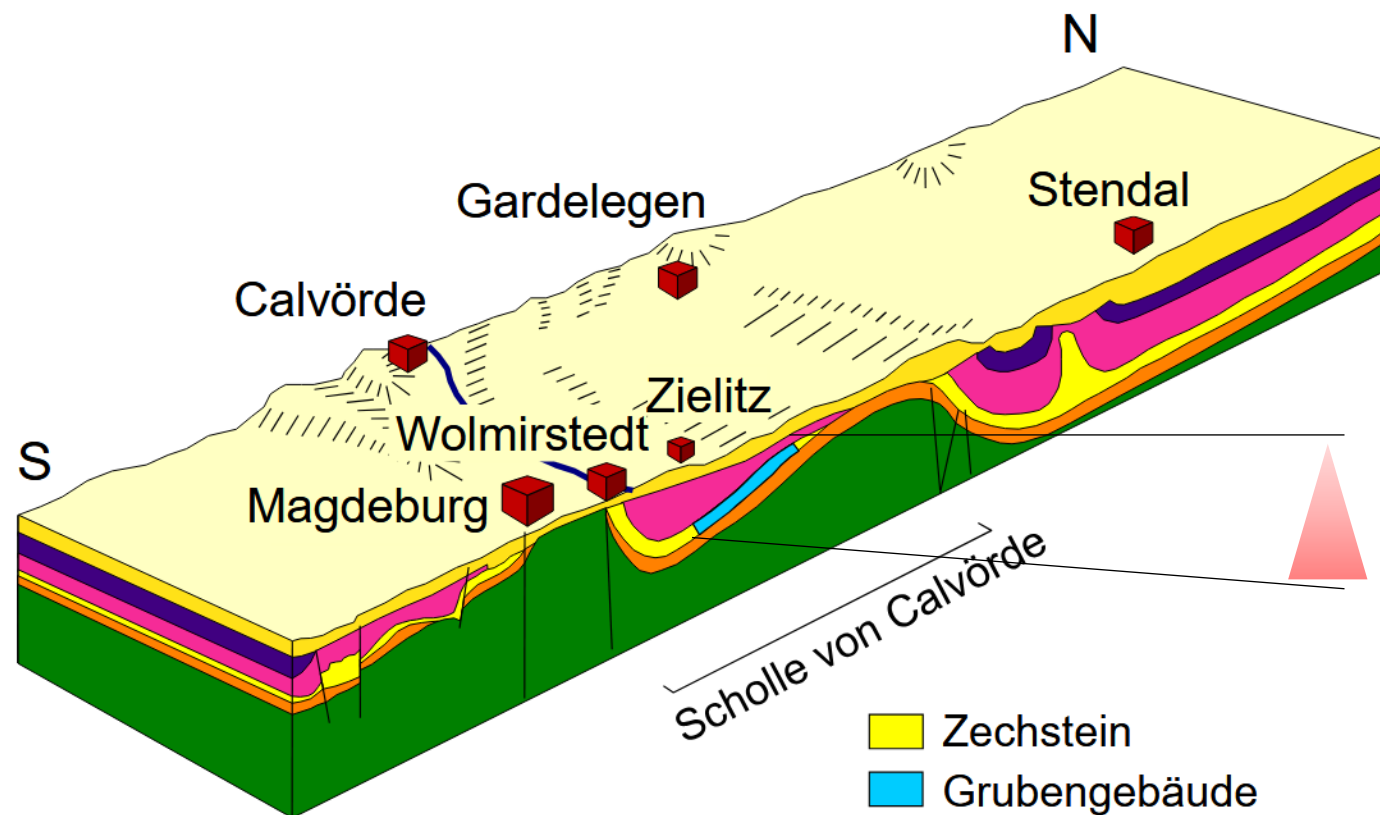
Share of annual potash production capacity (in %)



ONE OF THE LARGEST MINES IN EUROPE



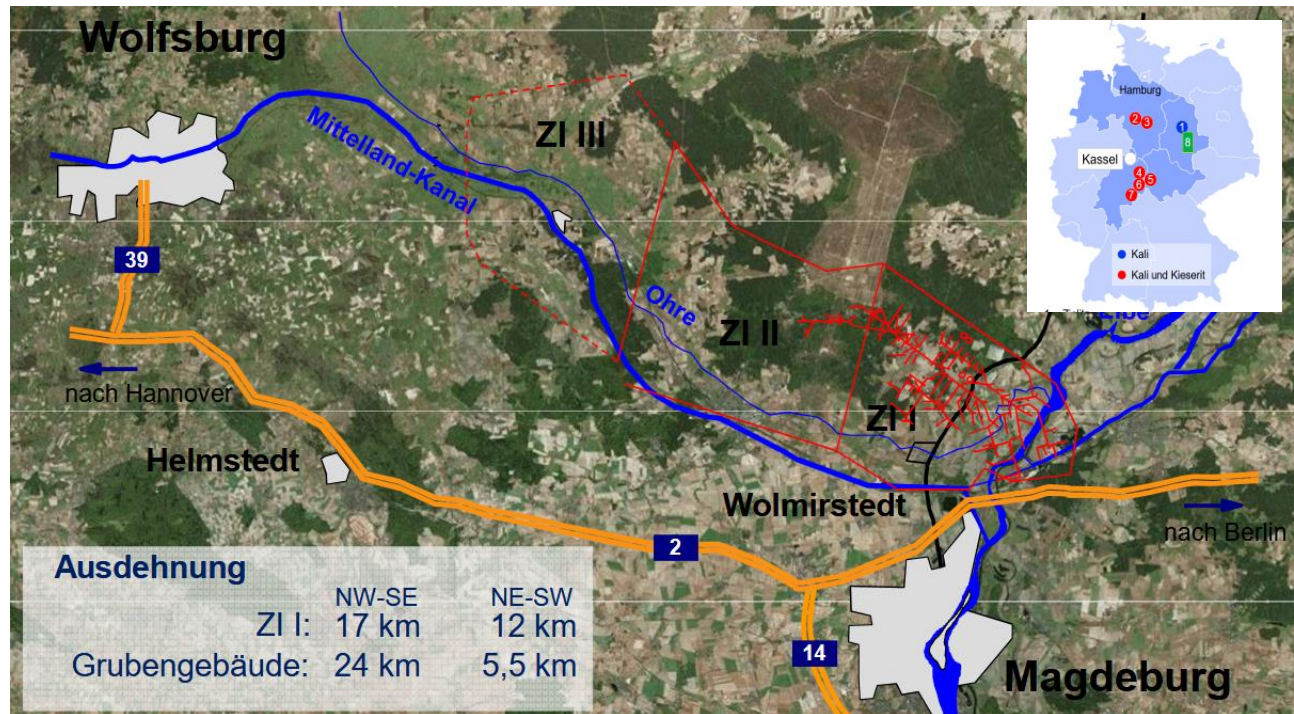
GEOLOGY ZIELITZ



Sylvinit seam „Ronneberg“

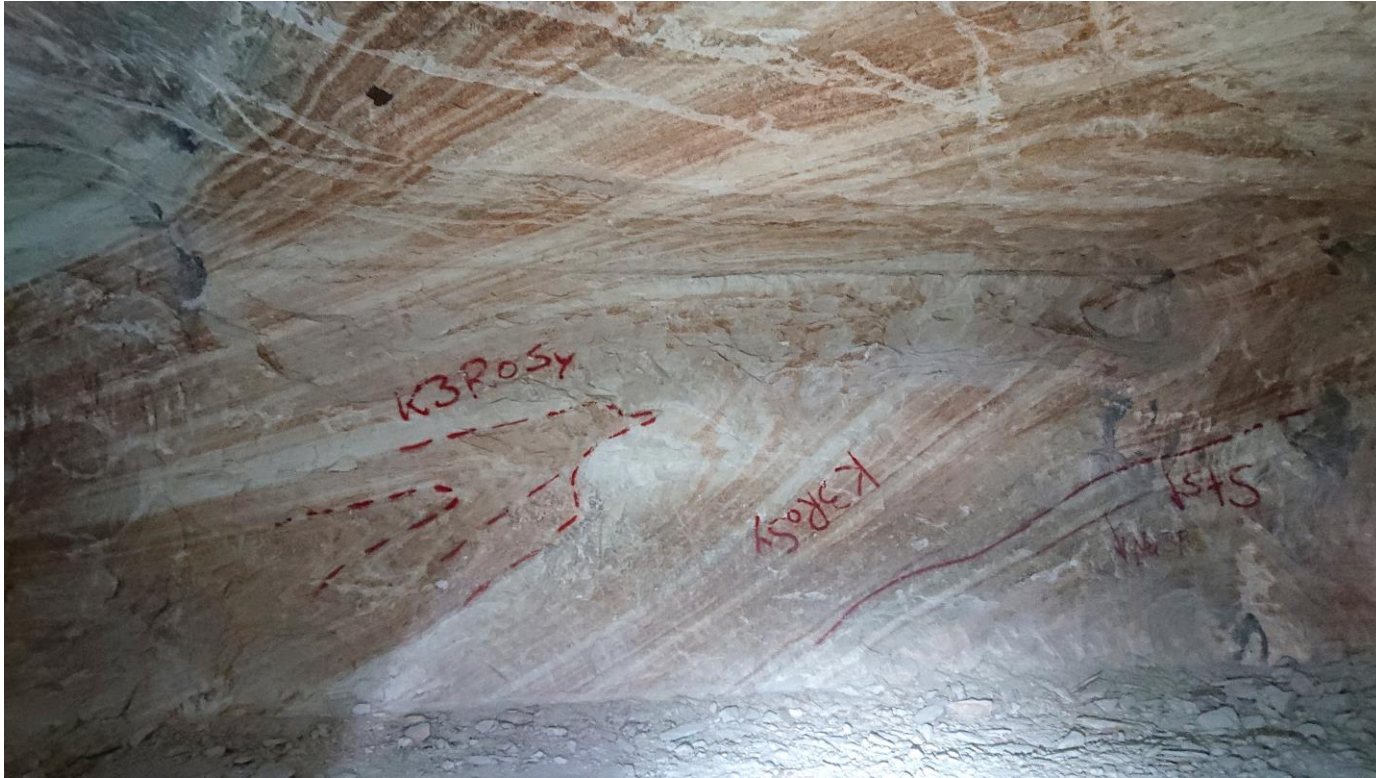
- Thickness: 3-20 , (av. 5.5 m)
- K₂O ca. 12 %
- General inclination: 17 %
- 4 shafts

MINE ZIELITZ

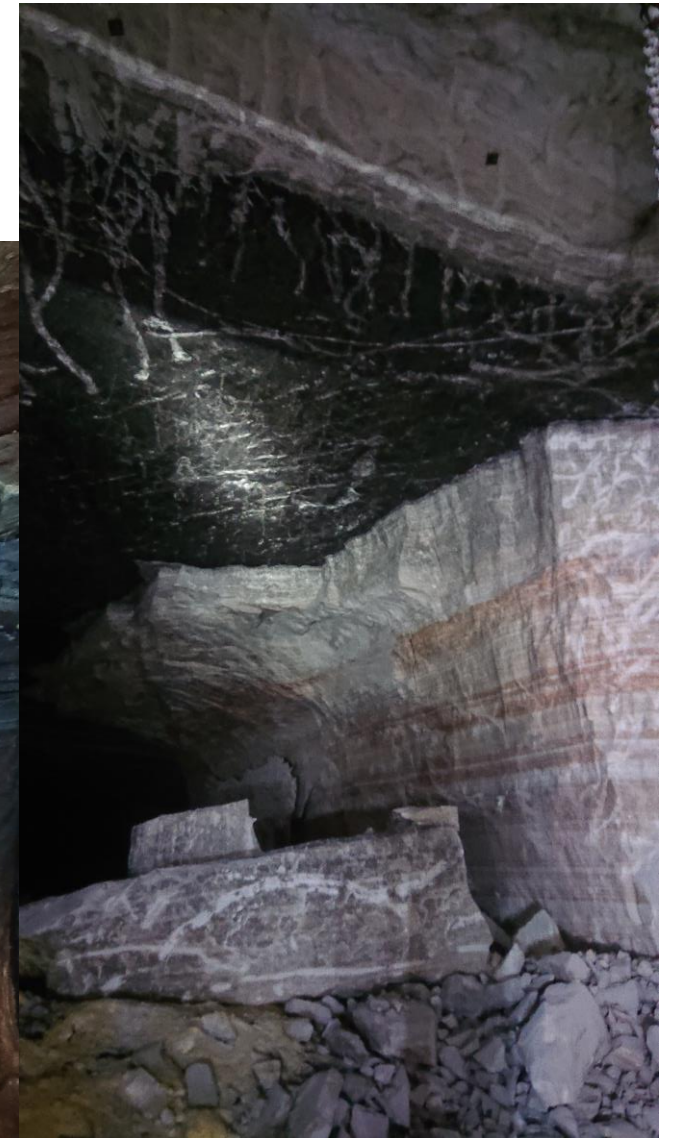


- Mining area: 61 km², extends 19 km SE-NW, 6 km SW-NE.
- Room-and-pillar mining: ~40-70% loss
- Production capacity: nearly 12 Mio t p.a.
- 1.2 Mio t of product

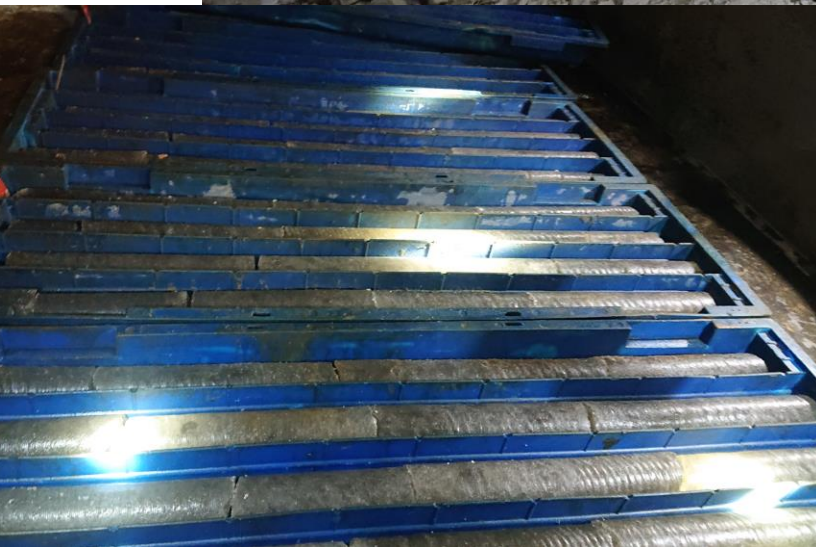
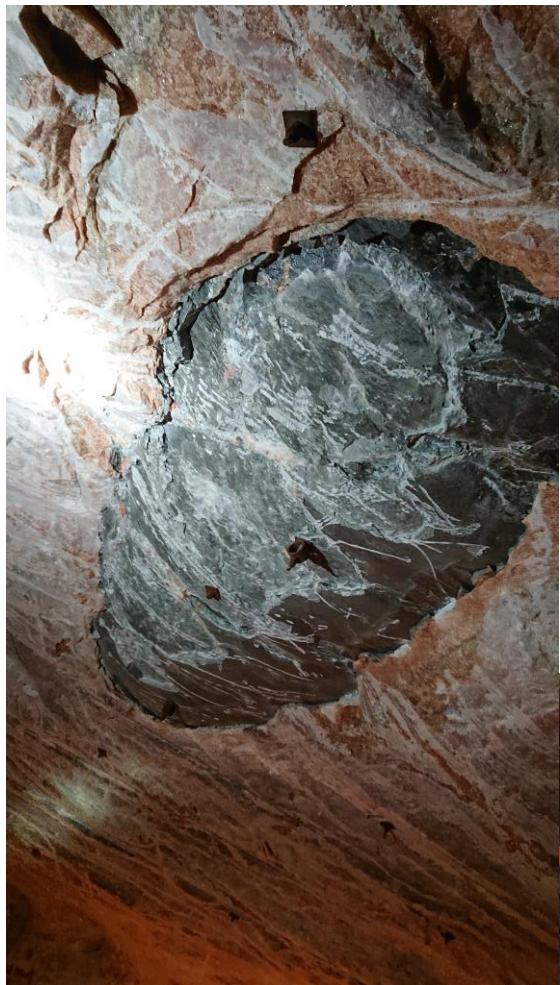
EXCITING GEOLOGY



EXCITING GEOLOGY



EXCITING GEOLOGY



**TAL
TECH**

TALLINN

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

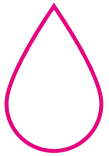


- Application: ~ 5 m of shelf
Ca. 10.000 pages
- Permit: 978 pages
- ~10 years review time
- Public formal planning permission procedure
- Tremendous amounts of data
- Key issue = Salt Water Emmissions

SITUATION



- **Mining Law**
Organise and balance the needs of benefit for society by resource extraction against individual rights



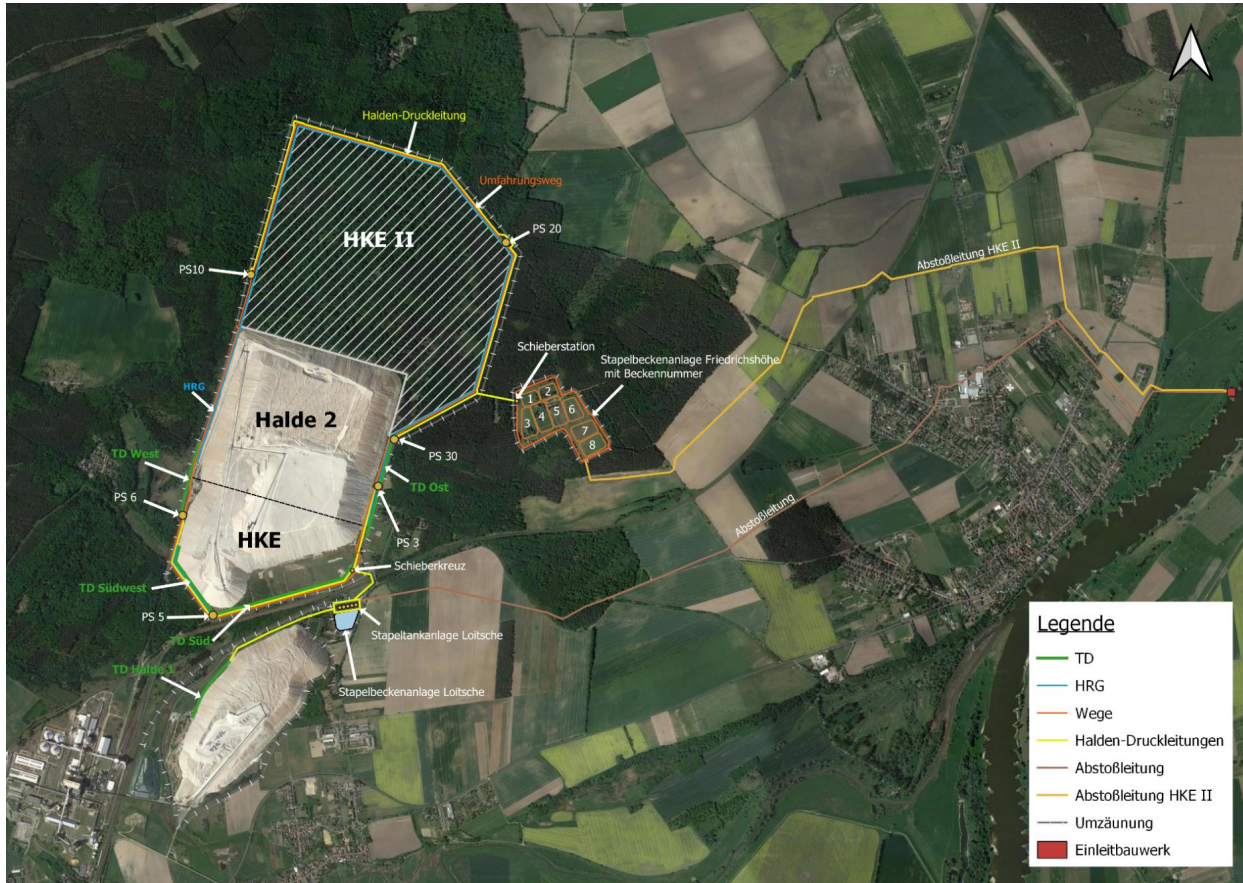
- Minimize impact of mining to the highest *feasible* extent
- Necessary to adhere to **4th EU Water directive Framework**



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

HALDENKAPAZITÄTserweiterung II

2ND CAPACITY EXTENSION FOR WASTE DUMP



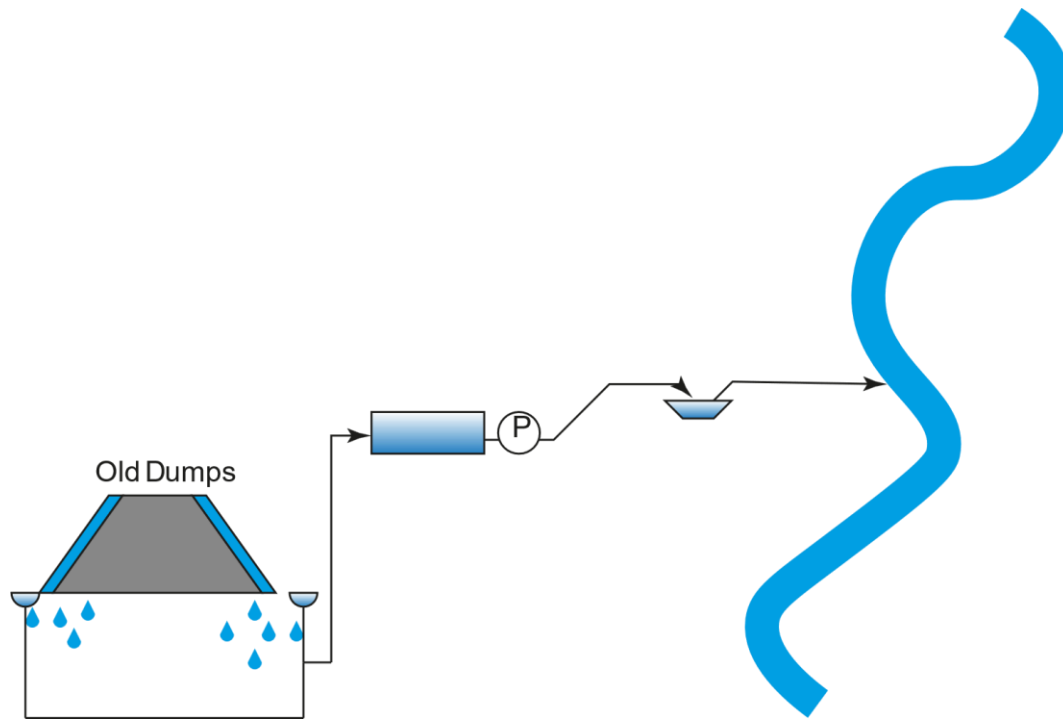
- Amount Ca. 10 Mio t/a
- Runtime 34 a
- Space 200 ha
- New pumping stations
- Pipelines
- Infrastrukture
- Buffer basins
- Base sealing
- Surface buffer layer

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)

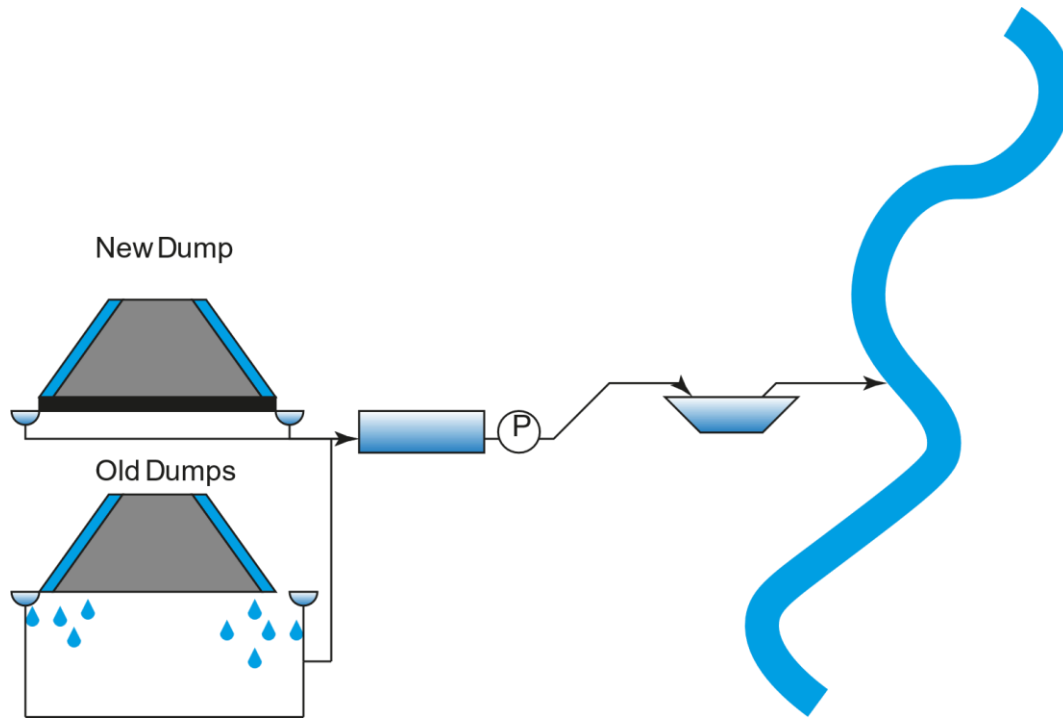
EMISSION MITIGATION CONCEPT



- **Status Quo**

- X mio m³ seep into groundwater from old dumps

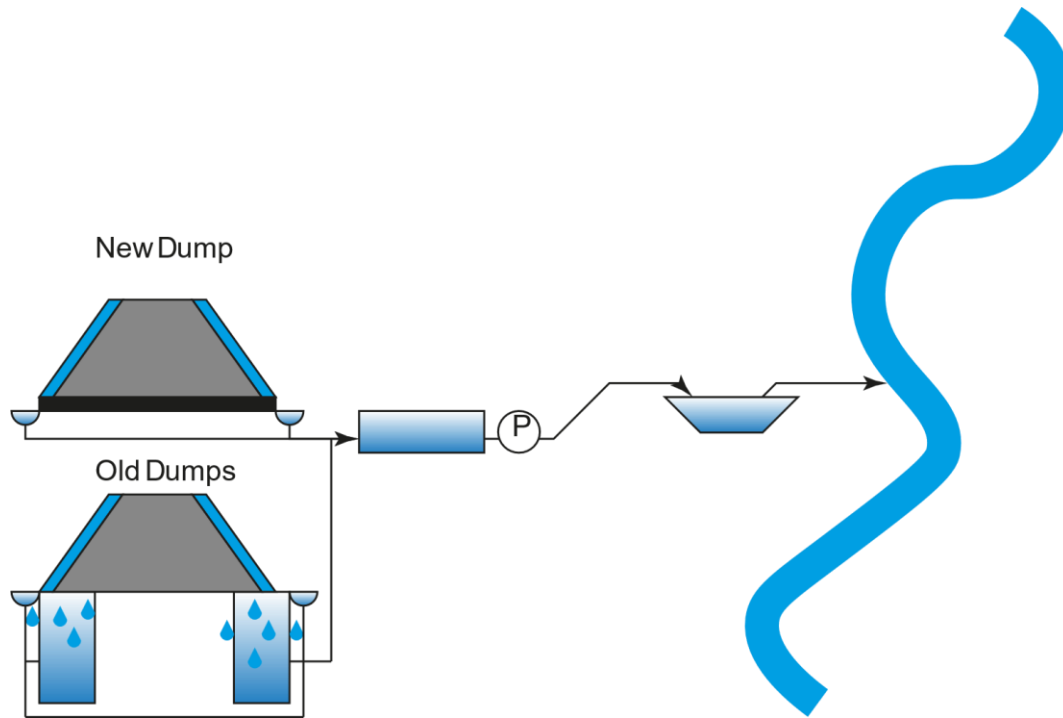
EMISSION MITIGATION CONCEPT



■ 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

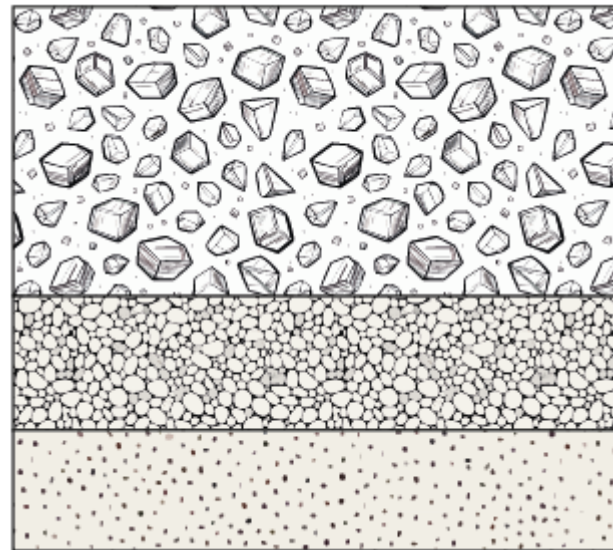
- **With the Dump extension, less saltwater goes into Ground, than without!**

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

BASE SEALING



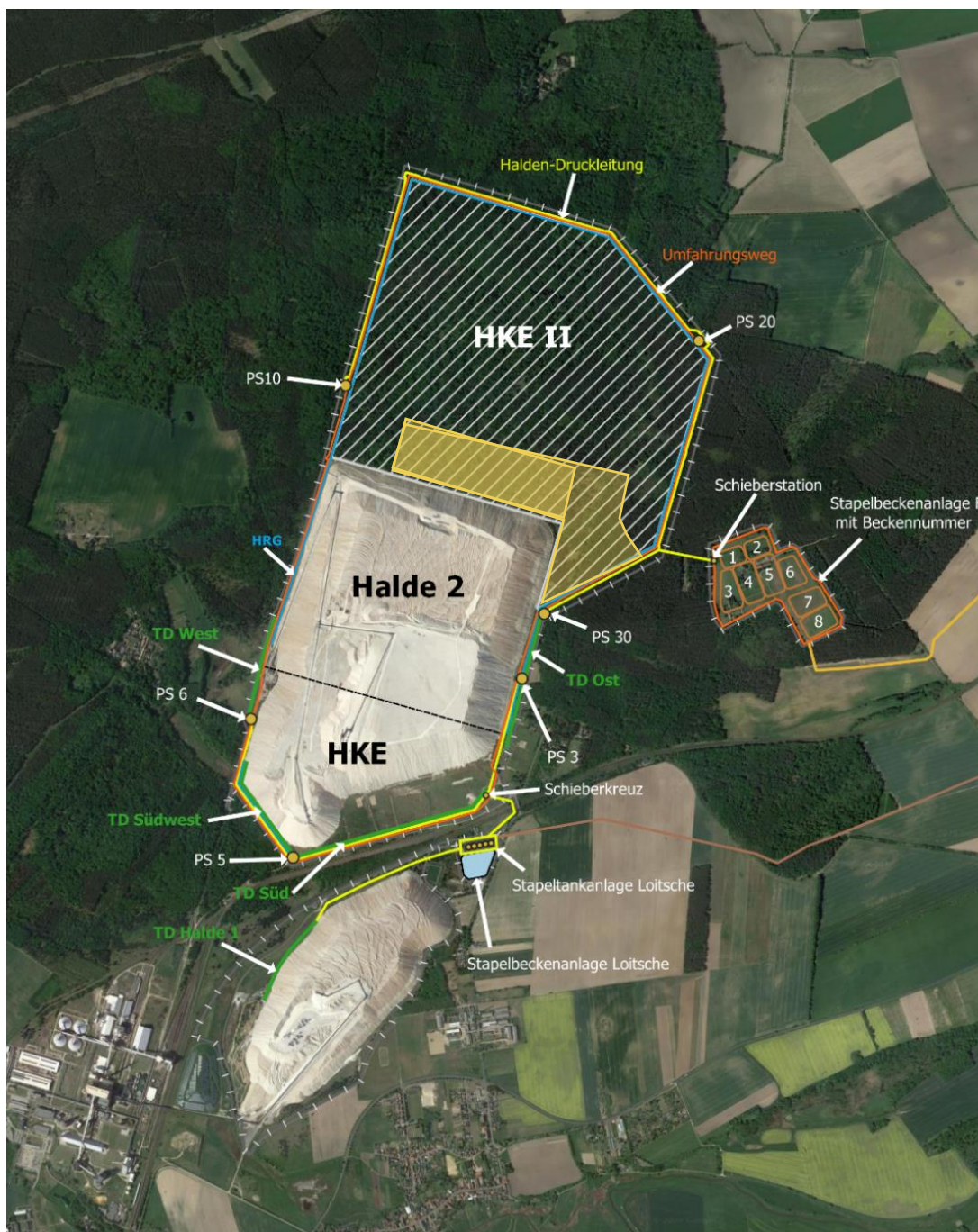
- K_f of the system $< 5 \cdot 10^{-10}$
- Rigerous QM-regime
- Redundant hydraulic safety because salt core of Dump is solidified

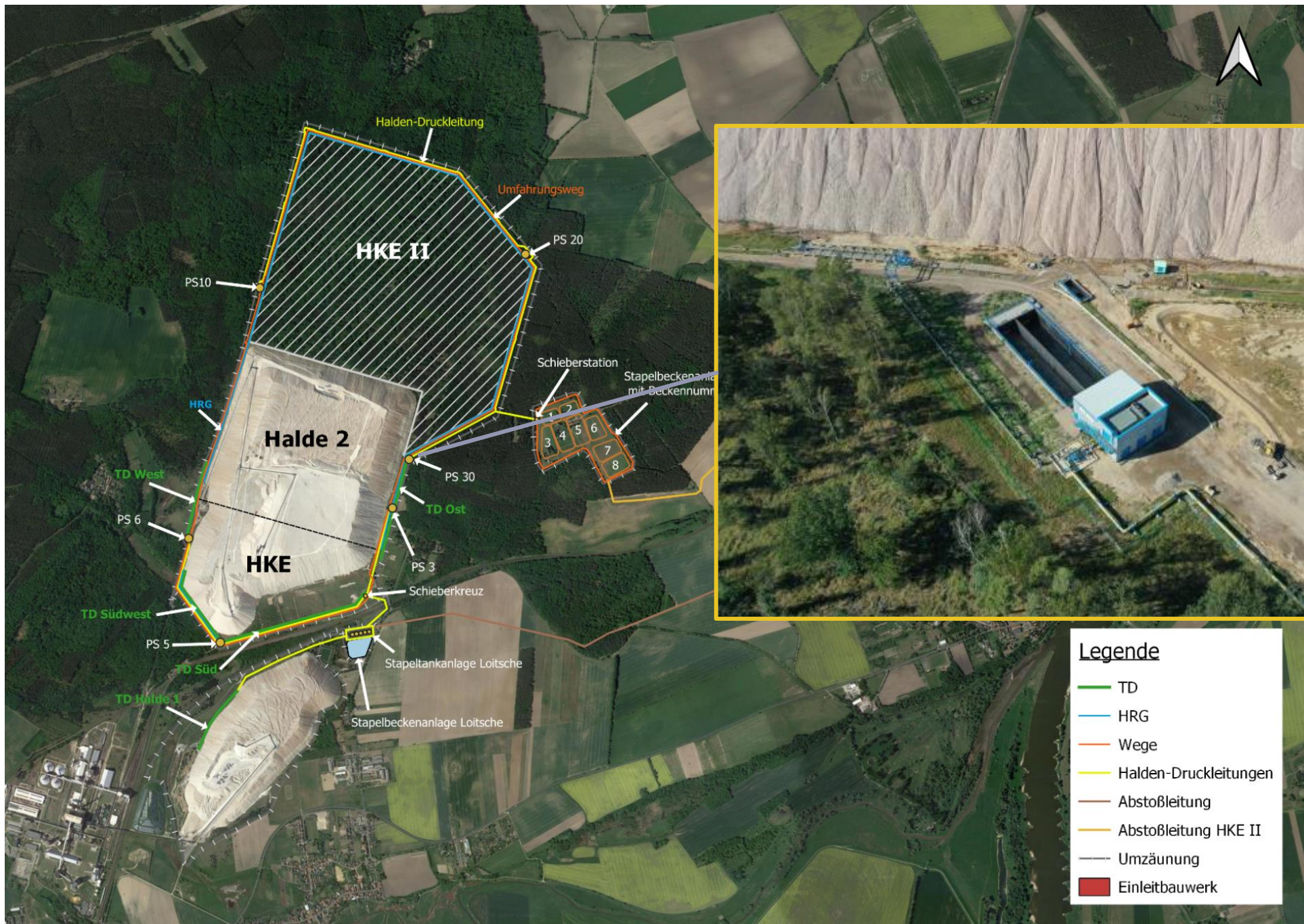


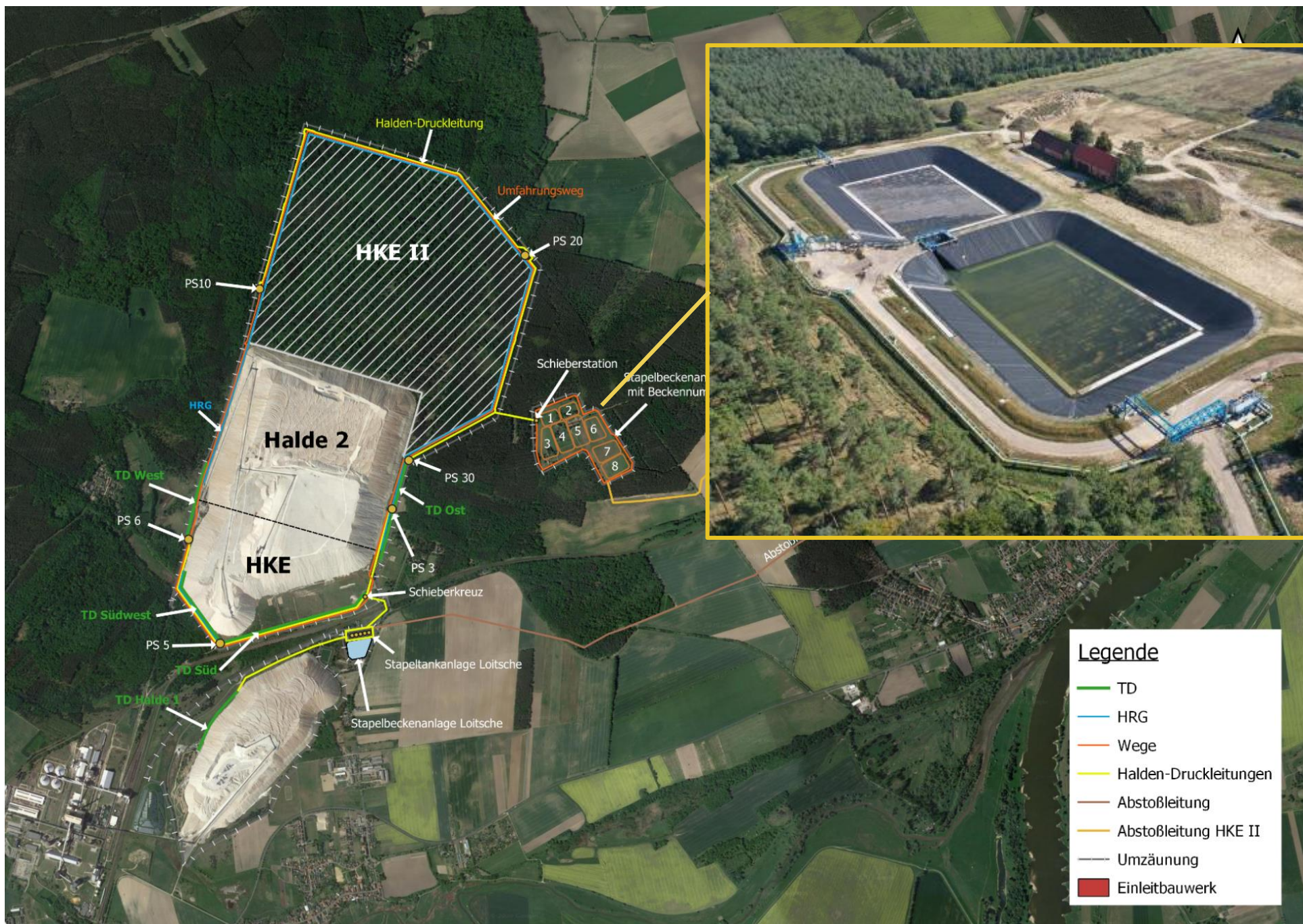
---- Protective Salt

---- Sand + Bentonite

---- Fine Sand + Bentonite +
Improvement substances

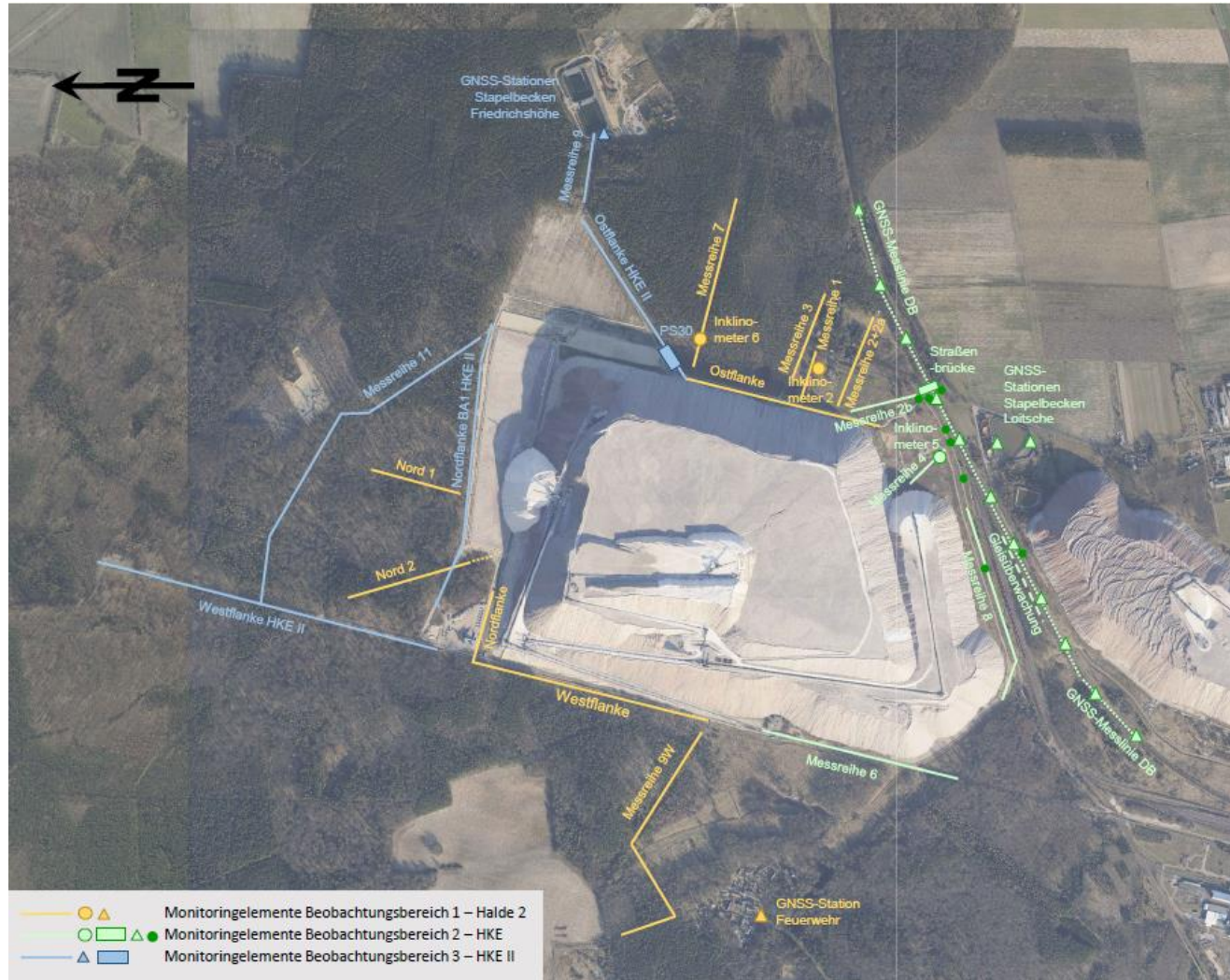






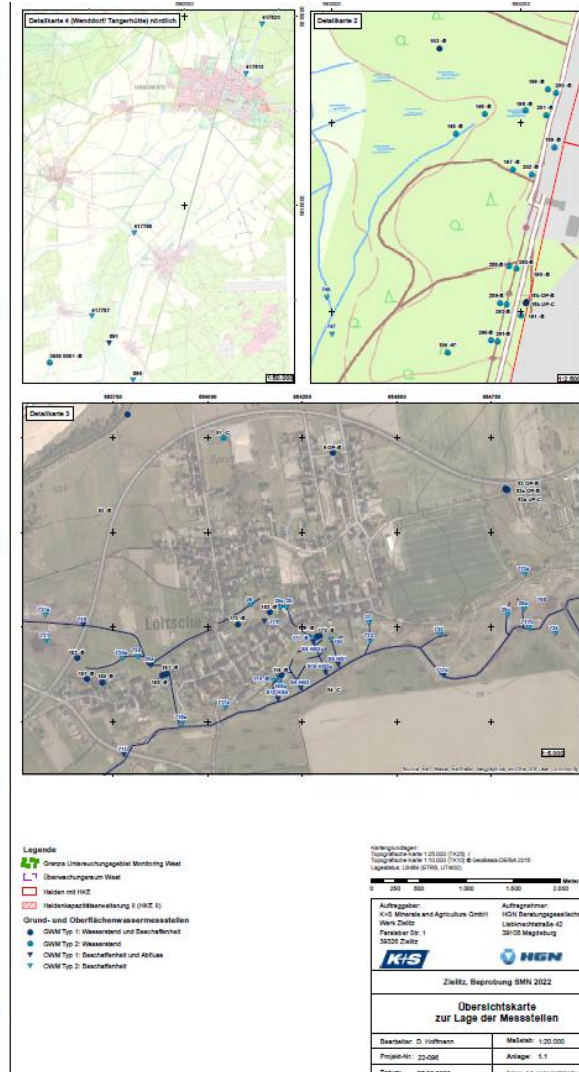
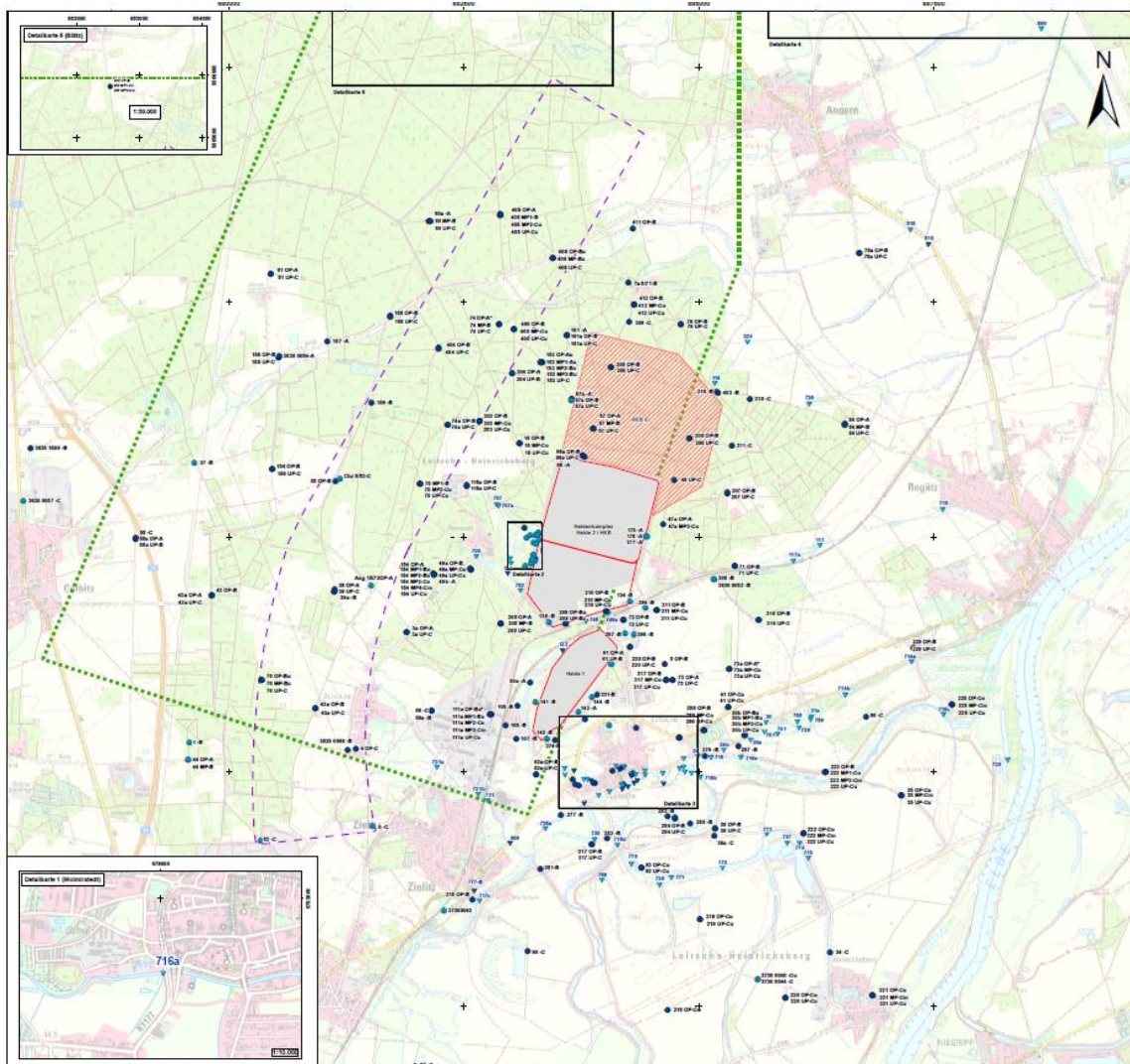


GEOTECHNICAL MONITORING



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

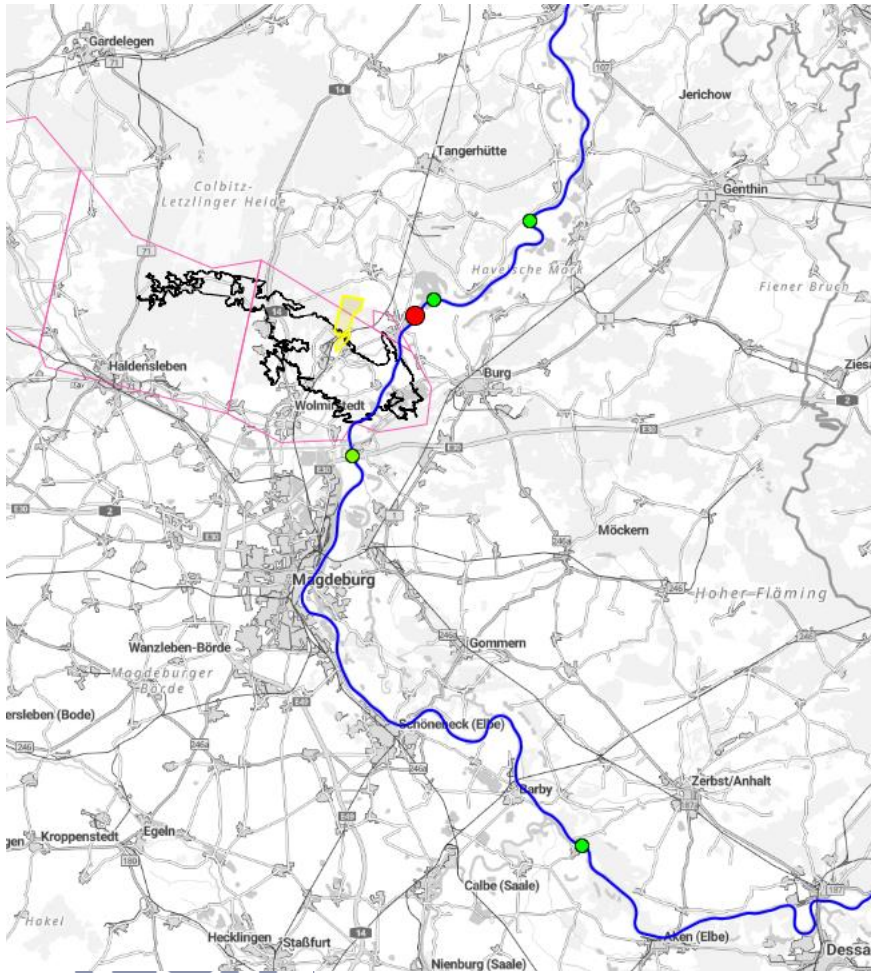
GROUND- AND SURFACE WATER MONITORING I



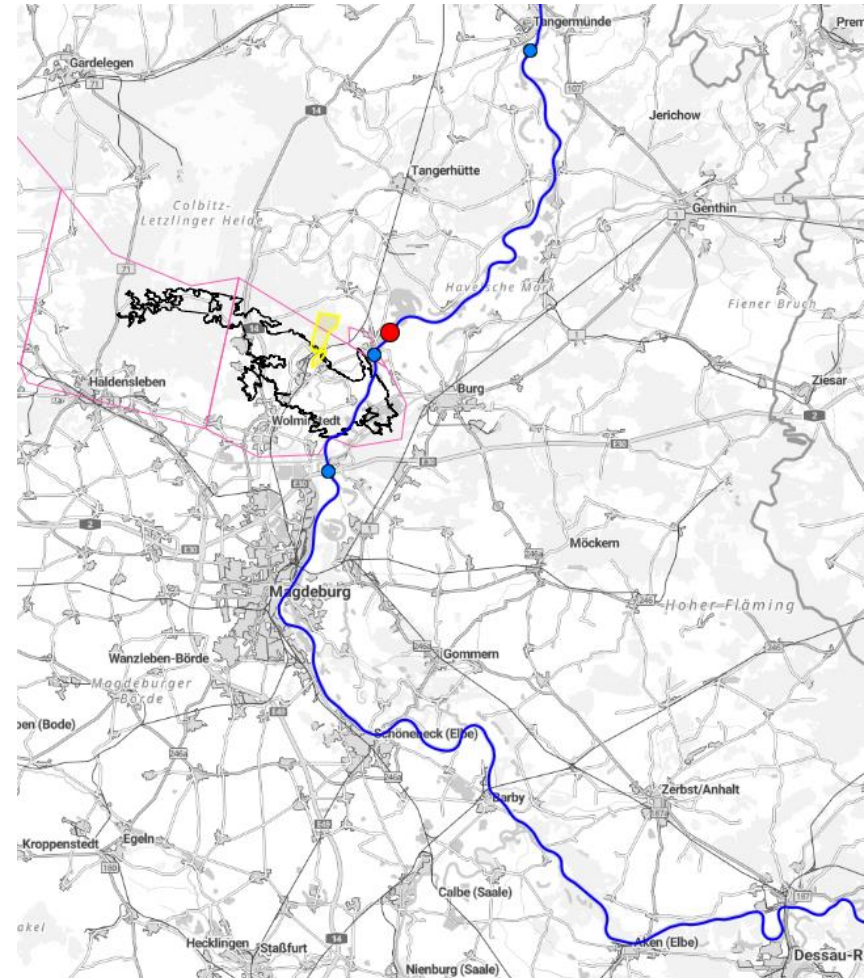
- Over 100 measurement points
- 3 Aquifers
- Drinking water protection area
- Village groundwater downstream direction

SURFACE WATER MONITORING

Ecological Measurements



Continuous EC-Measurments

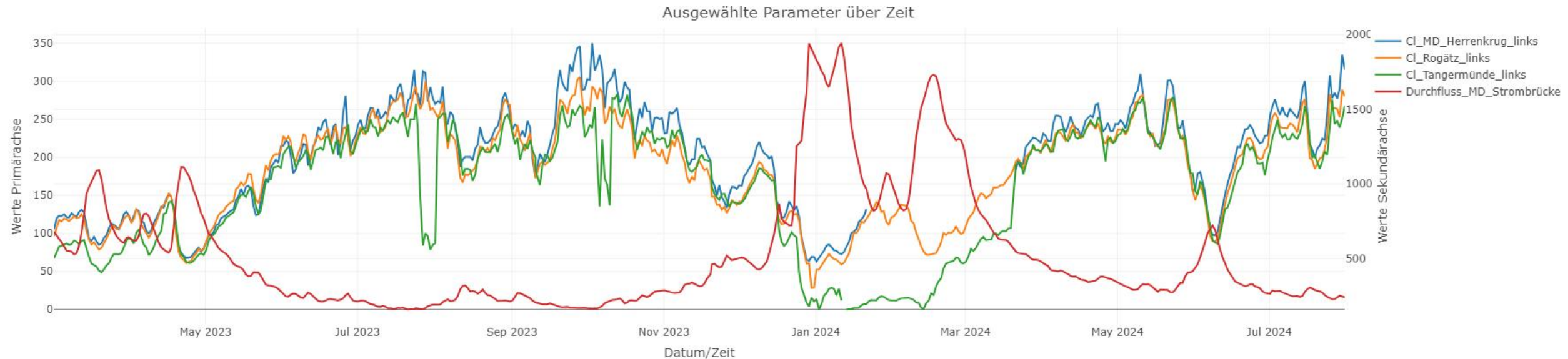


REAL-TIME-WATER ANALYSIS (ELECTRIC CONDUCTIVITY)



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

The image displays two screenshots of a web application titled 'Nebenbestimmer'. The top screenshot shows the 'Start' page, which includes a welcome message and a section for managing projects. The bottom screenshot shows the 'Betriebsplan' (Operating Plan) section, which includes a dropdown for selecting a plan, a checkbox for 'abgeschlossene anzeigen?' (show completed), and a table of entries for the operating plan. The table has columns for 'Eintrag' (Entry), 'Datum Eintrag' (Entry Date), 'Bezug auf NB-Nummern:' (Reference to NB numbers), and 'Vis-Link'. The entries include details about the submission and review of the operating plan.

Top Screenshot: Start Page

Header: Nebenbestimmer | Projekt: Halden Zielitz | Nutzer: Anja.Weidenmüller

Start

Willkommen im Nebenbestimmer

Dieses Tool soll primär die Nachverfolgung von Nebenbestimmungen, Umweltschutz und sonstigen Bestimmungen vereinfachen.

Projekte managen

Hier können Ihre Projekte verwaltet werden werden

Projektauswahl:

Bottom Screenshot: Betriebsplan Section

Header: Nebenbestimmer | Projekt: Halden Zielitz | Nutzer: Anja.Weidenmüller

Betriebsplan

Auswahl Betriebsplan

SBP 2.65.3/06/19 "System Basisabdichtung - 1. BA"

☒ abgeschlossene anzeigen?

Neu Ändern Löschen

Details Betriebsplan

Vis-Link Smart Client:

Vis-Link Browser:

Gültig bis: keine Angabe

Bemerkungen: QMP / Technische Merkblätter beachten

Status:

Bestimmungen

Diese Box enthält die Bestimmungen des jeweiligen Betriebsplanes. Das können Nebenbestimmungen oder sonstige Maßnahmen direkt aus dem Betriebsplan sein, oder auch nachträglich per Schreiben geforderte Aspekte.

Auswahl Nebenbestimmung

3.2 | Einreichung Dokumentation

Einträge zur Nebenbestimmung

Neu Ändern Löschen Neu aus Vorlage

Suche

Eintrag	Datum Eintrag	Bezug auf NB-Nummern:	Vis-Link
Lesefassung TA 1.1 eingereicht & kursorisch durch Gf geprüft/ Antwort s. Link	31.8.2021	► 1.4.4., 3.2	
Bericht zu TA 1.2 & 2.1 eingegangen, Bitte SN an Wiesner geben, Rücklauf bis 26.11. erwartet; Gf: bis dahin prüfen	9.11.2021	► 1.4.4., 3.2	
Keine Beanstandungen von Wiesner / Gf; Gespräch Bischoff: nächster Bericht noch in 2021 angedacht; Nachtrag Gf: Kam dann in 02/22	7.12.2021	► 1.4.4., 3.2	
Berichte zu TA 1.1, eingegangen, Wi beteiligt, selbst geprüft und freigegeben; Nachtrag: Bericht zu TA 1.2 & 2.1 eingegangen, beteiligt, geprüft und freigegeben	2.3.2022	► 1.4.4., 3.2	
Nachtrag zu TA 1.3 & 2.2: Bericht eingegangen und unter Beteiligung Wiesner freigegeben	5.9.2022	► 1.4.4., 3.2	



UNIVERSITIES' ROLES



U N I K A S S E L
V E R S I T Ä T



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



TALLINN UNIVERSITY OF TECHNOLOGY

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 kaevandamisest 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? *

Väga halvasti/väga hästi



**TAL
TECH**

THANK YOU!