Geosentra.

Precision Science. Transformed by Technology.

Company Profile

Bridging the Gap Between Geoscience Excellence and Digital Innovation

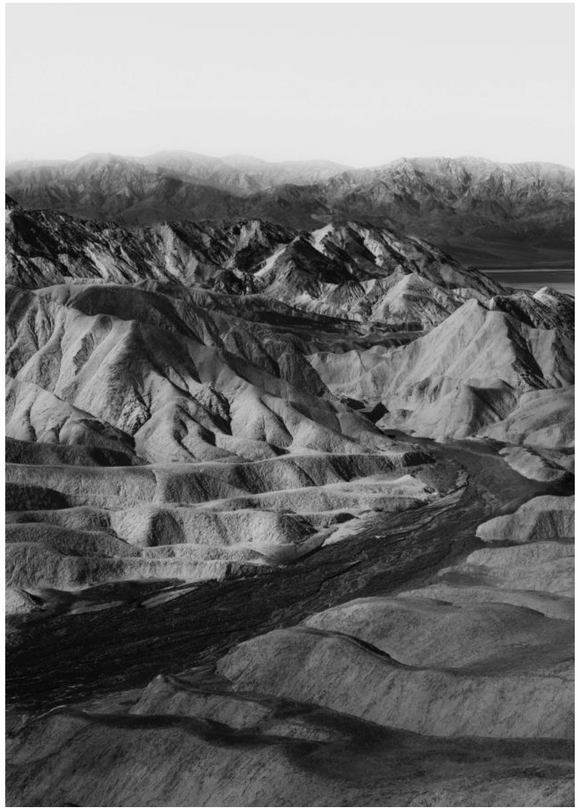
Geosentra.

Our Story

Geosentra was founded with a singular purpose: to solve the world's most complex environmental and geoscience challenges.

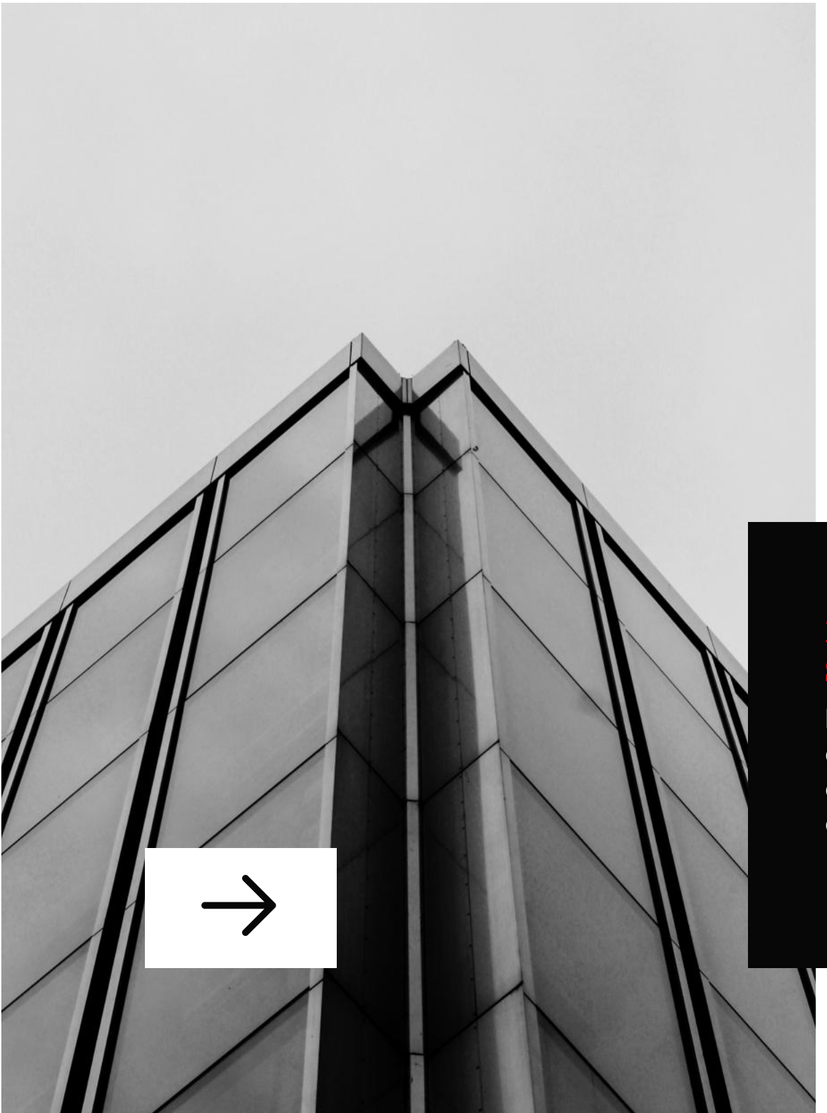
We realized early on that "consulting" wasn't enough. To achieve **true transformative impact,** we needed to **integrate** the **precision of science with the efficiency of digital systems**.

Today, **we don't just provide reports; we build the digital infrastructure and scientific models** that **allow industries to operate sustainably** and **accurately**.



To be the world's leading reference and provider of geoscience and environmental solutions, recognized for our integrity, innovation, and transformative impact.

Our Vision



Our Mission

Let us achieve our great mission together.

Delivering Superior Solutions

Providing high-accuracy consulting, modeling, and engineering to support critical decision-making.

Democratizing Expertise

Empowering professionals through high-quality applied education and training (Geosentra Academy).

Driving Innovation

Integrating cutting-edge technologies like Python scripting and advanced modeling software for maximum efficiency.

Building Long-term Partnerships

Serving as a trusted guide for our clients' long-term environmental and operational goals.

Our Service

Lorem ipsum odor amet, consectetuer adipiscing elit. Posuere fames donec inceptos pulvinar conubia fusce integer eget. Maximus maximus interdum magna ipsum dapibus ac vitae.

Environmental & Geoscience Modeling

Navigating environmental risks with scientific certainty.

Water, Groundwater, & Air Quality: Specialized modeling (WASP, QUAL2K/QUAL2KW, MODFLOW, FEFLOW, AERMOD) to ensure regulatory compliance.

Flood & Hazard Analysis: Comprehensive 1D & 2D flood modeling (HEC-RAS) for infrastructure safety.

Wastewater Treatment Design: Detailed Engineering Design (DED) and procurement for domestic, medical, and industrial wastewater treatment plants (WWTP/IPAL).

Digital Transformation & Custom App Development

Automating and optimizing business processes through bespoke digital ecosystems.

Multi-Platform Development: We build tailor-made Web, Mobile, and Desktop applications designed to solve specific operational bottlenecks.
Bespoke Business Process Automation: From simple task automation to complex enterprise-level workflows, we transform manual legacy systems into streamlined digital assets.
End-to-End Scalability: Our solutions are designed to grow with your business, ensuring that your digital infrastructure supports long-term efficiency and data-driven decision making.

Geosentra Academy

Bridging the gap between academic theory and industrial practice.

Our Goal: Empowering the next generation of geoscience professionals.

We share our proprietary workflows—including Python for geoscience—to elevate the standard of the entire industry.

Your Professional Guide

Many **companies** are **trapped** in a l**abyrinth of bureaucracy**, **manual legacy systems**, and **data uncertainty**.

At Geosentra, we act as **The Guide**.

We don't just show you the problems;
We give you the map to reach your destination.

Meet Our Team

Partner With Us
Turn your operational challenges into competitive advantages.

Phone : +62 813-3161-2857

Mail : yasirabdan@geosentra.id

Instagram / TikTok: ysrabdn_

Website: geosentra.id / yasirabdanzakia.com

Rivaldo Pieter Linogi

Chief Operating Officer (COO)

Yasir Abdan Zakia

Chief Executive Officer (CEO)
& General Director

Cut Natasha Shaharani

Chief Marketing Officer (CMO)

Geosentra.

Strategic Technical Partner for 20+ Industry Leader

Empowering major organizations to make **data-driven decisions** and **streamline operations through custom-built digital ecosystems**

We act as the technical engine behind the success of global industry players, solving their most complex scientific and operational hurdles

Our Best Portfolio

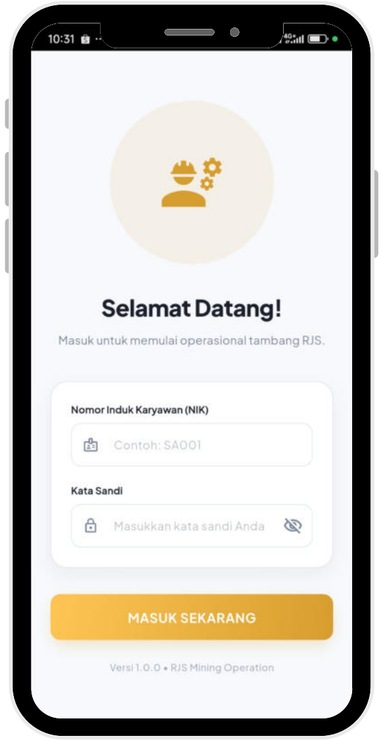
A Story of Our Company Over the Years.

Geosentra.

1 TIMESHEET MOBILE MANAGEMENT SYSTEM

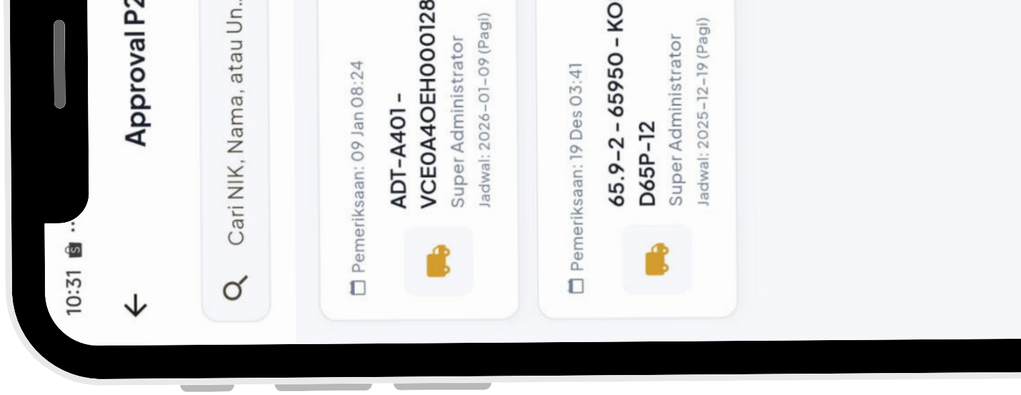
PT. Roda Jaya Sakti

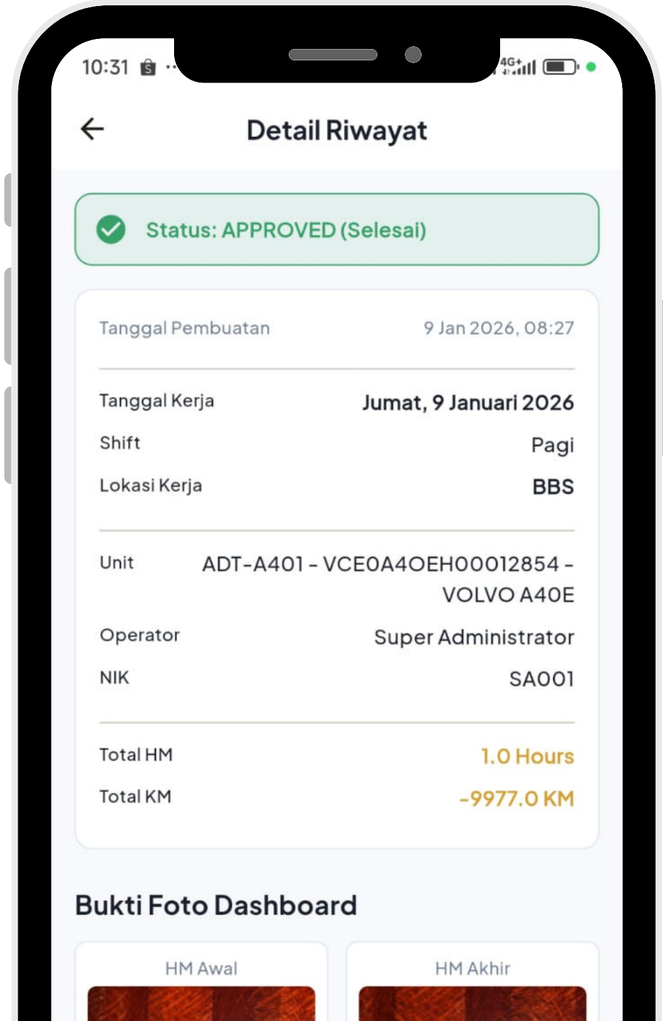
Geosentra.

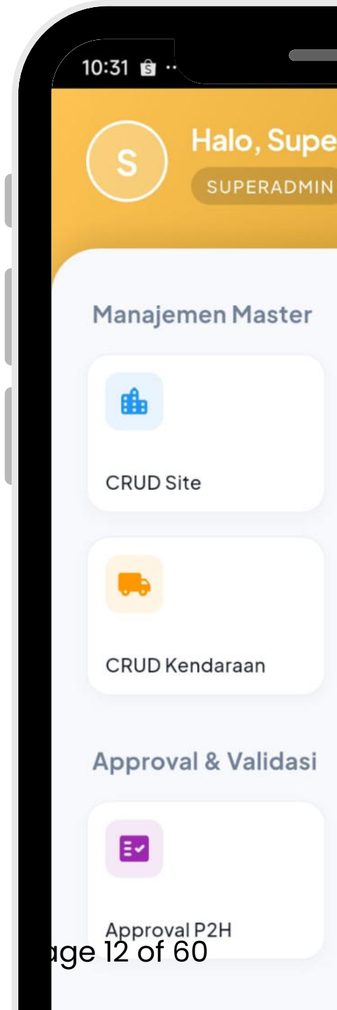


What We've Done

- **Real-Time Asset Tracking:** Precision monitoring of Hour Meter (HM) and Kilometer (KM) for heavy equipment operational efficiency.
- **Integrated Master Data:** Centralized management for User Roles and Vehicle Fleet (Full CRUD capabilities).
- **Digital Approval & P2H:** Streamlined timesheet validation and digital pre-operational inspections (P2H) for preventive maintenance.
- **Secure Multi-Login:** Flexible and secure access across devices for various user levels within a single platform.
- **GPS-Based Attendance:** Location-validated check-ins to ensure workforce presence and discipline at mining sites.
- **Management Dashboard:** Real-time data visualization of personnel and fleet performance to support strategic decision-making.



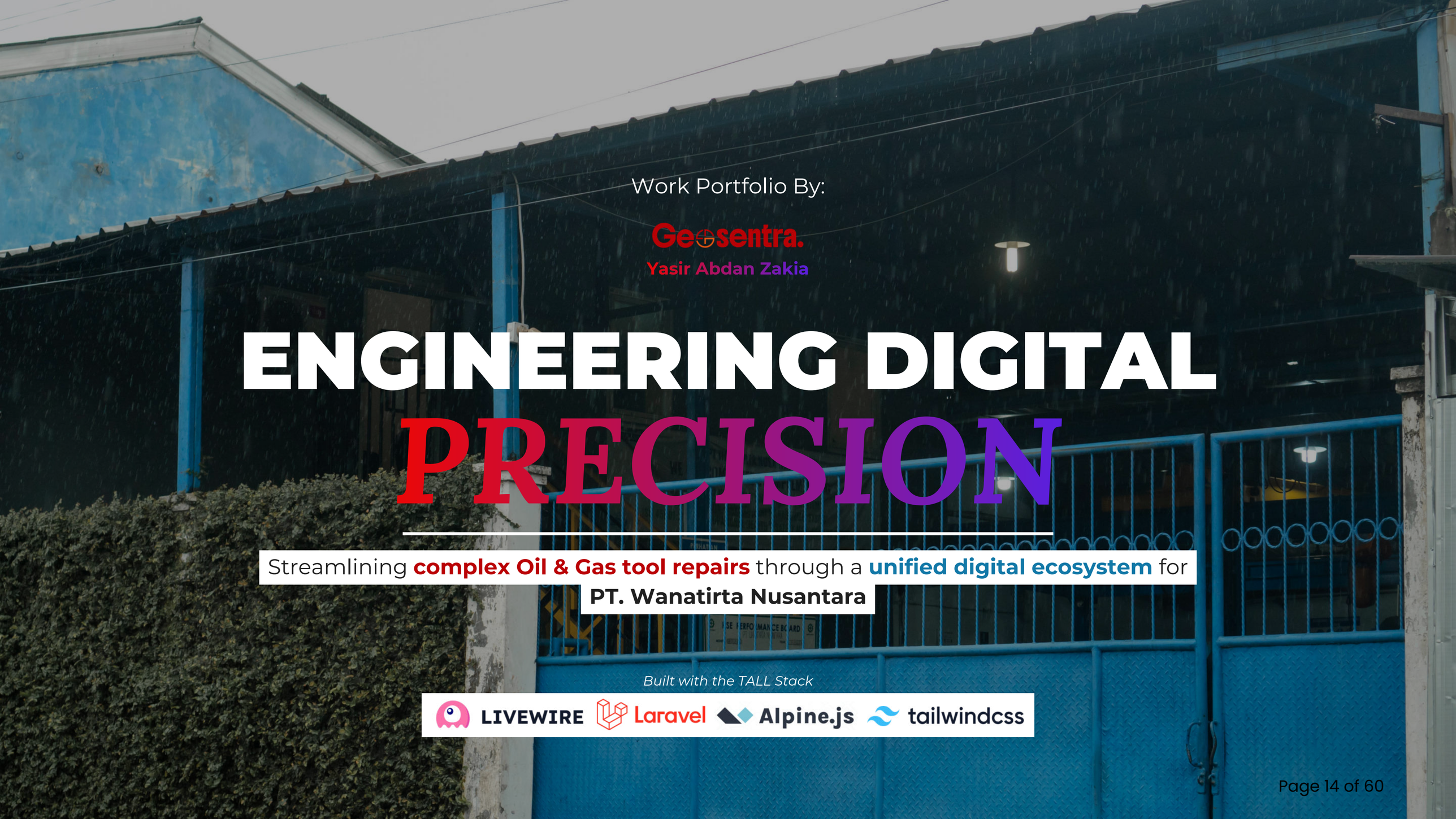




Geosentra.

2 CUSTOM ERP FOR PDC & TRI-CONE BITS REPAIR PROCESS

PT. Wanatirta Nusantara



Work Portfolio By:

Geosentra.

Yasir Abdan Zakia

ENGINEERING DIGITAL PRECISION

Streamlining **complex Oil & Gas tool repairs** through a **unified digital ecosystem** for **PT. Wanatirta Nusantara**

Built with the TALL Stack

LIVEWIRE Laravel Alpine.js tailwindcss

Geosentra.

MEET THE CLIENT:

PT. Wanatirta Nusantara (WTN)

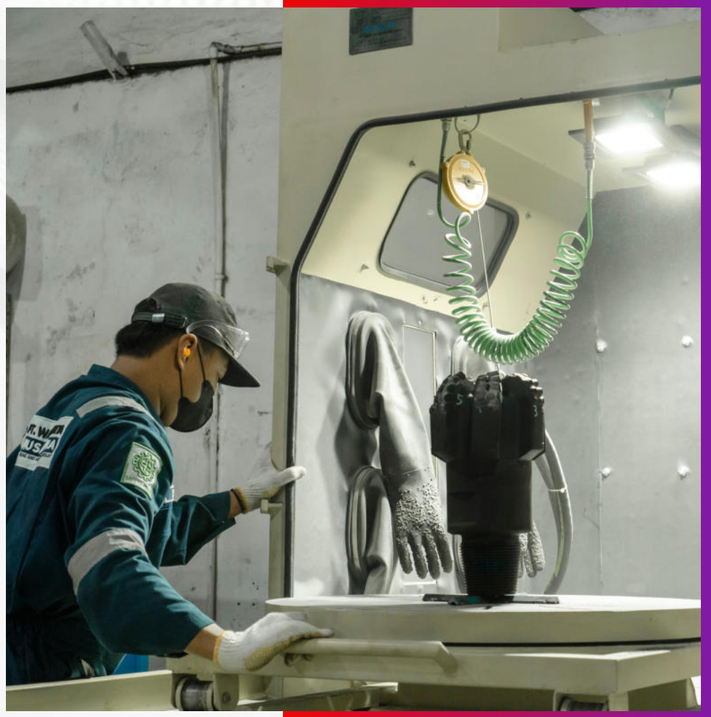
PT. WTN is a specialized Brazing & Hardsurfacing company for the drilling industry. Since 2010, they have been the trusted partner for global energy giants like **Baker Hughes**, **Halliburton**, and **Ulterra** in **repairing PDC & Tri-Cone bits**.

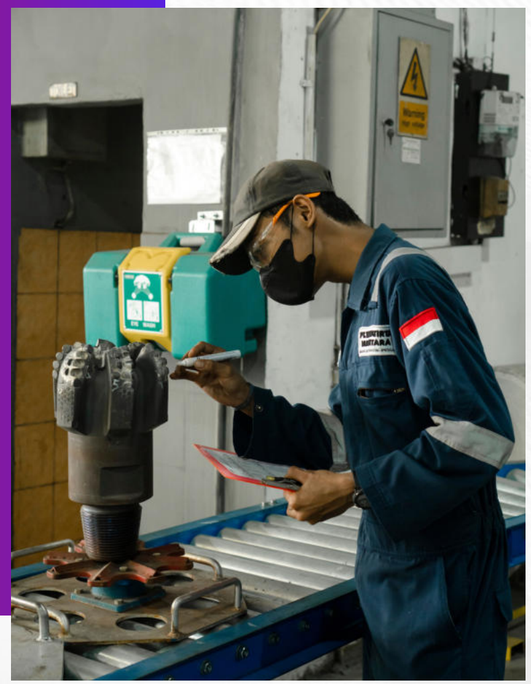
In an industry where a single drilling bit can cost thousands of dollars, precision in repair and documentation is not just a service—it's a requirement.

When Physical Paper Limits Growth

Despite their technical expertise, PT. WTN’s operations were hindered by manual processes:

- **Data Vulnerability:** Physical documents were prone to being lost or misplaced.
- **Information Silos:** Tracking an item's repair history (e.g., "How many times has this bit been serviced?") was a time-consuming manual task.
- **Visibility Gap:** Management had no real-time view of workshop progress, leading to delays in client reporting.





THE SOLUTION:

End-to-End Digital Transformation

We engineered a custom ERP system specifically designed to mirror PT. WTN's unique workflow. The goal was to move from "searching for papers" to "clicking for data," ensuring every step from receiving to delivery is captured digitally and instantly.

Geosentra.

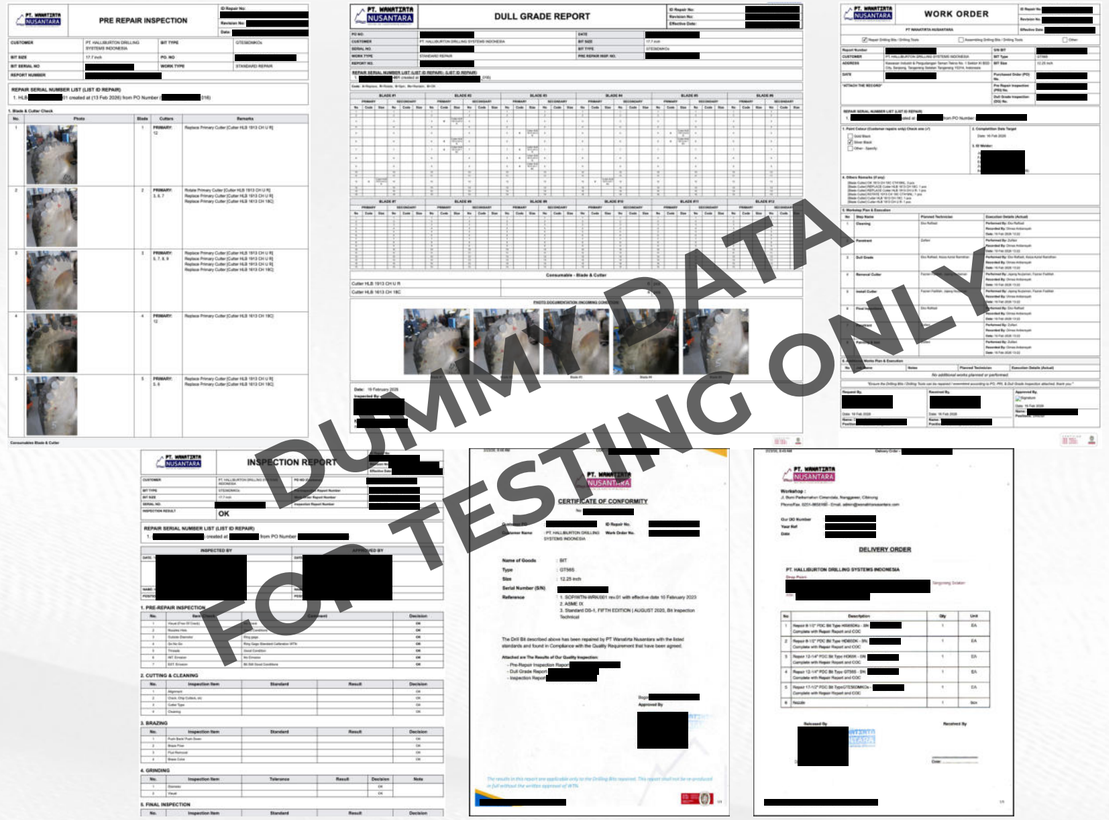
AUTOMATED DOCUMENTATION

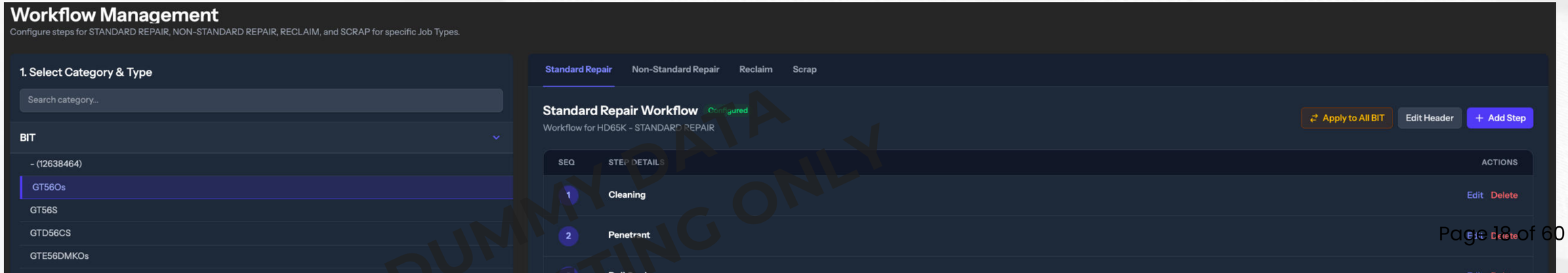
From intake to delivery

We digitized the entire technical lifecycle into a sequential, automated flow:

- **Stage 1:** Pre-Repair Inspection & Dull Grading.
- **Stage 2**: Digital Work Order (WO) generation.
- **Stage 3:** Final Inspection & Certificate of Conformity (COC).
- **Stage 4**: Automated Delivery Order (DO).

No more manual data re-entry. Data from the inspection stage flows automatically into the final certificate, eliminating human error.





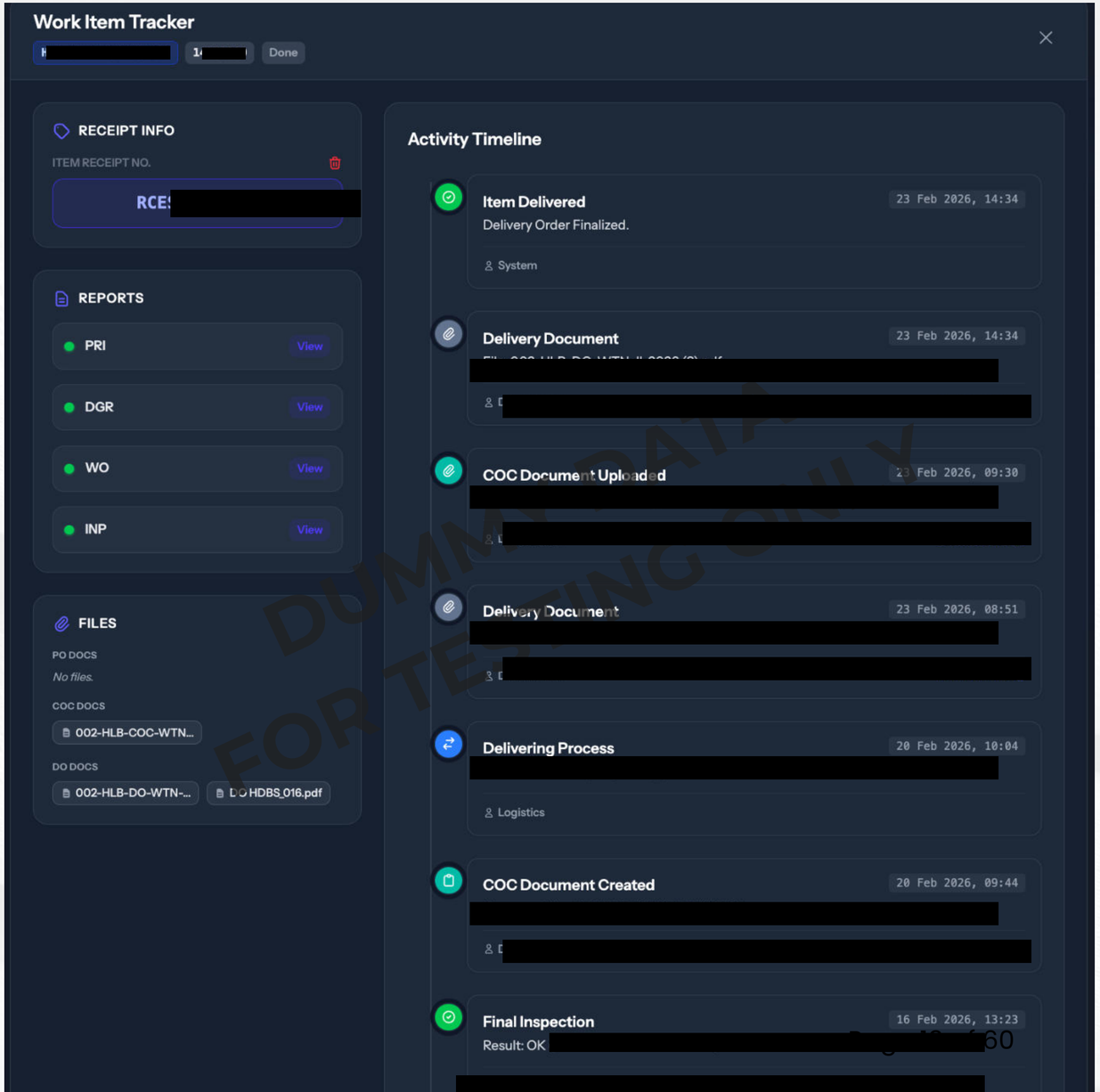
Geosentra.

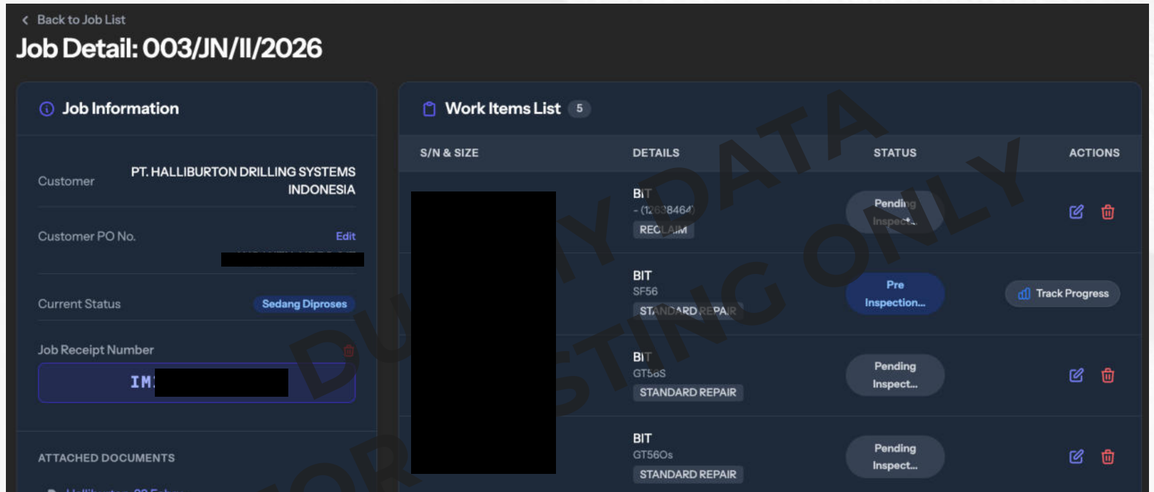
CUSTOMER TRANSPARENCY

Real Time Tracking

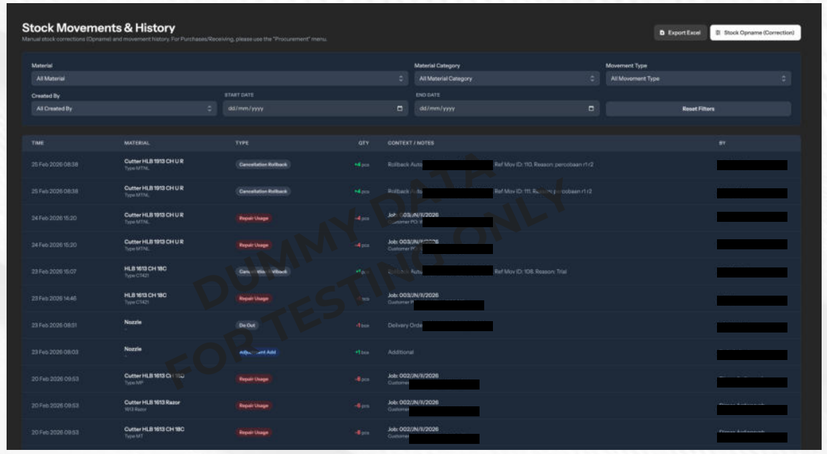
We turned "transparency" into a competitive advantage.

- **Client Dashboard:** PT. WTN's clients can now log in to their own accounts.
- **Receipt-Based Tracking:** Clients can track the live progress of their tools using a unique Receipt/Serial Number.
- **Granular Details:** Visibility into exactly which consumables or inventory items were used during each repair stage.





OTHER FEATURES

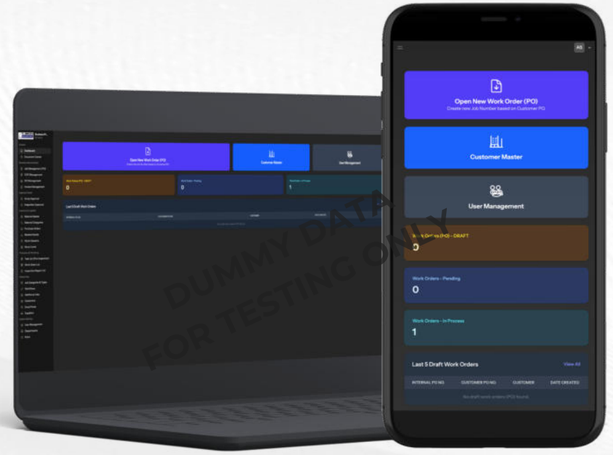


Smart Inventory & Stock Card System

Stock Card Visibility
Real-time tracking of material movement (General & Detailed).

Auto-Deduction
Materials used in Work Orders are automatically deducted from the inventory, preventing stockouts of critical brazing materials.

Audit Readiness
Providing a crystal-clear audit trail for ISO compliance.

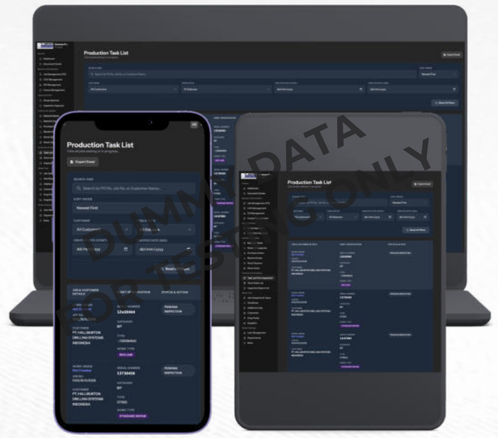


The Owner's Bird-Eye View

Real-time Progress Monitoring
See exactly which stage every bit is in.

Bottleneck Identification
Instantly identify which process is slowing down production.

Performance Analytics
Data-driven insights to optimize workshop efficiency.



Robust, Responsive, and Scalable Architecture

Ensured a **secure, enterprise-grade backend** with a **reactive**, **modern frontend experience**.

Created a professional, **mobile-responsive UI** that technicians can **easily use on tablets / phone** in the workshop.

Provided **lightweight interactivity for a smooth user experience** without the bloat of heavy frameworks.

TRANSFORMING OPERATIONS

Building Trust

By replacing paper with a custom ERP, PT. Wanatirta Nusantara has significantly reduced administrative lead times and heightened client trust through unprecedented transparency.

3 CUSTOM ERP FOR EMPLOYEE WELFARE & OPERATIONS

PT. Roda Jaya Sakti

Work Portfolio By:

Geosentra.

Yasir Abdan Zakia

INTEGRATING EMPLOYEE WELFARE & OPERATIONS DIGITAL

Digitalizing **Cooperative Finance & Daily Meal Distribution for 1.700+ Workforce** at **PT. Roda Jaya Sakti**

Built with the TALL Stack

LIVEWIRE Laravel Alpine.js tailwindcss

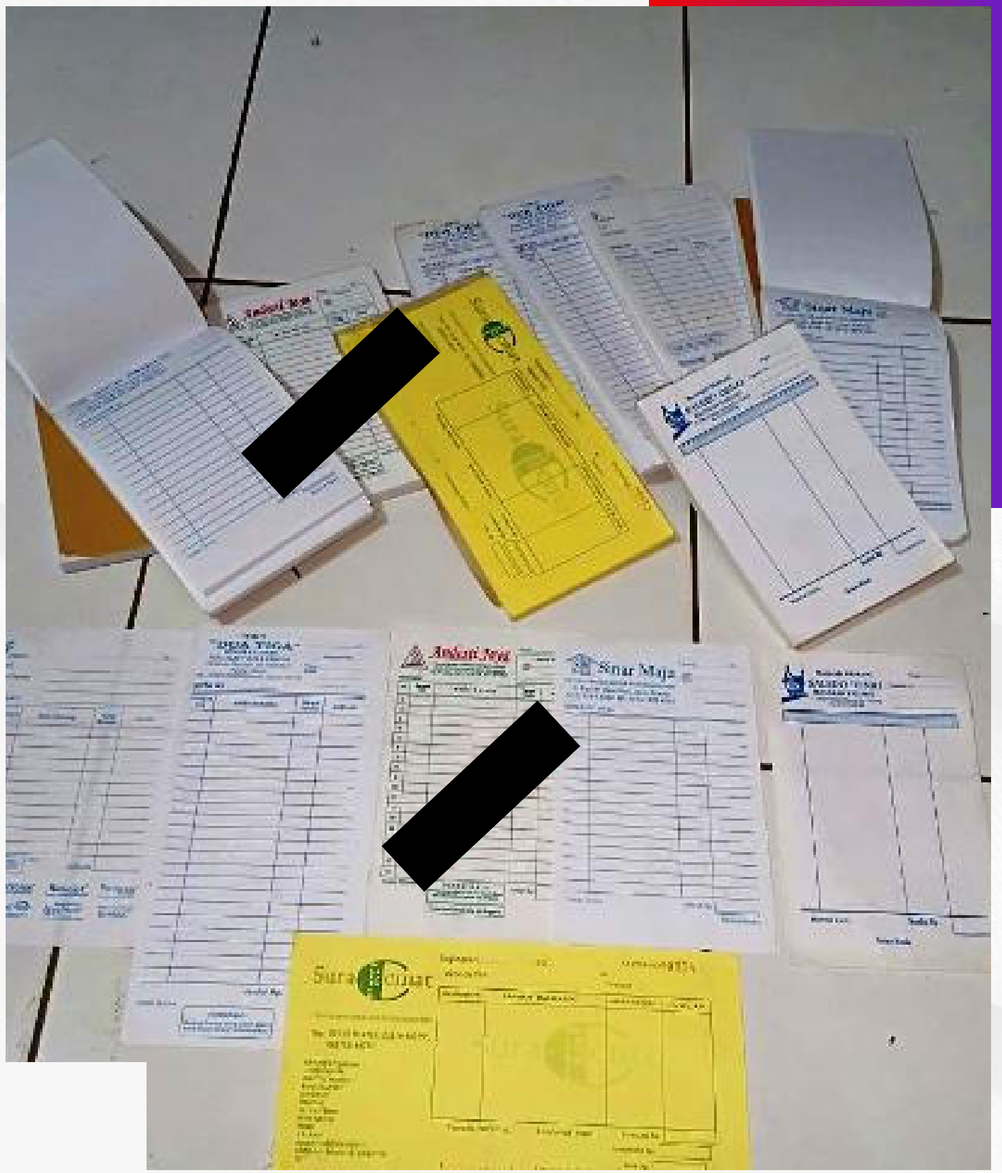
MEET THE CLIENT:

PT. Roda Jaya Sakti (RJS)

PT. RJS is a **leading Mining Service, Heavy Equipment Rental, and Construction company** operating in Eastern Indonesia (Morowali & Konawe)

With a massive operation involving over 1.700 employees and 641 heavy equipment units, managing daily employee welfare is a logistical giant.

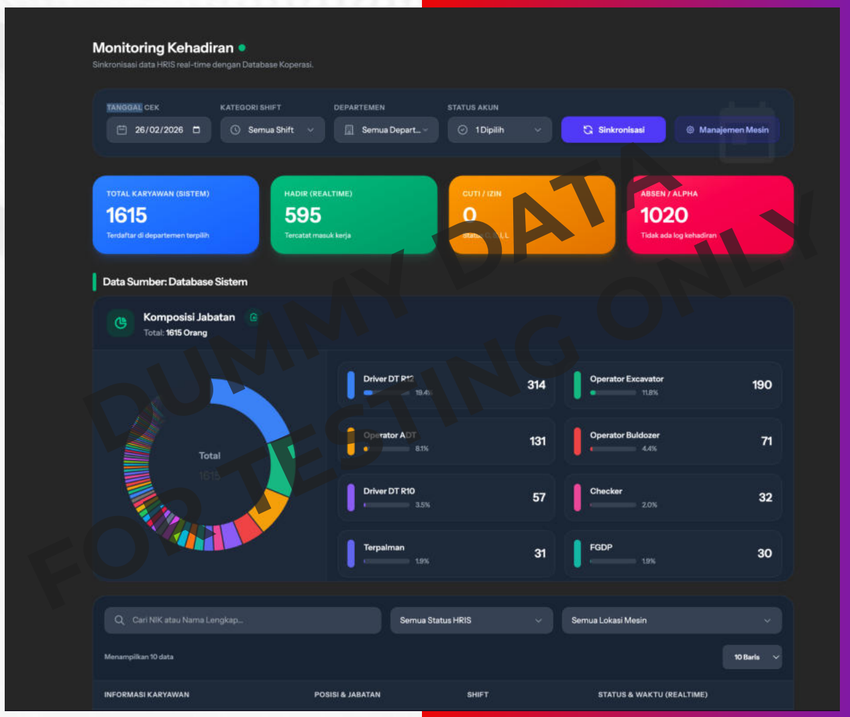
In a high-tempo mining environment, efficient logistics aren't just about moving ore—it's about ensuring every worker is fed accurately and every financial transaction is recorded precisely.

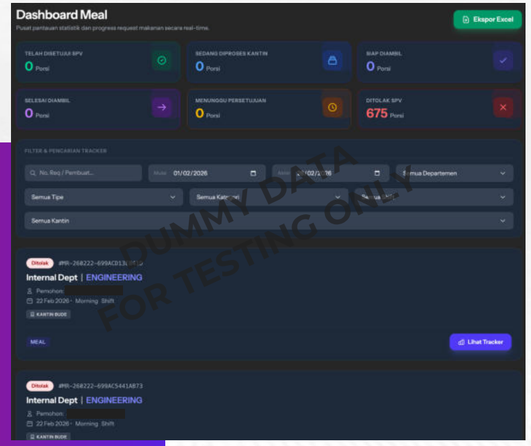


When Scale Outbreaks Manual Control

Despite their massive fleet operations, the internal employee service systems were struggling with manual limitations:

- **The "Ghost" Meal Request**: Dept Admins manually requested meals to GA, leading to data discrepancies. Food was prepared for employees who were absent, causing waste and budget leaks.
- **Financial Fog:** Tracking monthly allowance limits (Plafon: 500k - 1.5jt) for 1.700 members manually was prone to errors. Employees didn't know their remaining balance in real-time.
- **Revenue Blindspot:** Management had no real-time visibility on daily cooperative revenue or precise meal consumption costs per department.





THE SOLUTION:

Unified Employee Service Ecosystem

We engineered Simkop RJS (Sistem Informasi Koperasi RJS), a centralized web-based system that bridges HRIS (Attendance), Finance (Cooperative), and General Affairs (Canteen).

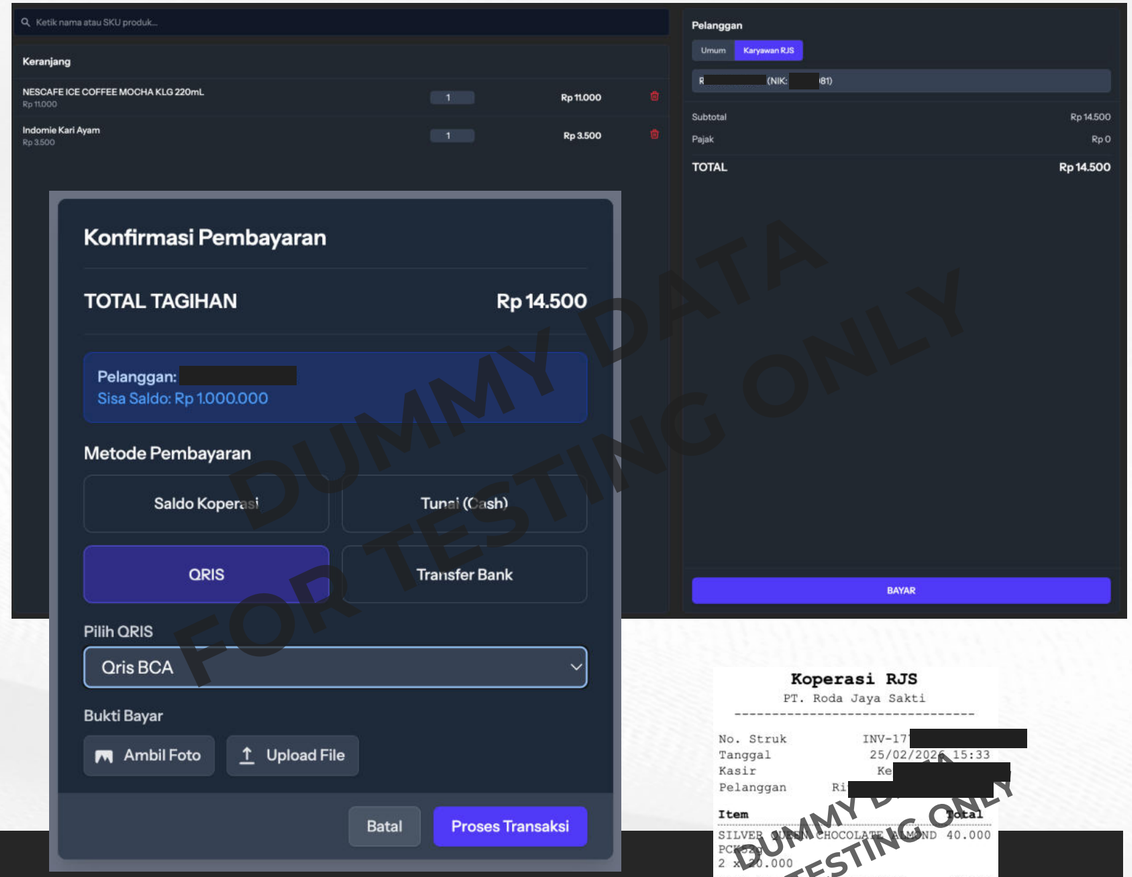
The goal was to transform scattered manual requests into a synchronized digital flow, ensuring that every Rupiah in the cooperative and every plate in the canteen is accounted for based on real-time data.

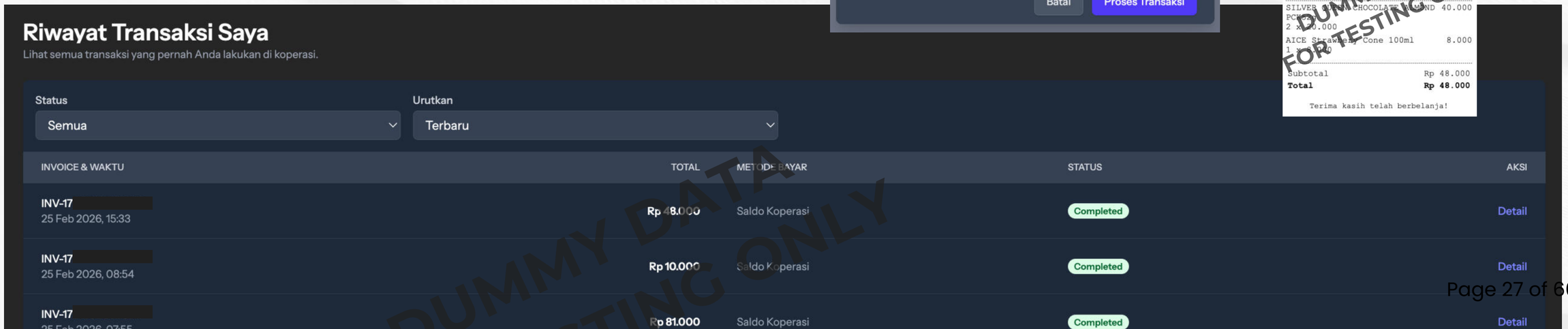
SMART COOPERATIVE SYSTEM

Flexible Transactions & Real-time Balance

We digitized the entire shopping experience for employees with a robust Point of Sales (POS) system:

- **Multi-Method Payment:** Cashiers can process payments via Cash, Transfer, QR Code, or the unique "Saldo Koperasi" (Payroll Deduction).
- **Auto-Limit Enforcement:** The system automatically recognizes the employee's rank and enforces their monthly limit (500k/1jt/1.5jt). Transactions are rejected instantly if the balance is insufficient.
- **Transparency:** Every employee can view their transaction history and remaining balance in real-time, eliminating disputes at the end of the month.



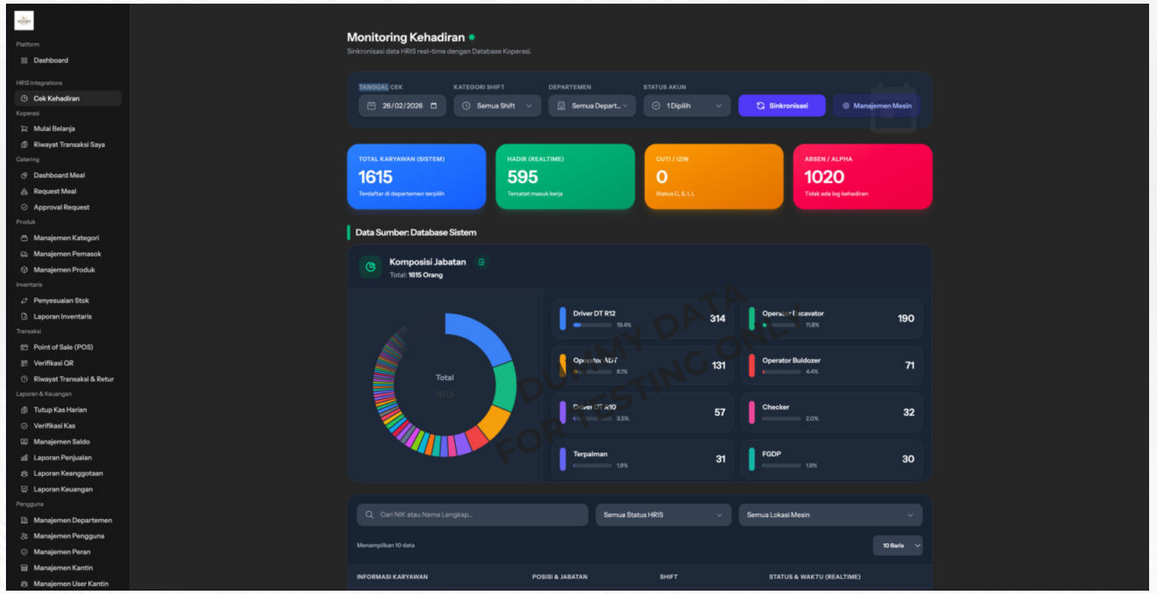


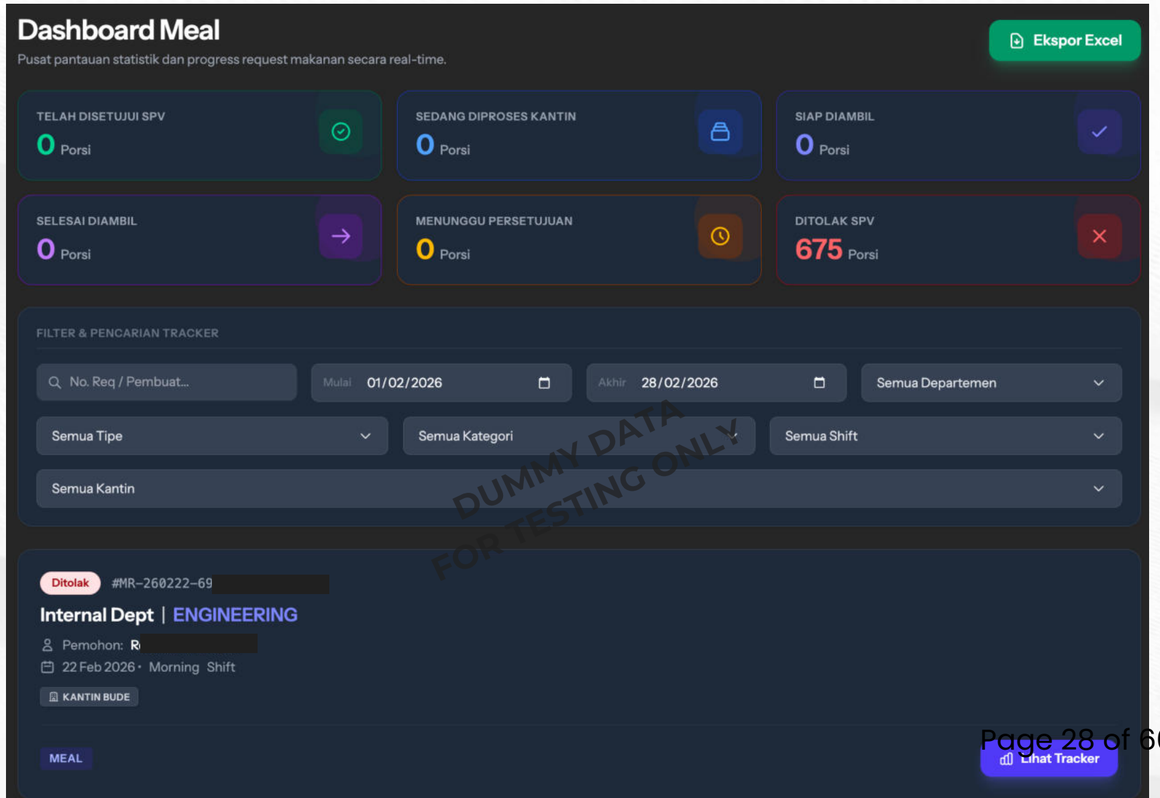
DATA-DRIVEN MEAL LOGISTICS

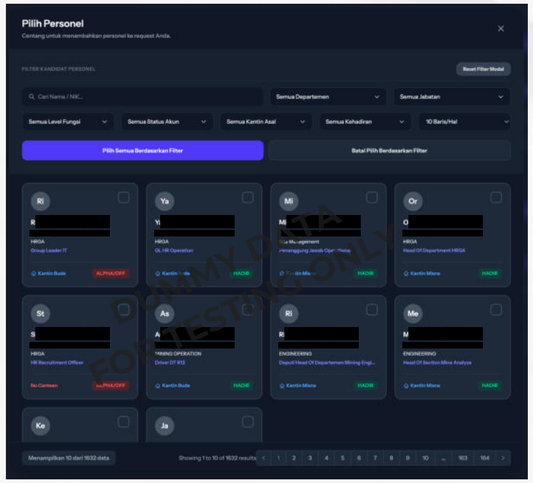
Fingerprint Integrated Requests

We eliminated food waste by integrating the canteen system directly with the HRIS API:

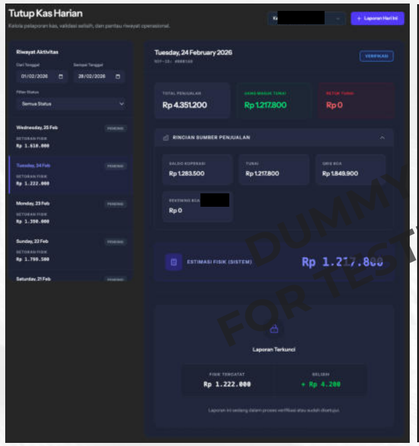
- Real-time Validation: The system pulls data from fingerprint machines. Meal requests are only valid for employees who are physically present on site.
- Automated Workflow:
  - Dept Admin: Inputs request.
  - System: Verifies against Attendance API.
  - SPV GA: Approves verified numbers.
  - Canteen: Receives exact production quota.
- Result: Zero "Ghost" requests. 100% data accuracy between attendance and consumption.

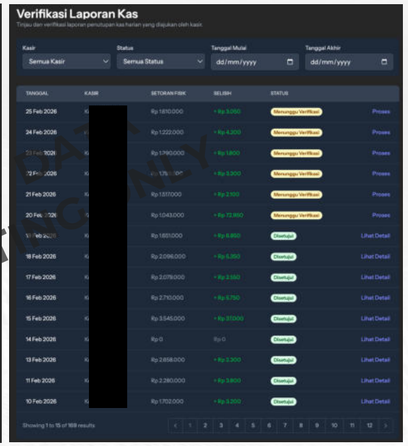






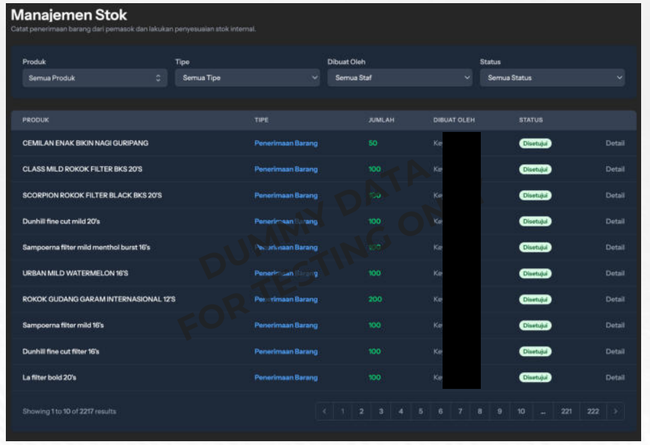
HER FEATURES





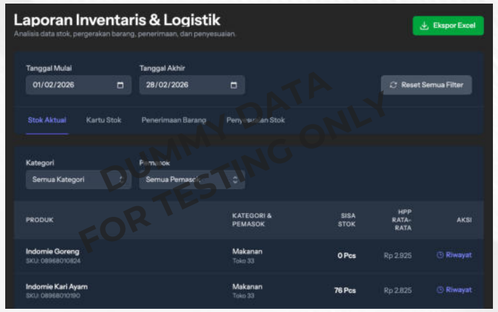
Daily Closure & Financial Integrity

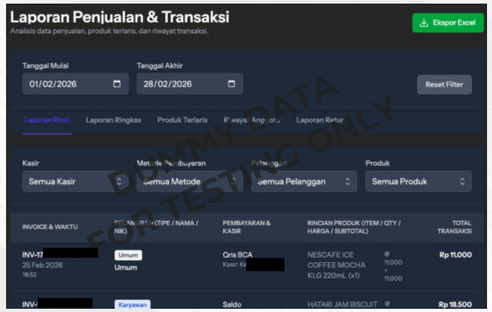
Automated daily financial closing ensures that physical cash in the drawer matches the system's recorded cash transactions before the shift ends.

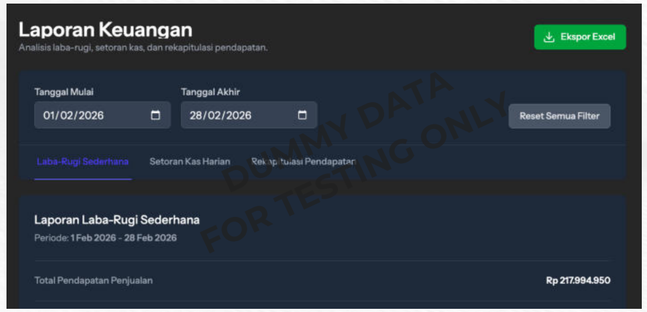


Dynamic Inventory Management

Goods sold in the cooperative are automatically deducted from stock, triggering alerts for low inventory.







Comprehensive Reporting

Management gets granular reports: Financial Reports, Inventory Reports, and Meal Consumption Reports broken down by Department and User.

TRANSFORMING WELFARE OPERATIONS

Efficiency & Accountability

Simkop RJS has revolutionized how PT. Roda Jaya Sakti manages its workforce needs.

- For Finance: Revenue tracking is now instant and error-free.
- For GA/Canteen: Food waste is drastically reduced due to precision attendance data.
- For Employees: Trust is restored through transparent balance tracking and ease of transaction.

4 RIVER WATER QUALITY MODELING USING WASP

PT. Gorontalo Sejahtera Mining

Water Quality & Metals Transport Modeling - Taluduyunu River Challange

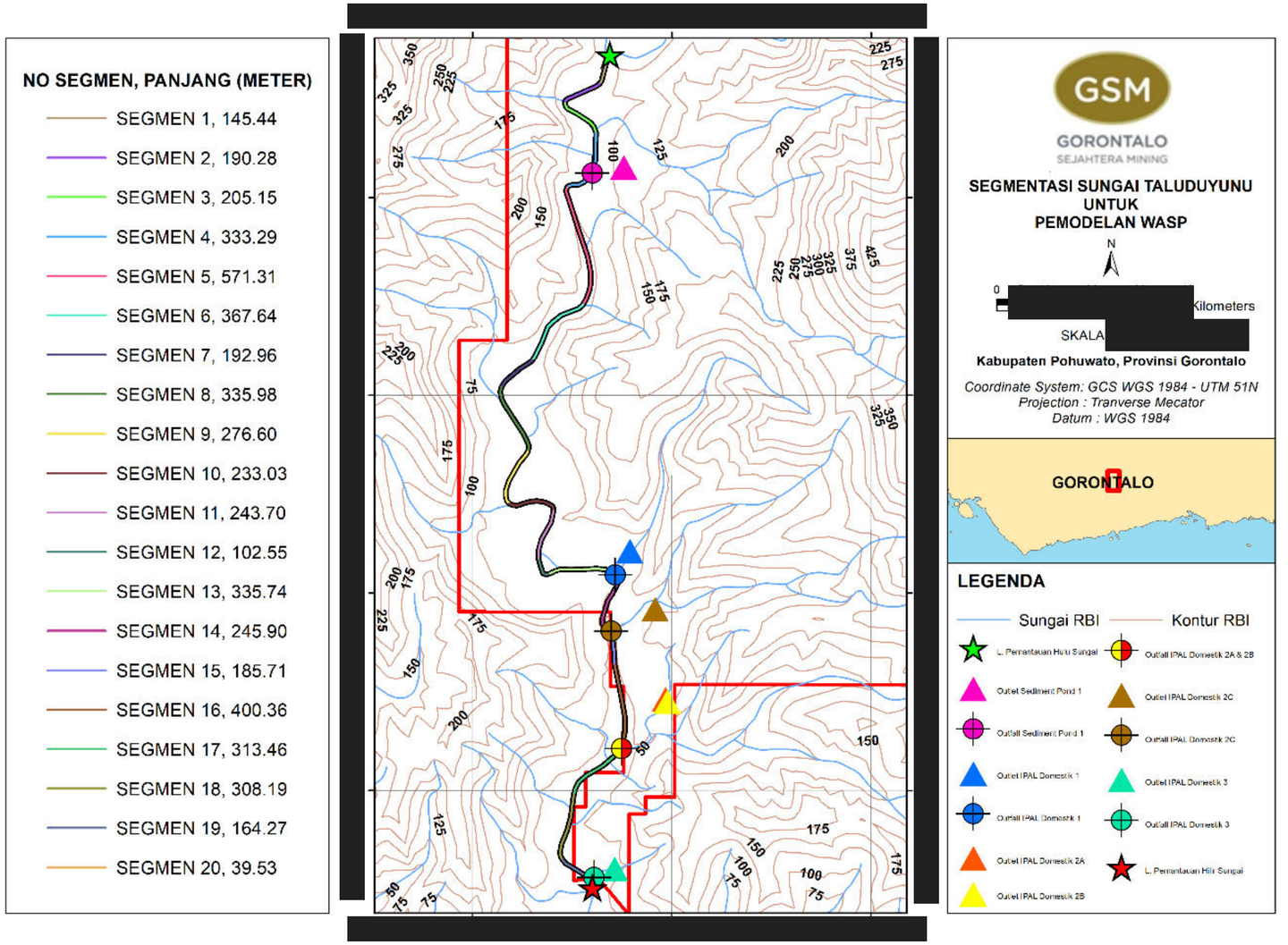
The water quality of the Taluduyunu River is heavily influenced by dynamic pollutant loads originating from continuous mining operations and domestic facilities. The core objective was to analyze the fate and transport of a wide spectrum of pollutants—ranging from suspended solids and heavy metals (Cu, Cd, Zn, Pb) to non-conservative organic wastes (BOD, NH3)—across a critical 5.19 km stretch of the river.

Morphological Discretization & Spatial Mapping

To accurately capture the river's complex hydrodynamic behavior, I implemented a precise spatial discretization strategy.

- **Morphological Segmentation**
- The 5.19 km river stretch was dynamically divided into 20 distinct computational segments. Instead of arbitrary distances, each segment boundary was strategically defined by the river's natural meanders and bends to accurately reflect physical changes in flow velocity and mixing zones.

- **Point Source Integration**
- Successfully mapped 5 critical discharge points (1 primary outfall from the Sediment Pond and 4 from Domestic WWTPs) directly into their corresponding morphological segments to trace exact injection zones.



Geosentra.

Tabel 3.1. Input WASP Parameter Dataset Sungai Taluduyunu

Parameter	Kondisi	Value	Unit	Keterangan
Model Type	Advanced Toxicans	[redacted]	-	Digunakan untuk simulasi transpor dan nasib zat beracun, mencakup COD, TSS, serta logam berat seperti Cu++, Cd++, Zn++, Pb++, As5+, Ni++, Cr6+, dan Hg++ pada badan air permukaan
	Advanced Eutrophication			Digunakan untuk simulasi siklus nutrien dan oksigen terlarut, mencakup BOD yang secara spesifik dimodelkan sebagai CBOD, dan Amonia (NH_3) sebagai bagian dari siklus nitrogen, serta digunakan khusus untuk simulasi pH dan Alkalinitas.
Start Date	-		-	Tanggal awal simulasi
End Date	-		-	Tanggal akhir simulasi
Start Time	-		-	-
End Time	-		-	-
Model Output Interval	-		*Hari*	Output ditunjukkan per 1 jam perjalanan kontaminan
Solution Technique	Euler		-	Menggunakan metode numerik ***Euler Forward*** **(Eksplisit Euler)** untuk menyelesaikan persamaan diferensial yang menggambarkan perubahan kualitas air dari waktu ke waktu.
Settling Velocity	-		*m/hari*	**Settling velocity (v_s)** mengacu pada kecepatan partikel pembawa logam mengendap di kolom air. Nilai ini merupakan nilai tipikal untuk logam yang teradsoprsi pada partikel tersuspensi pasir halus (Chapra, 2008)
Dispersion rate	-		*m2/dt*	Nilai tipikal untuk sungai panjang (Stevens et al., 2004)

Sumber: Data diolah, 2025

Tabel 3.2. Input WASP Densitas dan Koefisien Partisi Logam Berat

Kontaminan Logam Berat	Bulk Density[a] (kg/m³)	Bulk Density[a] (g/mL)	Partition Coefficient[b] (L/Kg)
Cu++	[redacted]		
Cd++			
Zn++			
Pb++			
As+5			
Ni++			
Cr+6			
Hg2+			

Sumber:
a) Engineering Toolbox, 2024
b) Allison dan Allison, 2005

Tabel 3.3. Konstanta Model Eutrophication WASP Sungai Taluduyunu

Grup Konstanta	Nama Konstanta	Nilai	Keterangan
Global	*Elevation above Sea Level (m)*	[redacted]	Elevasi maksimum area sungai yang dimodelkan
	CO2 Partial Pressure (atm)		konstanta krusial untuk memodelkan pH dan alkalinitas karena mengatur pertukaran CO2 antara air dan atmosfer. Nilai 0.00042 diambil dari konsentrasi CO2 atmosfer global yg bernilai sekitar 425 ppm (NASA, 2025)
	Water Type (Fresh water = 0, Marine water = 1)		Model untuk sistem air tawar (sungai)
Dissolved Oxygen	*Global Reaeration Rate @ 20°C*		Dihitung mundur dari nilai k_a=5/hari pada suhu rata-rata
	Rearetaion Option		Model reareasi Churhill
	Theta - Reaeration Temp. Correction		nilai standar literatur
CBOD	*CBOD Decay Rate @ 20°C*		Titik awal umum untuk efluen IPAL domestik
	CBOD Temp. Correction Coefficient		Nilai standar literatur
	CBOD Half Saturation Oxygen Limit		Batas umum dimana DO rendah mulai menghambat dekomposisi
Inorganic Nutrient	*Nitrification Rate @ 20°C*		Estimasi untuk sungai dangkal dan turbulen
	Nitrification Temp. Coefficient		Nilai umum dari literatur untuk proses nitrifikasi
	Half Saturation for Nitrification O2		Batas umum DO dimana nitrifikasi mulai terhambat

Keterangan:
a) Chapra, 1997.

Bridging the Gap

Executing a complex biochemical model often faces the hurdle of incomplete real-time field data. To resolve this, We applied a rigorous, scientifically backed estimation strategy

Empirical Formulations

Instead of relying on missing direct measurements, crucial parameters like natural reaeration capacity were calculated using established empirical methods, such as standard nomographs and the Churchill formulation.

Literature-Backed Proxies

Global constants for metal partition coefficients, bulk densities, and atmospheric interactions were synthesized from trusted environmental literatures (e.g., US EPA and NASA guidelines) to establish a **valid baseline.**

Extreme Hydrological Bounding

To account for climatic uncertainties, the simulation was stress-tested across two extreme boundaries: the critical Dry Season (lowest dilution capacity) and the Rainy Season (peak flow and high natural sediment loads).

Integrated Modeling via US EPA WASP

With the spatial boundaries defined and data gaps scientifically bridged, the parameters were injected into the US EPA Water Quality Analysis Simulation Program (WASP).

- **Advanced Eutrophication (EUTRO):** Deployed to simulate complex biochemical processes, mapping the decay of organic materials, oxygen consumption (CBOD), and nitrogen cycling from the domestic outfalls.
- **Advanced Toxicants (TOXI):** Utilized to dynamically simulate the transport, physical advection, and complex phase-partitioning of heavy metals interacting with suspended solids along the water column.

Quantifying Environmental Thresholds

The predictive modeling delivered clear, actionable intelligence regarding the river's carrying capacity under various stress conditions

The Critical Dry Season

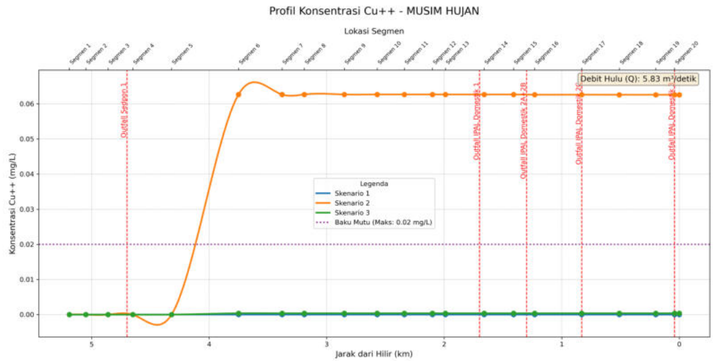
The model proved that during low-flow periods, the river's assimilation capacity drops significantly. Under these conditions, Total Suspended Solids (TSS) becomes the absolute controlling parameter.

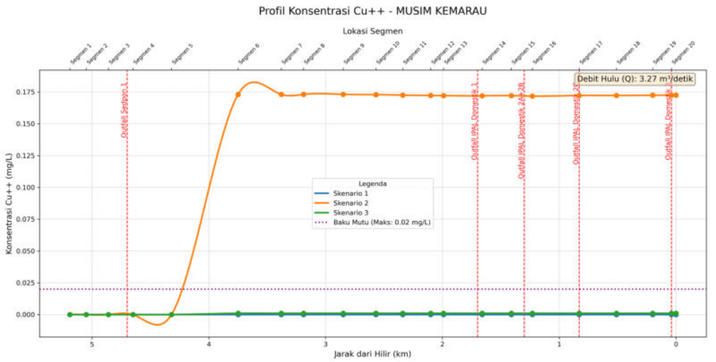
Preventing Toxicity

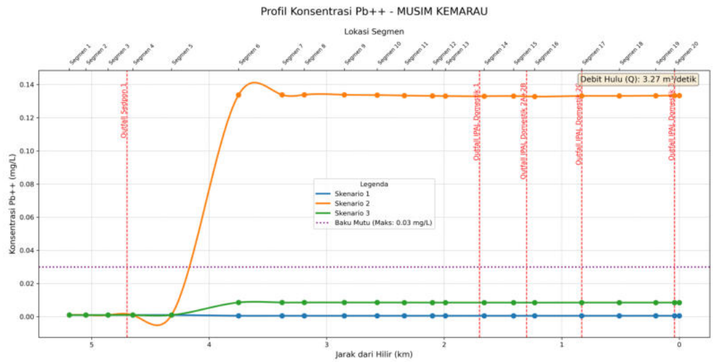
Simulations of worst-case scenarios (untreated discharge) revealed severe spikes in heavy metals (Pb and Cu) that drastically exceeded safety standards.

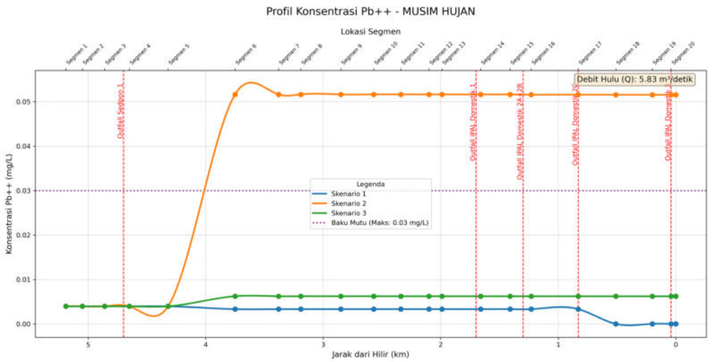
Engineering Validation

The spatial mapping validated that maximum efficiency at the Settling Pond is an absolute operational requirement. Proper treatment successfully maintains heavy metal concentrations well below hazardous thresholds, ensuring the ecological safety of the Taluduyunu River









5 COMPREHENSIVE FLOOD HAZARD MODELING AND VULNERABILITY ANALYSIS

PT. Pani Industri Nusantara

Geosentra.

The Pani Gold Mine Project (PT PIN & MDKA)

PT PANI INDUSTRI NUSANTARA (PIN), a subsidiary of the mining holding PT Merdeka Copper Gold Tbk (MDKA), operates the Pani Gold Mine in Gorontalo.

About PT PIN

Positioned to become one of Indonesia's largest primary gold mines, it holds an estimated 190.3 million tonnes of ore reserves containing 4.8 million ounces of gold. The multi-decade project utilizes a phased development approach, combining heap leach and Carbon-in-Leach (CIL) processing to reach a massive capacity of 20-22 million tonnes per annum. With operations scaling toward a peak production of 500,000 ounces per year, securing the mine's critical infrastructure against environmental hazards is an absolute engineering priority.

Geosentra.

Critical Infrastructure Risks Amidst Data Scarcity

The **development of the Tailings Storage Facility (TSF)** and its embankments **faced severe structural threats from extreme surface runoff.** Mitigating this massive environmental risk was heavily obstructed by a critical lack of reliable meteorological data.

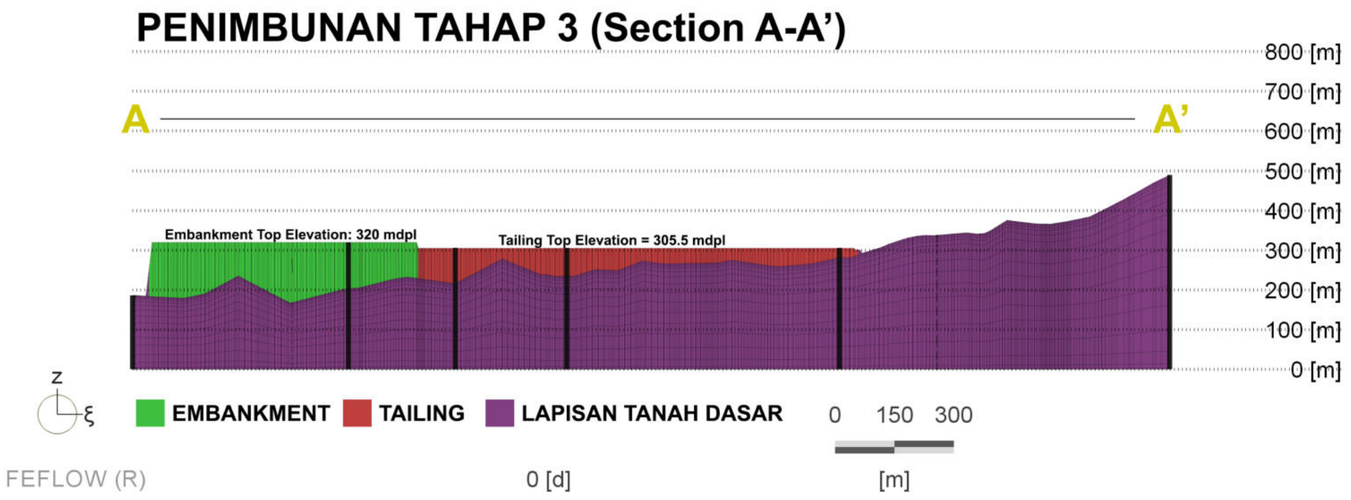
01. The TSF and its associated embankments faced a severe, latent threat of structural failure triggered by extreme surface runoff events.

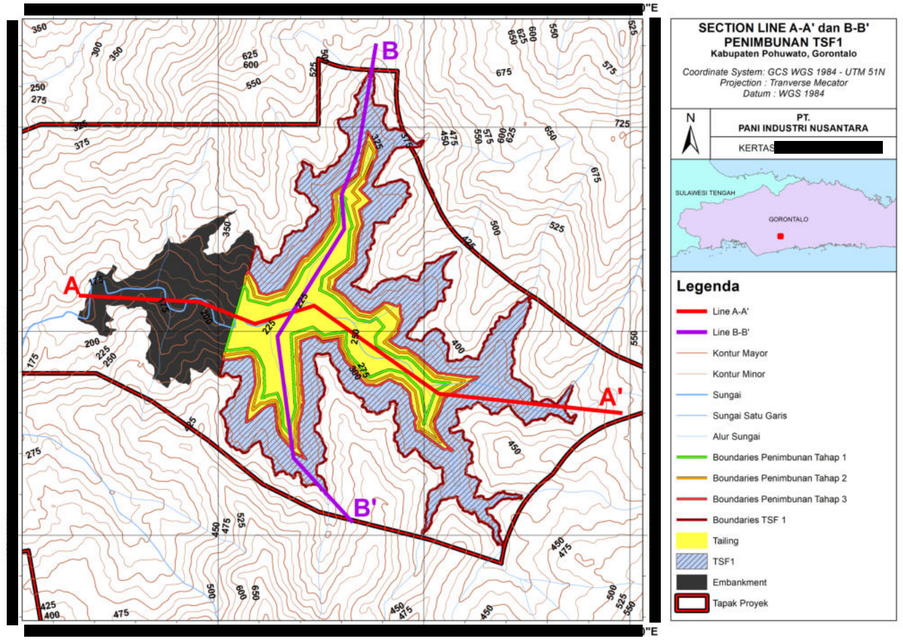
02. A potential catastrophic overtopping event carried the high-stakes risk of triggering a massive, irreversible environmental disaster.

03. Efforts to proactively mitigate this critical risk were heavily obstructed by a severe deficiency in historical meteorological data.

04. Fragmented and missing local rainfall records completely invalidated the application of standard hydrological frequency analysis.

05. This data scarcity left the engineering team without the essential design hyetographs and flood hydrographs needed to accurately predict peak discharge.





Geosentra.

Hydrological Engineering & Data Synthesis

To break through the analytical deadlock caused by data scarcity, We implemented a comprehensive hydrological engineering strategy to restore and synthesize critical meteorological datasets.

01 Missing Data Imputation

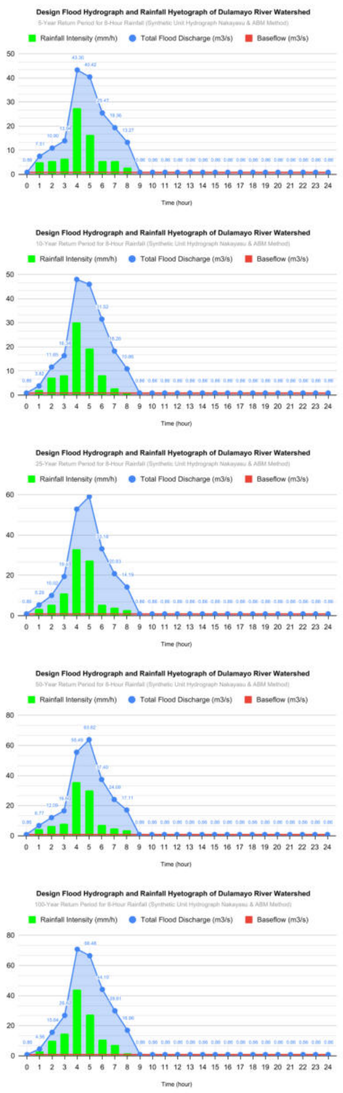
Restored the integrity of the meteorological dataset using proven statistical methods to correlate fragmented local records with continuous data from valid reference stations.

02 Extreme Rainfall Analysis

Conducted an advanced extreme rainfall frequency analysis on the newly validated data to establish a highly reliable, data-driven baseline.

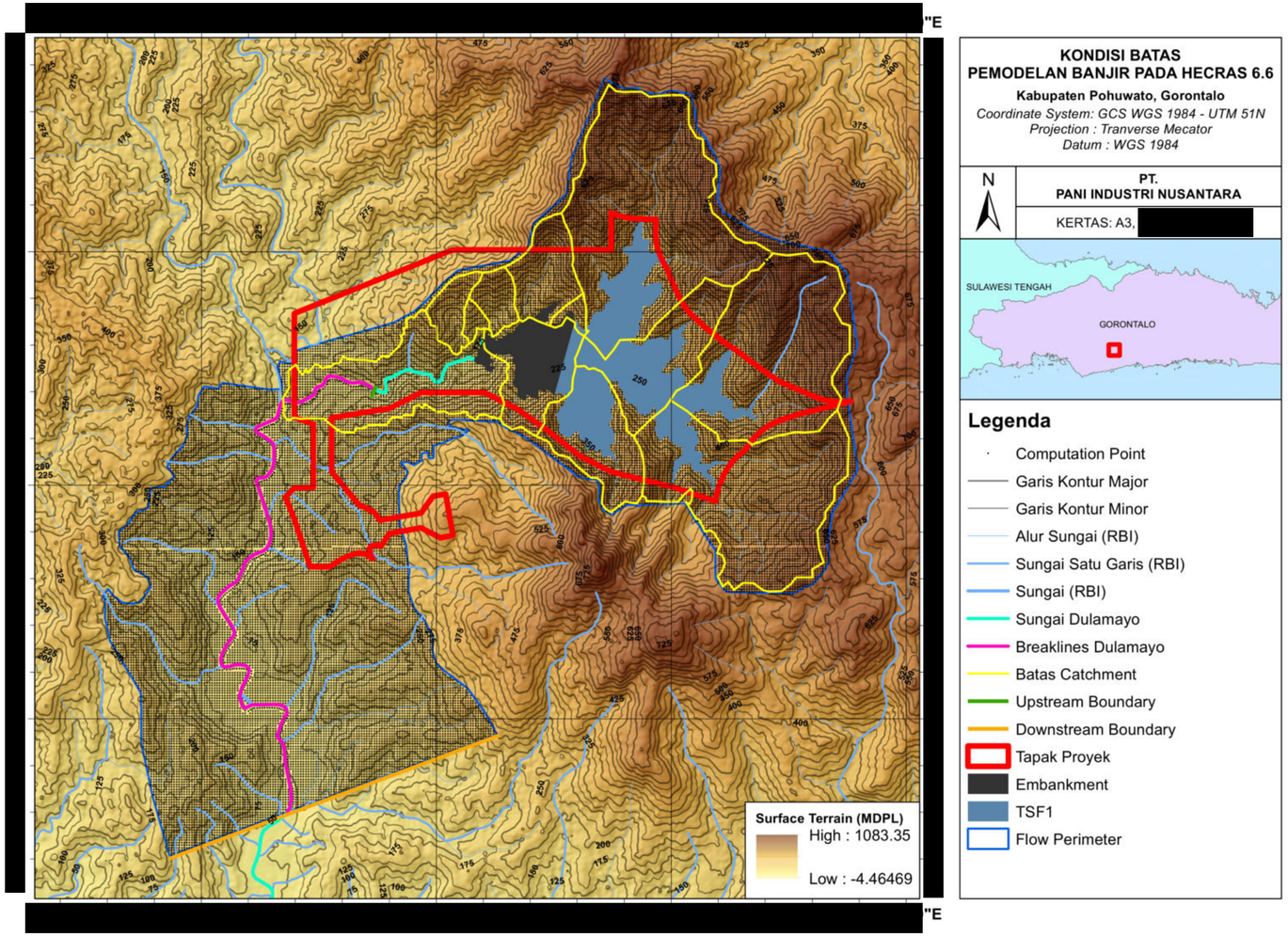
03 Hydrograph Synthesis

Synthesized precise Rainfall Hyetographs and converted them into dynamic Flood Hydrographs to map out temporal flow dynamics.



About Our Vision

This rigorous data reconstruction process successfully modeled critical 5, 10, 25, 50, and 100-year extreme storm events, providing the exact input variables required for advanced spatial routing and hydrodynamic simulations.



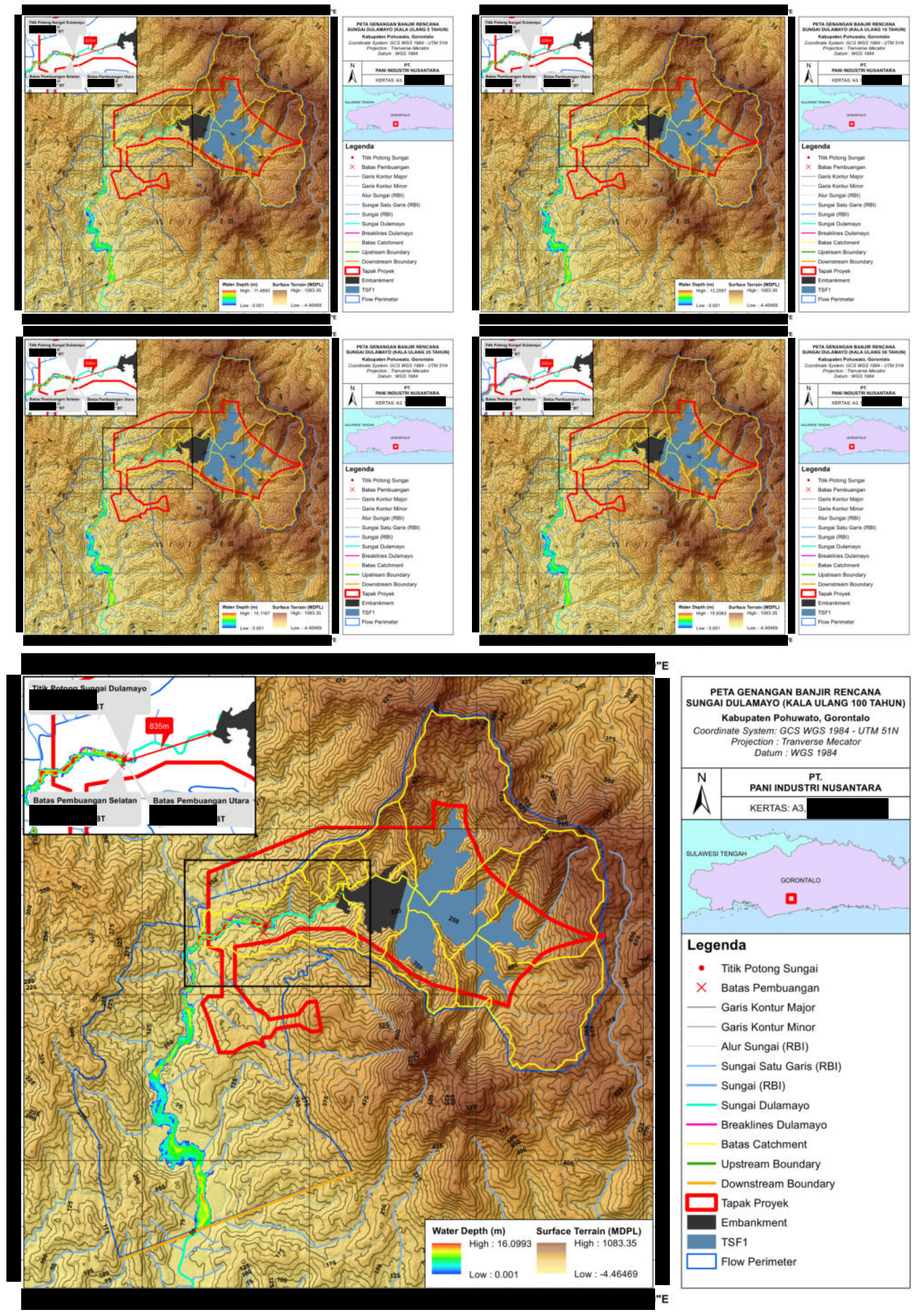
2D Hydrodynamic Simulation via HEC-RAS

Equipped with accurately synthesized hydrological parameters, the next phase was to dynamically visualize how these extreme floodwaters would interact with the mine's complex physical terrain. We integrated the computational hydrology models into the HEC-RAS 2D hydrodynamic simulation engine, combining them with high-resolution Digital Elevation Models (DEM). This advanced spatial routing approach precisely simulated fluid behavior, allowing us to map the exact depth, velocity, and boundaries of the flood inundation zones surrounding the highly sensitive TSF and embankment areas.

Geosentra.

Strategic Relocation and Environmental Security

The HEC-RAS hydraulic modeling delivered an undeniable spatial quantification of the flood hazards and their destructive potential. Providing these highly accurate inundation maps directly initiated a critical strategic intervention by the management team. Driven by the spatial data, a decisive resolution was made to relocate the planned runoff containment facilities to a safer elevation and distance, well away from the embankment. This preventative measure guaranteed the geotechnical stability of the tailings infrastructure and ensured absolute compliance with stringent dam safety standards.



6 AIR QUALITY MODELING USING AERMET-AERMOD MODEL

PT. Foodex Inti Ingredients

AIR QUALITY DISPERSION MODELING & METEOROLOGICAL SYNTHESIS

PT. FOODEX INTI INGREDIENTS

Project Overview

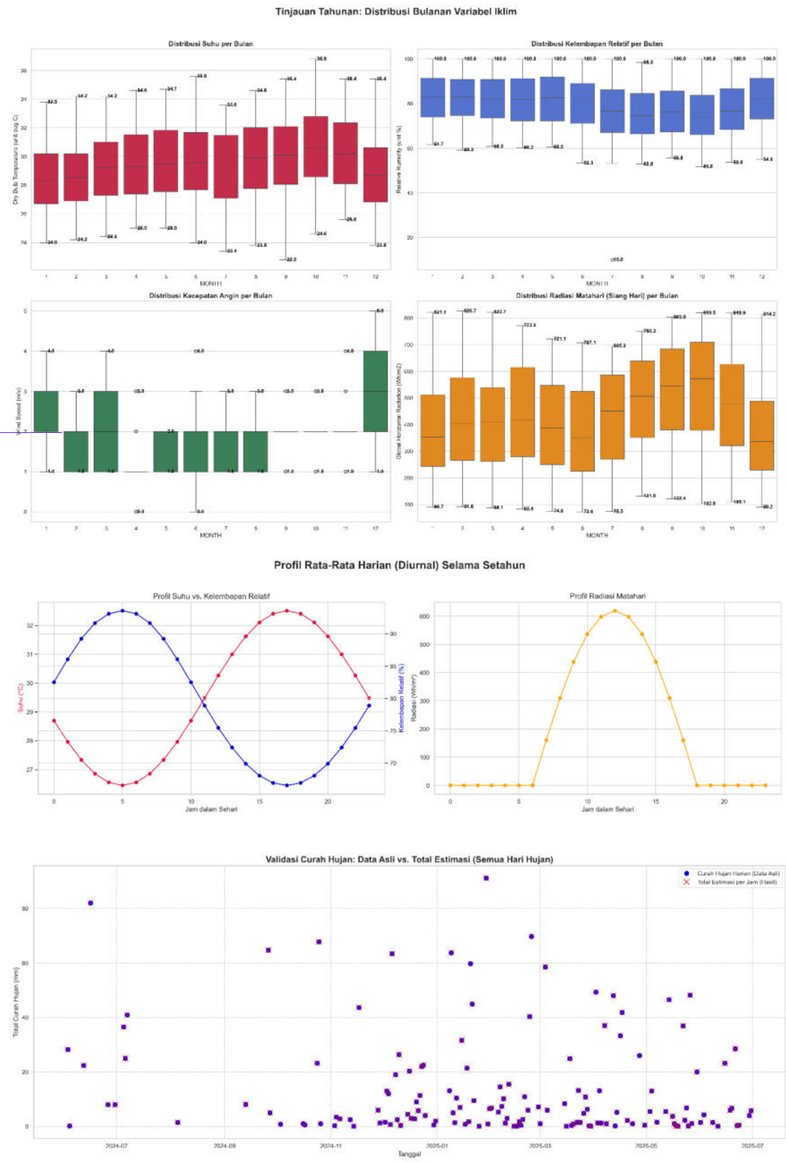
PT. Foodex Inti Ingredients operates a manufacturing facility situated in the Delta Silicon 3 industrial zone in Cikarang, West Java. The project demands a rigorous evaluation of air pollutant dispersion—spanning CO2, CO, H2O, SO2, NO2, Particulates, and VOCs—originating from 13 distinct stack sources.

Accurately predicting how these complex emissions are transported and diluted in the atmosphere is an absolute environmental priority.

Geosentra.

Meteorological Engineering & Data Synthesis

To break through the analytical deadlock caused by data scarcity, We implemented a comprehensive computational strategy using Python to restore and synthesize the critical meteorological datasets.



Missing Data Imputation

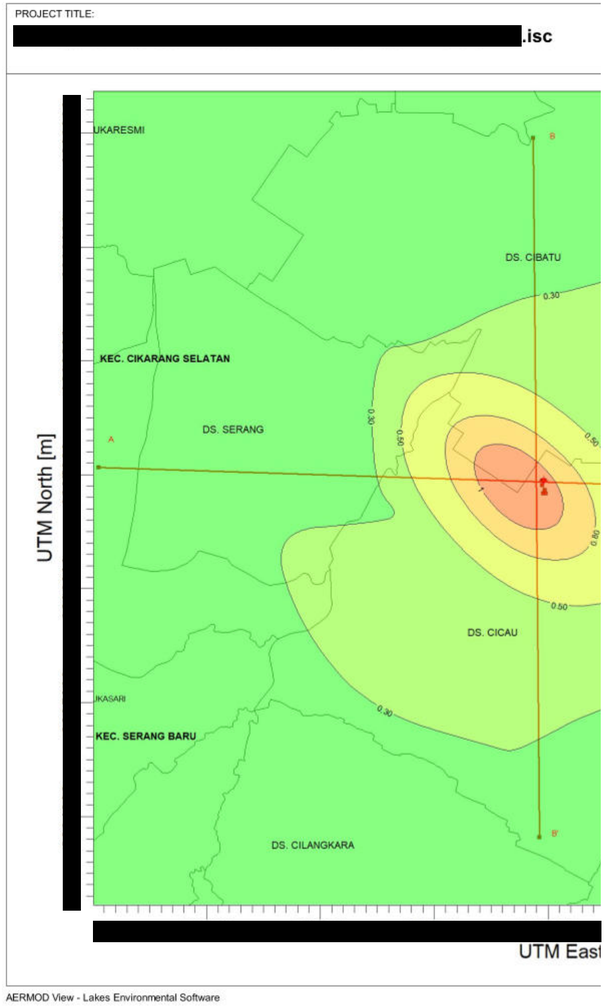
Restored the integrity of the temperature dataset using diurnal cosine interpolation to accurately represent natural thermal cycles.

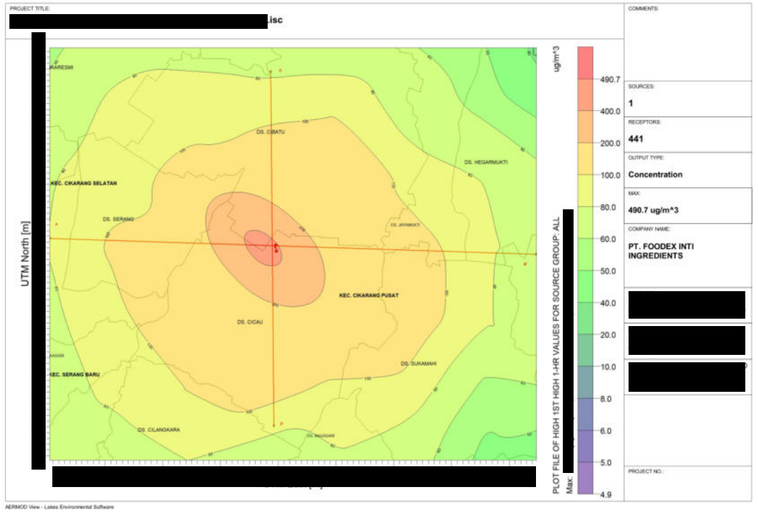
Algorithmic Estimation

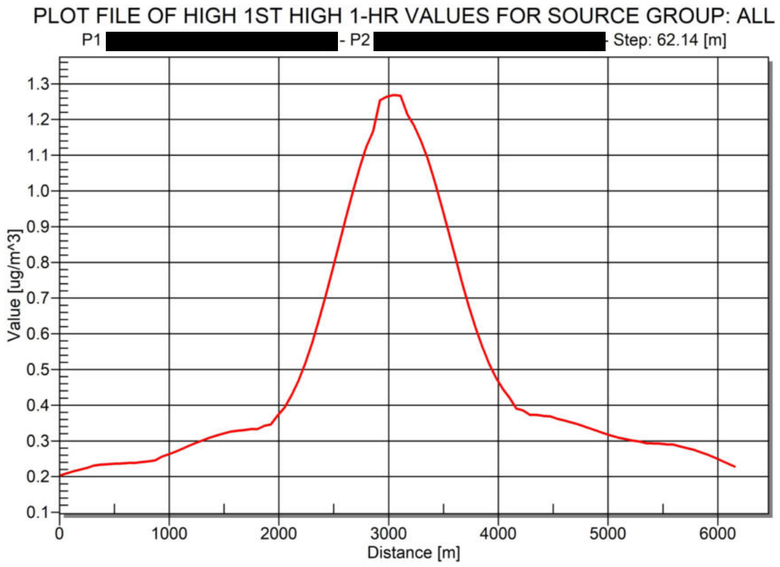
Conducted advanced estimations for relative humidity utilizing the August-Roche-Magnus formula , and synthesized solar radiation profiles via a modified Angstrom-Prescott method.

Mass Balance Validation

This rigorous data reconstruction process perfectly maintained the absolute statistical mass balance of critical variables like precipitation, providing the exact input variables required for valid simulations.







Advanced Dispersion Simulation via AERMET-AERMOD

Equipped with accurately synthesized hourly meteorological parameters for a full one-year period, the next phase was to dynamically visualize how these emissions would interact with the surrounding environment.

We integrated the computational atmospheric models into the AERMOD dispersion engine. This advanced spatial routing approach precisely simulated plume behavior, allowing us to map the exact distribution, concentration gradients, and temporal decay of pollutants over critical 1-hour and 24-hour periods.

Spatial Quantification and Environmental Security

The AERMOD modeling delivered an undeniable spatial quantification of the emission hazards and their true environmental potential.

Providing these highly accurate isopleth maps directly proved a consistent "bell-shaped" dispersion curve, confirming that maximum pollutant concentrations are strictly localized within a 1 to 2 kilometer radius of the facility boundaries. Driven by the spatial data, the analysis verified a rapid atmospheric dilution and exponential decay. This scientific validation guarantees that distant residential communities remain completely secure from long-range pollution transport, ensuring absolute compliance with environmental safety standards.

7 TAILINGS MANAGEMENT, RECLAMATION PLANNING, AND GROUNDWATER MODELING

PT. J Resources Bolaang Mongondow

Geosentra.

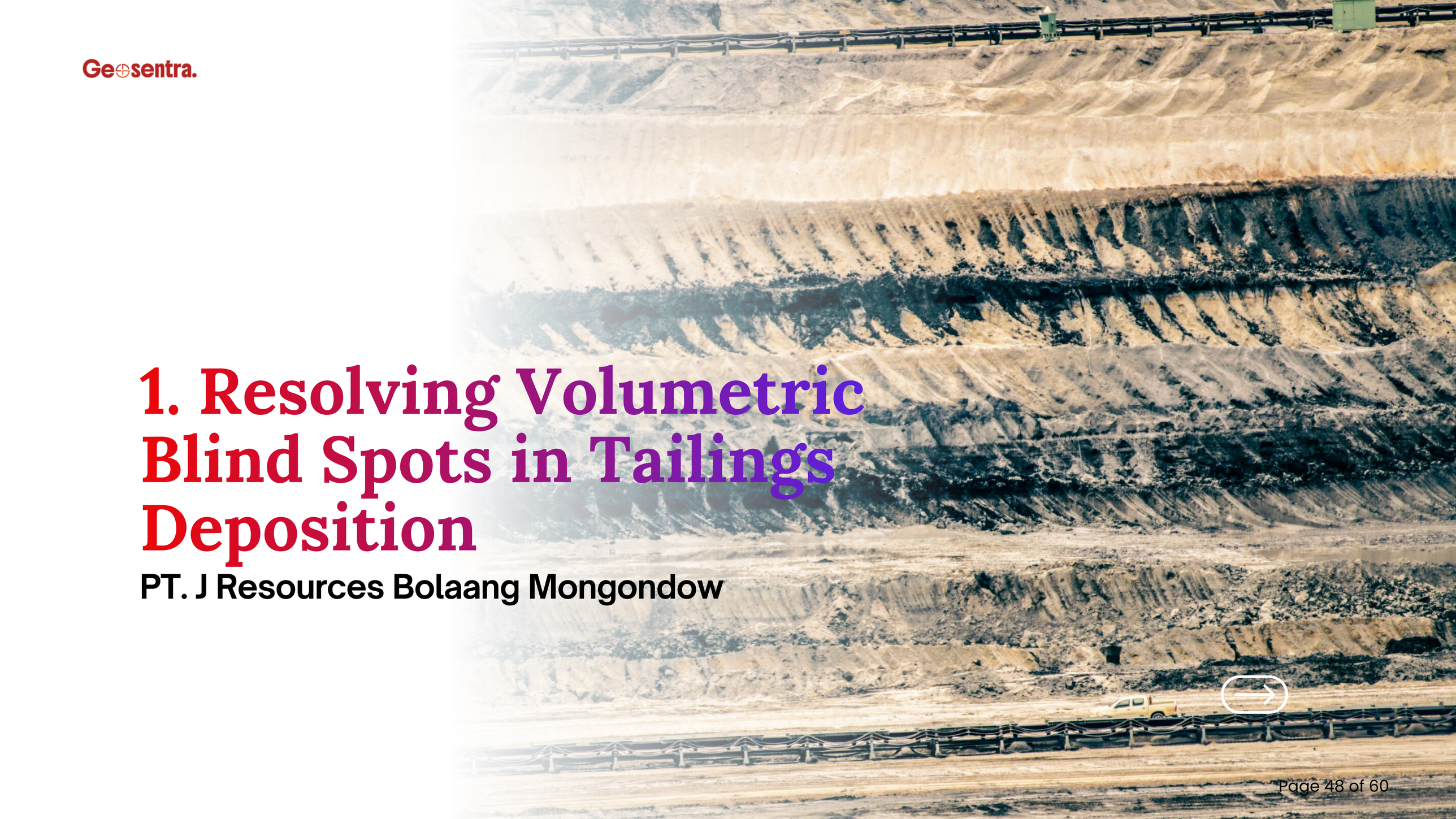
About

J Resources Bolaang Mongondow

PT J Resources Bolaang Mongondow (JRBM) is a **leading gold mining company** operating in the Bolaang Mongondow Regency, North Sulawesi, and is a prominent subsidiary of PT J Resources Asia Pasifik Tbk (PSAB). The company manages and operates an open-pit mine at the Bakan site under a Contract of Work (Kontrak Karya) that is valid until 2034. **JRBM is strongly focused on the continuous exploration, development, and production of high-quality gold ore**, serving as the operational foundation where We applied our expertise in environmental engineering and hydrogeological modeling.

J RESOURCES

Geosentra.



1. Resolving Volumetric Blind Spots in Tailings Deposition

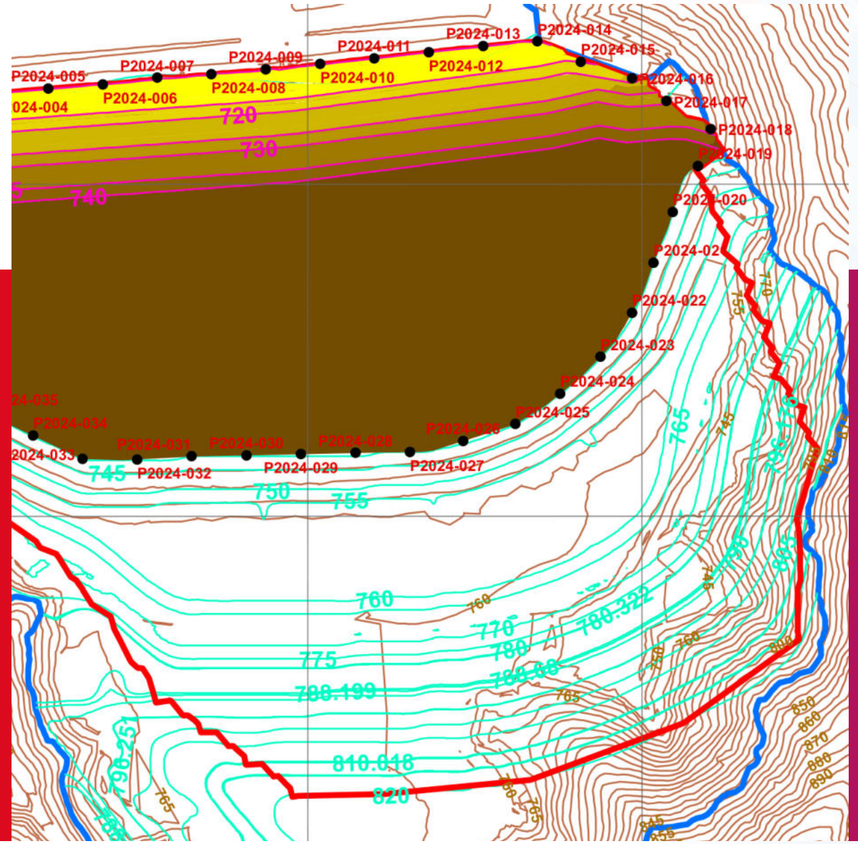
PT. J Resources Bolaang Mongondow

Geosentra.

The *Problem*

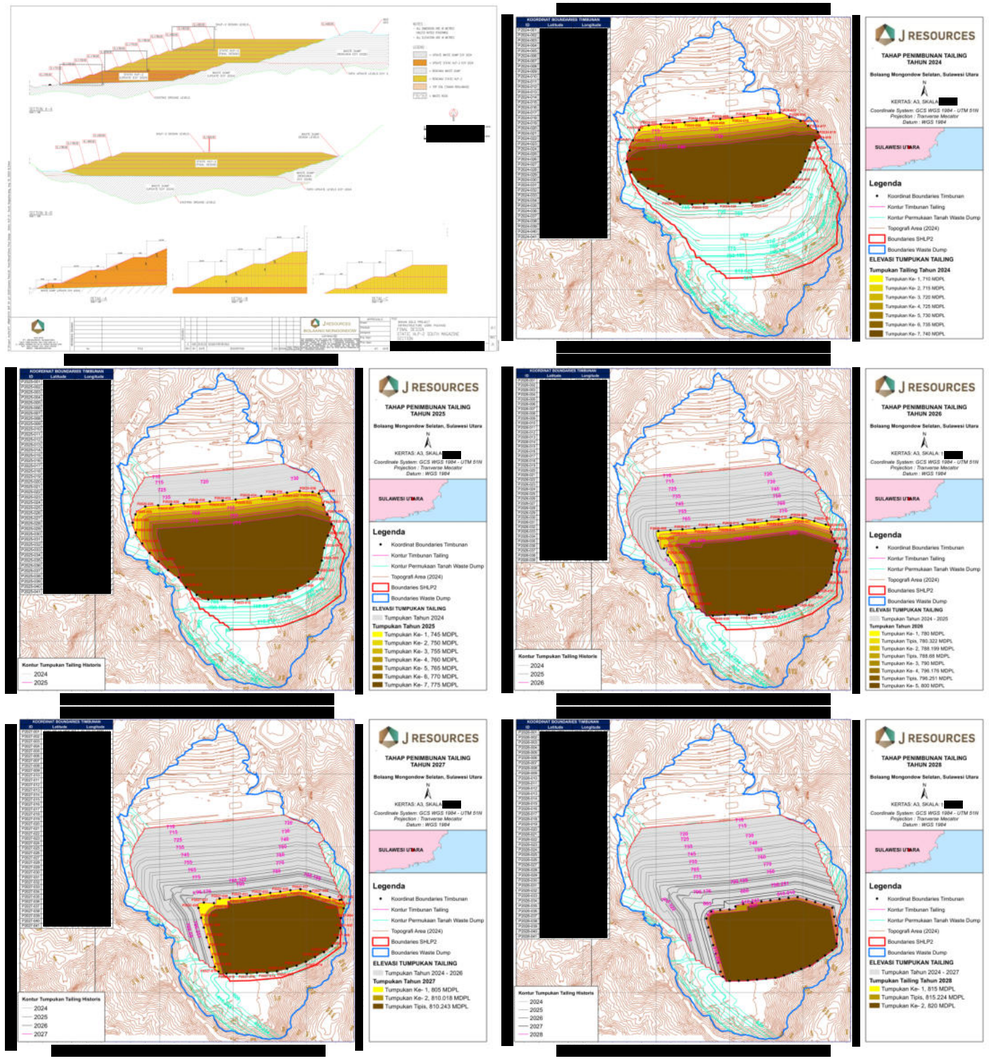
We faced a major bottleneck in calculating exact volumes for over 20 overlapping tailings stacks. These stacks leaned against a cliff face, creating spatial blind spots that masked their original geometry and depth. Conventional survey methods were insufficient, as we only had baseline pre-deposition contours and outer elevation data to work with.

Geosentra.



The Solutions

To overcome this data limitation, We initiated a geospatial engineering approach integrating custom Python automation scripts with advanced GIS analytics. Using the pre-deposition Digital Elevation Model (DEM) as a baseline, the algorithm extrapolated the "missing" depths by calculating intersections between the existing outer tailings boundaries and the cliff profile.



The *Result*

This computational approach successfully reconstructed the 3D topography of the overlapping blind spots. We completely eliminated the volumetric information gap, allowing us to accurately separate, reconstruct, and map more than 20 complex tailings stacks individually.

Geosentra.

2. Progressive Reclamation Strategy

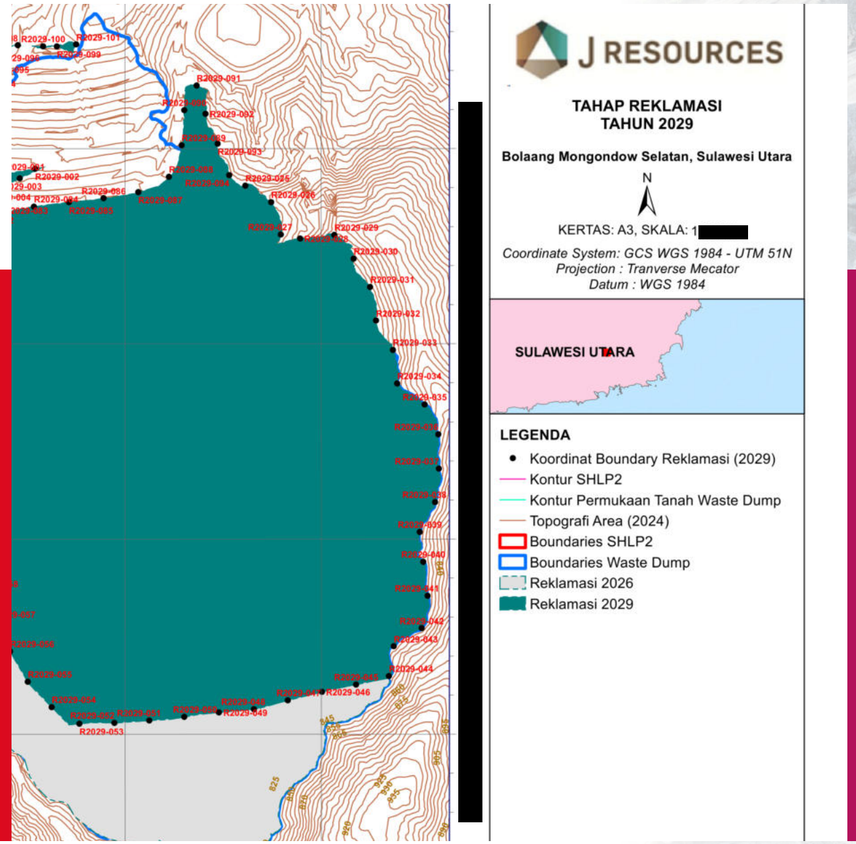
PT. J Resources Bolaang Mongondow

Geosentra.

The *Problem*

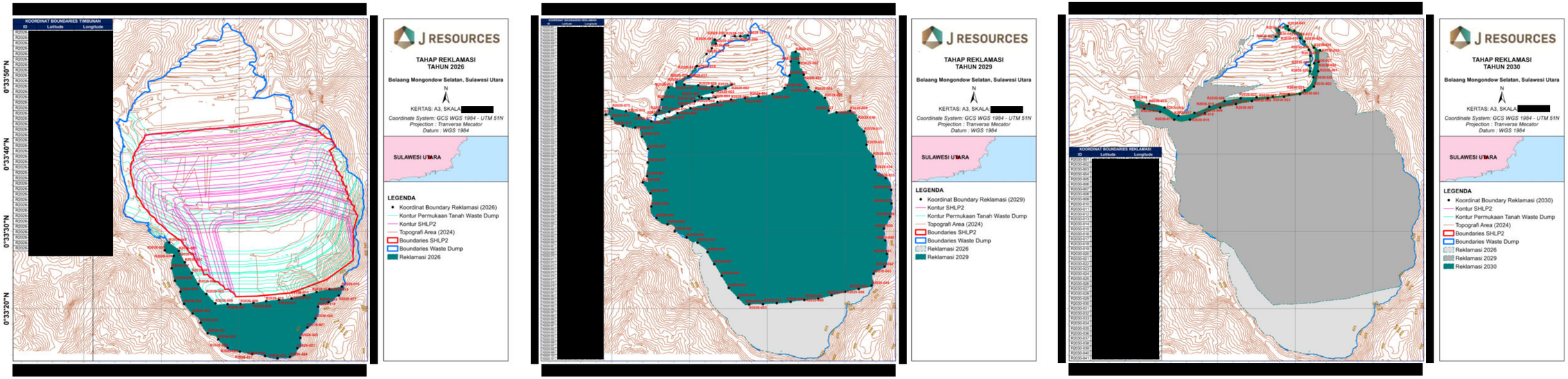
Mining operations must be accompanied by sustainable environmental restoration. The challenge was to create a realistic, phased post-mining reclamation plan for the SHLP-2 South Magazine area that aligns with JRBM operational timeline.

Geosentra.



The Solutions

I developed a spatial reclamation stage map, strategically mapping out the specific areas targeted for environmental restoration over key milestones.



The *Result*

This resulted in a clear, actionable reclamation roadmap for the years 2026, 2029, and 2030. It provides the company with a visual guideline to ensure regulatory compliance and a structured transition toward environmental recovery.

Geosentra.

3. Environmental Risk Assessment & Contaminant Transport

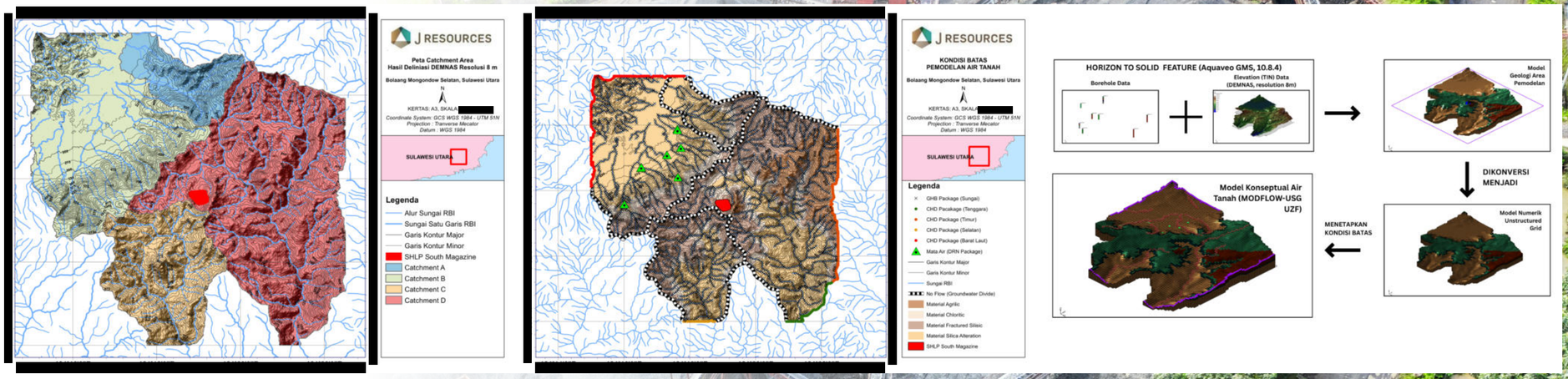
PT. J Resources Bolaang Mongondow

Geosentra.

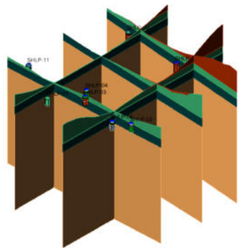
The *Problem*

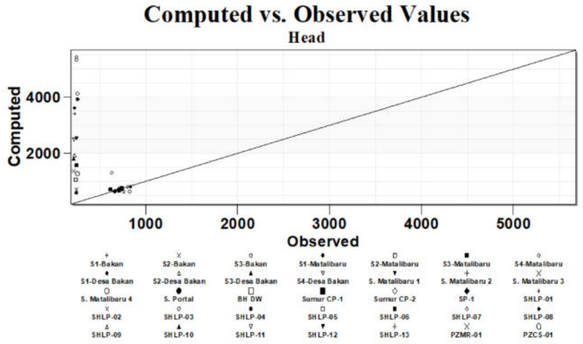
JRBM had to prepare for worst-case scenarios, specifically: what would happen to the surrounding environment and groundwater if the tailings facility's liner experienced a tear?

Geosentra.

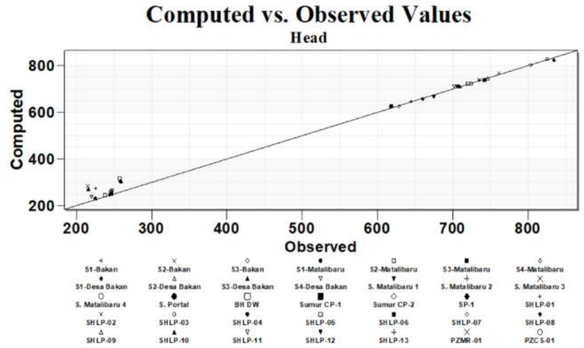


MODEL GEOLOGI
SHLP SOUTH MAGAZINE





RINGKASAN STATISTIK MODEL AIR TANAH
SEBELUM KALIBRASI

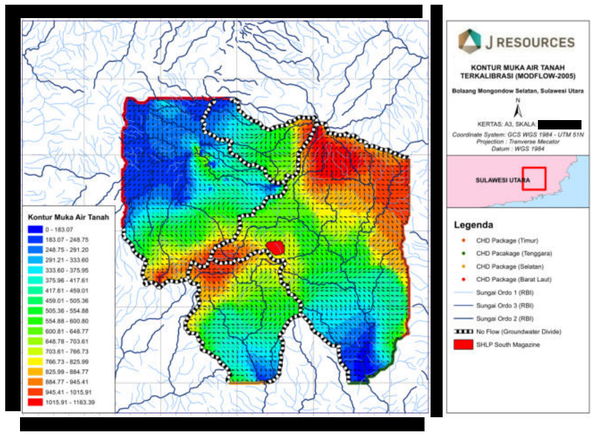


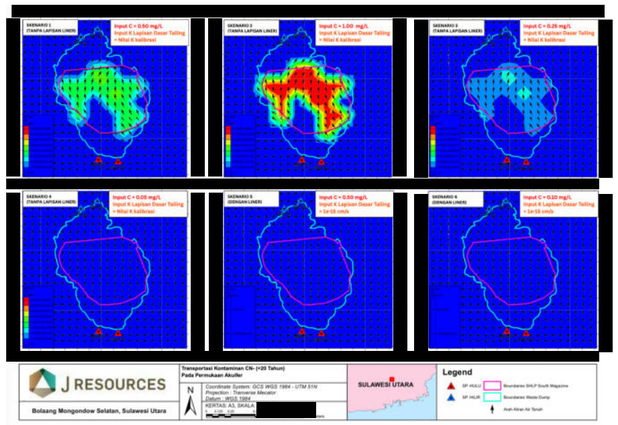
RINGKASAN STATISTIK MODEL AIR TANAH
SETELAH KALIBRASI

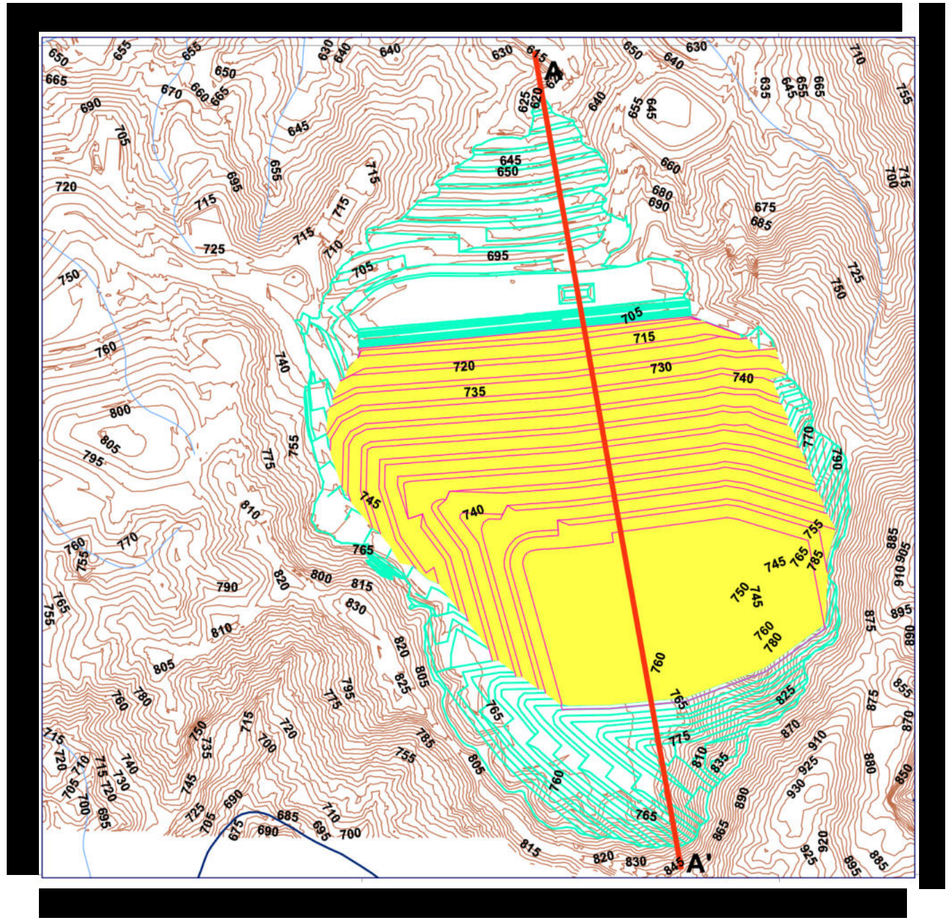
The Solutions

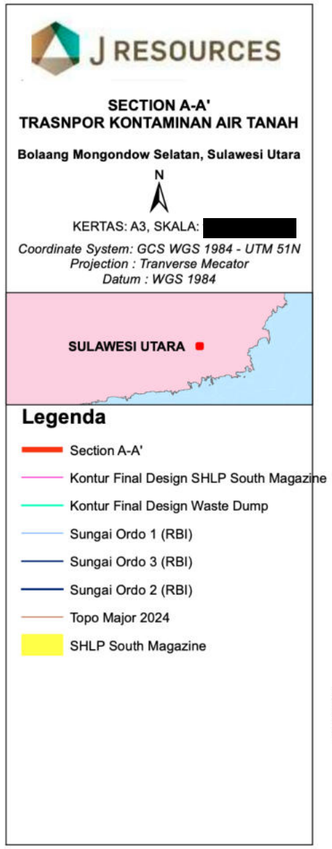
Leveraging the geological and groundwater models We built, We simulated the transport of heavy metal contaminants. We mapped out the potential spread from both a top view and a cross-sectional side view (Cross-Section A-A').

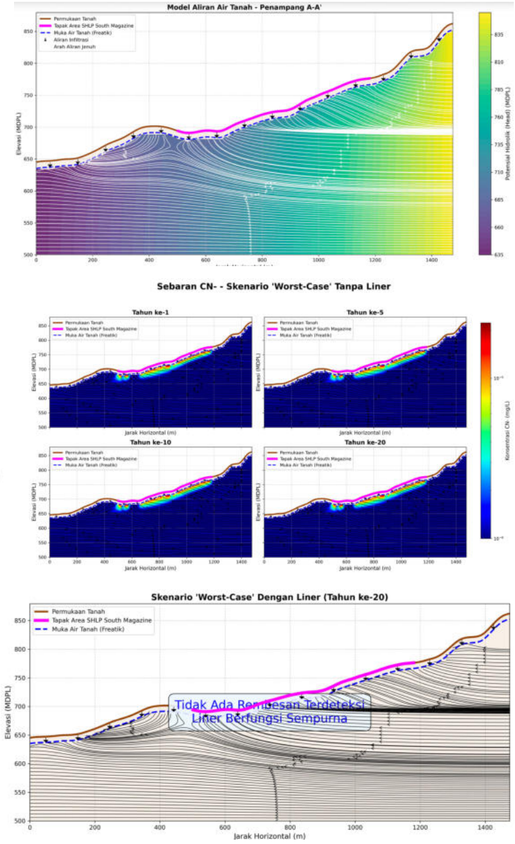
Geosentra.











The *Result*

This provided a critical risk assessment visualization. It allows the management and environmental teams to see exactly how and where contamination would spread, enabling them to design proactive mitigation strategies and emergency response plans.

Thank You

+62 813-3161-2857

www.geosentra.id / yasirabdanzakia.com

yasirabdan@geosentra.id