Mine Dewatering Design and Groundwater Control

Mining Hydrology, Groundwater Modelling and Pumping Systems

FORMAT	DATES	CPD POINTS	
Live Online Training	28 – 30 September 2026	3 Points	R 12 999 per delegate

Overview

Effective management of groundwater and mine water is critical to maintaining safe, productive and economically viable mining operations. Poorly controlled groundwater can affect pit and underground mine stability, production, equipment, infrastructure and environmental performance.

This 3-day technical course provides delegates with a practical, engineering-based understanding of mining hydrology, groundwater behaviour, mine-water inflows, dewatering design, groundwater control, groundwater modelling and pumping systems, combining core theory with calculations, case studies and design exercises relevant to both open-pit and underground operations.

Hydrogeology & Inflow Assessment → Dewatering Design → Groundwater Control → Modelling & Monitoring → Optimisation & Risk Management

By the end of the programme, delegates will be equipped to assess groundwater risk, design and evaluate mine dewatering systems, and integrate water management into mine planning and operational decision-making.

Who Should Attend

- Mine Water & Hydrogeology Engineers
- Mine Planning Engineers
- Geotechnical & Slope Stability Engineers
- Dewatering & Pumping System Engineers
- Mine Infrastructure Managers
- Environmental & Compliance Officers
- Consulting Engineers
- Mining Operations Personnel

Learning Outcomes

- ✓ Explain the fundamental principles of mining hydrology and groundwater flow
- ✓ Characterise aquifers and groundwater systems relevant to mining
- ✓ Assess groundwater inflows into open-pit and underground mines
- ✓ Evaluate pumping-test and aquifer-test information
- ✓ Develop conceptual groundwater models for mining areas
- ✓ Select appropriate mine dewatering and groundwater-control methods
- ✓ Determine pumping capacity and system requirements
- ✓ Design and evaluate mine sumps, pump stations, wells and drainage systems
- ✓ Optimise mine dewatering systems for reliability, energy efficiency and cost

DAY 1: Mining Hydrology, Groundwater and Mine-Water Inflows

Sessions 1 to 5

1 Fundamentals of Mining Hydrology

- Introduction to mining hydrology; hydrology versus hydrogeology
- Evaporation, evapotranspiration and groundwater recharge/ discharge
- Hydrological conditions in mining environments
- The hydrological cycle, precipitation, runoff and infiltration
- Surface water and groundwater interaction
- Seasonal and climatic influences; water management through the mine life cycle

2 Groundwater Systems and Hydrogeology

- Occurrence of groundwater; aquifers, aquitards and aquicludes
- Hydraulic conductivity, transmissivity, storativity and specific yield
- Fractured-rock aquifers
- Unconfined and confined aquifers; porosity and permeability
- Hydraulic head and groundwater gradients; flow direction
- Structural and geological controls on groundwater movement

3 Groundwater Flow and Well Hydraulics

- Principles of groundwater flow; Darcy's Law
- Steady-state and transient conditions; radial groundwater flow
- Well yield, pumping rates and well interference (theory)
- Hydraulic gradients and groundwater-flow rates
- Drawdown, cone of depression and radius of influence
- Recovery following pumping; introduction to analytical solutions

4 Hydrogeological Investigation for Mining

- Objectives of hydrogeological investigations
- Groundwater-level monitoring; piezometers and monitoring wells
- Estimation of aquifer parameters; data quality and uncertainty
- Borehole investigations, exploration drilling and logging
- Aquifer testing: pumping tests, recovery tests, slug tests
- Developing a conceptual hydrogeological model

5 Mine-Water Inflows

- Sources of water entering a mine; groundwater inflows
- Inflows through faults, fractures and weathered zones
- Predicting inflows: average versus peak; seasonal variation
- Rainfall and surface-water contributions
- Inflows from adjacent workings and surface-water bodies
- Uncertainty, design allowances and water-inflow risk assessment

DAY 2: Mine Dewatering Design and Groundwater Control

Sessions 6 to 11

6 Mine Dewatering Principles and Strategies

- Objectives of mine dewatering
- Active and passive groundwater control
- Temporary versus permanent dewatering infrastructure
- Dewatering versus groundwater depressurisation
- Pre-mining and operational dewatering; progressive dewatering
- Selecting methods and integrating dewatering with mine planning

7 Open-Pit Mine Dewatering

- Groundwater conditions and pit inflow mechanisms
- Pumping wells and peripheral wellfields; in-pit and ex-pit dewatering
- Pit-wall depressurisation; managing groundwater around highwalls
- In-pit pumping and sump design
- Horizontal drainage and drainage trenches
- Dewatering during pit expansion; stormwater/groundwater integration

8 Underground Mine Dewatering

- Sources of underground mine water
- Main drainage systems and booster pumping; multi-level drainage
- Emergency water storage and standby pumping capacity
- Underground sumps and pump stations
- Shaft and decline drainage; rising mains
- Managing sudden water ingress and water-inrush preparedness

9 Groundwater Control and Depressurisation

- Purpose of groundwater control; reducing pore-water pressures
- Horizontal drains and drainage galleries (general application)
- Interference between wells; depressurisation targets
- Dewatering wells and horizontal wells
- Pumping-induced drawdown; wellfield configuration and spacing
- Managing pressures around pit slopes and underground excavations

10 Dewatering System Design and Pumping Calculations

- Establishing design inflows; well-discharge calculations
- Pumping-test interpretation; wellfield performance and interference
- Static/dynamic head, TDH, pump and system curves, operating points
- Drawdown calculations and aquifer response to pumping
- Required pumping capacity, peak, emergency and long-term
- Pipeline sizing, friction/minor losses, valve and fitting losses

11 Mine Drainage Infrastructure

- Mine sumps and pump stations
- Valves and control systems; water-storage facilities
- Redundancy and system reliability
- Drainage channels, trenches, pipelines and rising mains
- Sediment management; pump and pipeline protection
- Access and maintenance requirements

DAY 3: Groundwater Modelling, Monitoring and Optimisation

Sessions 12 to 17

12 Groundwater Modelling for Mine Dewatering

- Purpose of groundwater modelling; conceptual versus numerical models
- Hydrogeological inputs and hydraulic parameters
- Scenario analysis and modelling alternative dewatering strategies
- Model domains, boundaries and boundary conditions
- Steady-state and transient modelling; calibration and sensitivity
- Predicting inflows and drawdown; model uncertainty and limitations

13 Groundwater and Geotechnical Stability

- Relationship between groundwater and mine stability
- Groundwater pressure in pit slopes; groundwater-induced instability
- Piezometric monitoring for slope stability
- Pore-water pressure and effective stress
- Slope depressurisation using horizontal drains and galleries
- Integration of hydrogeological and geotechnical information

14 Mine-Water Quality and Environmental Management

- Mine-water quality fundamentals; suspended solids, salinity
- Water treatment requirements
- Environmental impacts of dewatering beyond the mine boundary
- Acid mine drainage; metals and other contaminants
- Groundwater-quality monitoring and discharge considerations
- Water reuse, recycling and sustainable mine-water management

15 Dewatering Monitoring and Control

- Groundwater monitoring networks; piezometer/observation boreholes
- Pump and pipeline performance monitoring
- Trigger levels, action levels and early-warning systems
- Water-level, flow and pressure monitoring
- Automated monitoring and SCADA integration
- Data interpretation and reporting

16 Dewatering Optimisation and Troubleshooting

- Pump performance deterioration and cavitation
- Pipeline blockages and sedimentation
- Optimising pumping schedules; reducing energy consumption
- Well clogging and reduced well yield
- Excessive drawdown and unexpected groundwater inflows
- Improving reliability; preventive maintenance and performance reviews

17 Mine-Water Risk Management and Emergency Response

- Mine-water hazard identification
- Loss of pumping capacity and power failure
- Emergency storage capacity
- Water-inrush risk, flooding scenarios and extreme rainfall events
- Emergency pumping, backup power and standby pumps
- Contingency planning, risk registers and business continuity

Registration Form

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R 12 999
per delegate

BOOKING CONTACT (APPROVING OFFICIAL)

FULL NAME (MR / MRS / MS)

POSITION

COMPANY NAME

VAT NUMBER

TELEPHONE

EMAIL

ADDRESS

SIGNATURE

DATE

FINANCE & PAYMENT

PERSON RESPONSIBLE FOR FINANCE

DIRECT TEL NO.

DATE OF PAYMENT

PURCHASE ORDER / REFERENCE NO.

ACCOUNT HOLDER	BANK	BRANCH	ACCOUNT NO.
Independent Training Management (Pty) Ltd	FNB South Africa	Randburg (251650)	62685879276

DELEGATES ATTENDING THIS WORKSHOP

#	FULL NAME	POSITION	EMAIL
1			
2			
3			
4			
5			

TERMS & CONDITIONS

1. **Fees** are current at time of print; Independent Training reserves the right to change them.
2. **Additional delegate rates** apply for bookings made at the same time, on the same course.
3. **Confirmation**: on receipt of this form and payment/PO, you will receive email confirmation with venue details, map and start times.
4. **Attendance**: no learner may attend without proof of payment or an order number.
5. **Substitution**: delegate substitutes may be made at any time at no penalty — please notify us in writing.
6. **Payment** is due 5 working days before the course by cheque or EFT, quoting the invoice reference and organisation name. Cancellations must be emailed to Independent Training; please notify us immediately of any reschedule or cancellation.

CANCELLATION CHARGES

11 – 30 days before course	10%
6 – 10 days before course	20%
4 – 6 days before course	30%
1 – 3 days before course	50%