DRA

BACKFILL SERVICES

About DRA

DRA is a multi-disciplinary engineering group delivering mining, minerals processing and infrastructure services from concept to commissioning as well as a comprehensive operations and maintenance service.

We have established ourselves as leaders in these areas in Africa and we are rapidly growing our business in other parts of the world. Our expertise covers a wide range of commodities, including gold, platinum, coal, ferrous metals, diamonds, uranium, base metals, potash and rare earth minerals.

DRA is a private company owned by its employees. We employ over 3,000 people globally. Our workforce includes 1,300 engineers from various disciplines, draughts people, operators and support staff. Our people are our most valued resource and many are recognised as leaders in their field.

We started the design and project management of mineral processing plants in South Africa in 1984, but our project portfolio currently extends across Africa and into the rest of the world. Our projects are located in South Africa, the rest of Africa, North and South America, Australia, Asia and as far as the Arctic Circle.

We provide a comprehensive list of engineering services required to advance a mineral project from concept to commissioning. Our contract operations division operates and maintains multiple mineral processing plants around the world on behalf of our clients.

In addition, DRA undertakes the design and construction management of surface and underground mining projects with expertise in both hard and soft rock design through the use of specialised software. Associated infrastructure projects, such as ports, roads, bridges and accommodation are further capabilities offered.

Our headquarters in Johannesburg, South Africa, provides engineering support to our offices and operations in nine African countries. DRA TAGGART has an office in Pittsburgh, USA and Toronto, Canada, which employs approximately 350 people, to support our operations in South America. Additionally, DRA has offices in Australia (Perth and Brisbane), India and China, which support regional and global projects.

What We Do

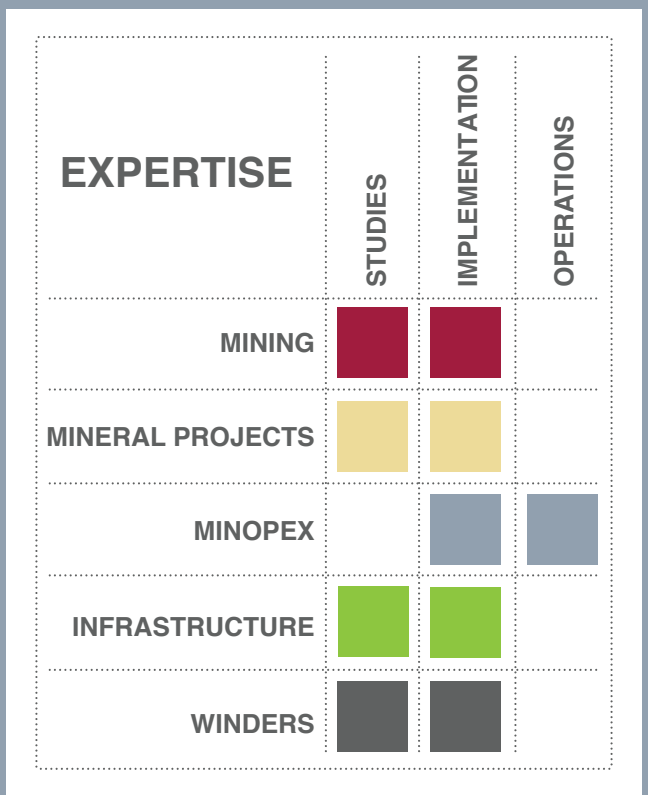
DRA offers a full range of engineering and project services. We tailor our services to meet the needs of our clients, offering both total engineering solutions and customised project solutions.

Our services include:

- Conceptual design and feasibility studies
- Detailed design and engineering
- Customised design of processing plants
- Large-scale mining infrastructure and backfill design
- Specialised winding system and shaft headgear design
- Project and construction management
- Commissioning
- Contract operations of mineral processing plants

DRA's contract operations of mineral processing plants provide a feedback loop to our design engineers regarding what works well and where improvements can be made.

The DRA Group provides highly flexible services, allowing us to meet the needs of multinational mining companies as well as junior and emerging producers.



Backfill Profile

Backfill is increasingly becoming an important component of underground mining operations because the disposal of mine tailings underground not only reduces the environmental impact but also provides in abundance an engineering material that can be used to improve both the ground conditions and the economics of mining.

Carefully engineered and efficiently run backfill systems can significantly enhance the effectiveness of the mining operation.

The purpose of the backfill is not to transmit the rock stresses, but to reduce the relaxation of the rock mass so that the rock itself will retain a load carrying capacity and become self-supporting.

The primary source of backfill materials is local to the mine, and the tailings from the processing of the ore are the most readily available source of backfill materials. Placement of mine tailings in underground backfill support directly reduces the quantity to be disposed on surface. This has direct operating and capital cost benefits and reductions in future rehabilitation costs to our clients.

DRA has an extensive understanding of the characteristics of the tailings material such as sizing, mineralogical composition, rheology and reactivity. These elements are vital to the design of reliable underground distribution pipeline systems. Gravity assisted delivery methods are utilized for backfill transportation with the dense tailings slurry being delivered by pipelines to the disposal point in the mined out stopes.

These pipelines can range from low pressure turbulent flow systems to high pressure laminar flow systems. The selection of a backfill system for a mine is part of the overall plan for the mining of the ore body. This plan takes into account the full life cycle of the operation, including mine closure and rehabilitation.

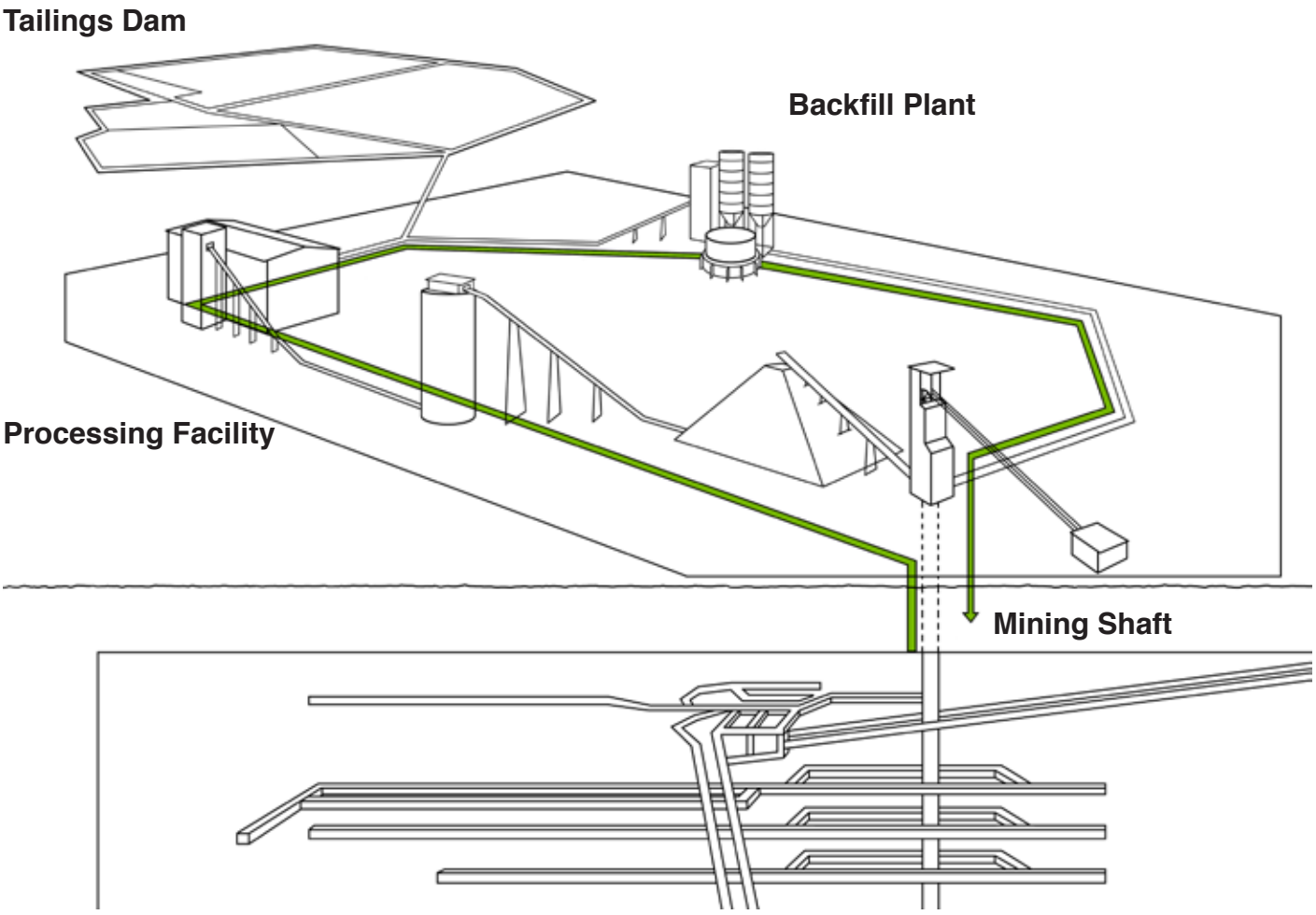
It is conclusive that the use of backfill in the mine as part of underground support system reduces mine closure costs and overall environmental impact.

Backfill Types

DRA has the capability to implement all variations of backfill. Each orebody and mine is unique and will require a tailored solution for backfill based on extensive test-work.

1. Slurry fill, hydraulic fill or cyclone classified tailings backfill, will utilise cyclone technology to reduce fines content and de-water plant tailings. This type of backfill is the most commonly used because it deploys cost effective and well understood hydro-cyclone technology.
2. Full plant tailings fill or paste fill requires the use of vacuum filter technology or state of the art high density thickeners to produce material for the fill.
3. Rock fill involves placing of rocks in the voids and pouring cemented fluid between the rocks to cover the voids to create roof support.

Typical backfill plant layout is as below:



Backfill Benefits

The deeper a mine progresses the more costly underground mining becomes. This will cause increased operational costs to be incurred by mining companies. DRA is able to offer a solution as backfilling reduces the overall cost impact by the re-use of waste to our clients benefit. Below are some of the benefits DRA is able to offer our clients by implementing this globally adopted technique.

Environmental

- Less environmental costs are incurred as backfill utilizes plant waste that would have been transported to the dumps for water recovery, diverting of the waste underground reduces related costs of managing the dams. Capital outlay of dumps design is reduced significantly as projected footprint of the dumps is reduced by less dump volume requirement.

Refrigeration

- Backfilling the mined out stopes underground reduces the area of the mine and in turn the need for extensive refrigeration load

Ventilation

- Prevention of air losses in mined out areas reduces losses related with ventilation of underground workings

Logistics

- Reduced logistics in the transport of support packs

Time Efficiency

- Shaft time is critical to underground mining, use of backfill eliminates the need for wood support completely and thus ensures shaft time can be maximised to proper use.

Improved ore extraction

- Improved ore extraction percentage, backfilling allows the pillar mining thus improves reef tons to be mined. The resultant of this is increased revenue, increment in the life of mine and all related benefits

Support

- Provides regional support in mined areas

Safety

- Helps to mitigate underground hazards such as falls of ground (FOG), underground fires associated with the use of wooden packs for support.

Projects

Sibanye Gold Backfill Project

Location:
30km South-West of Johannesburg, South Africa

Date: Jan 2013 to March 2015

Scope:
EPCM for the Sibanye Gold Backfill Project inclusive of design review of upfront work done by others.
Backfill purpose: Pillar extraction.
Design: 600 m^3/day, 647 tpd, 64% w/w using Hydrocyclone technology
Materials: Re-treated mine dumps and Binder
Rock engineering specifications: 880kPa in 28 days, 8m free standing height

Project cost and timeline:
EPCM and Plant cost R108m
Design to commission duration 2 years 3 months

Progress:
Construction complete, commissioning nearing completion
Handover in Q2 2015.

Randgold Kibali Paste Backfill Project

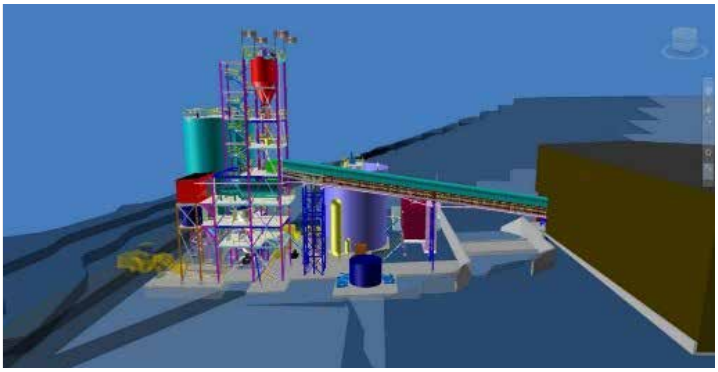
Location:
North–Eastern region of the DRC, 650km from Kisangani

Date:
March 2013 to May 2015

Scope:
Phase 1: Up front design review
Phase 2: Detailed design review, construction, procurement, commissioning and project management of Paste Plant
Backfill purpose: Regional and local support
Design: 182 m^3/h, 294 tph, 76.4% w/w horizontal vacuum filter
Materials: Floatation tailings and Binder

Project cost and timeline:
EPCM and Plant cost US$32 Million
Design to commission duration 2 years

Progress:
Construction complete, commissioning nearing completion
Handover in Q2 2015.



DRA PROJECTS (PTY) LTD
Telephone: (Johannesburg) +27 11 202 8600
E-mail: info@DRAglobal.com

DRA PACIFIC (PTY) LTD
Tel: (Brisbane) +61 732 364 157
Tel: (Perth) +61 8 9324 3833
E-mail: info@DRAglobal.com

DRA TAGGART
Tel: (USA) +1 724 754 9800
Tel: (Canada) +1 416 800 8797
E-mail: info@DRAglobal.com