

Providing global expertise in Africa



Knight Piésold delivers critical consulting services across a range of applications and industries, with its Tshwane branch specialising in geotechnical and, more recently, hydropower engineering.



Michael Plichta, regional manager: Tshwane and Jaco van Tonder, principal geologist: Tshwane, Knight Piésold

Though it may be a global company in terms of operational footprint – with offices and projects in North and South America, Europe, Asia, Australia and Africa – Knight Piésold remains strongly grounded in its home country.

Founded in 1921, it is the oldest consulting engineering firm in South Africa and has, over the last 96 years, staved off buy-outs by international behemoths to remain a truly independent and proudly South African organisation. While the firm initially cut its teeth in the mining sector, it organically expanded to become a multidisciplinary consulting firm of distinction.

Headquartered in Rivonia, Sandton, Knight Piésold has four other branches in South Africa, with a key office situated in the City of Tshwane and specialising in hydropower and geotechnical engineering.

Hydropower engineering

The Dams and Hydropower Unit is a relatively new addition to the Tshwane branch, having started operations in March 2017. The team working in the unit, however, could not be more experienced and consists largely of engineers who were working in the Rivonia head office. The reasons for the shift are that a number of the firm's dam engineers and the Department of Water and Sanitation – a major client – are based in Tshwane.

Bramhoek Dam – construction in progress (2010)

Knight Piésold has long been a pioneering force in the field of hydroelectric power and its expertise in hydropower and dam engineering has seen the firm play an important role in some of Southern Africa's most significant water engineering projects.

In South Africa, Knight Piésold was closely involved in Eskom's 1 333 MW Ingula Pumped Storage Scheme – one of the largest hydroelectric development of its kind in Africa. This comprised the construction of the upper Bedford Dam and Lower Bramhoek Dam. Michael Plichta, principal geotechnical engineer and regional manager: Tshwane, explains the firm's multiple roles: "At Ingula, the joint venture partners were responsible for project management, dam type selection, geotechnical investigations, dam design, tender construction documents, construction supervision and the compilation of an O&M manual."

Beyond its massive scale, the project was recognised as an exceptional achievement by the consulting engineering community, winning the 2016 CESA AON Engineering Excellence Award in the category "Projects with a value of R250 million and more".

What makes Ingula stand out further is that it is somewhat of an exception in terms of hydropower generation capacity in South Africa. "As a water-scarce country, South Africa has relatively few opportunities for hydropower, which can only provide limited



Bedford Dam construction near completion (2011)

power to the energy mix. Other than pumped storage schemes, it is mostly small-scale projects (less than 10 MW) that can be developed, and then only in some parts of the country," comments Plichta.

"You need a consistent flow of water and a large elevation difference for traditional hydroelectric dams, which is why we opt for pumped storage in South Africa. For example, we're currently working on a project in Sombwe, in the DRC, where the river's minimum flow is 100 cubic metres of water per second in the 'dry' winter season. We don't really get flows like this in South Africa, which is why most of our dam and hydropower-related work takes place beyond our borders," adds Jaco van Tonder, principal geologist at the Tshwane branch.

Geotechnical engineering

A key element in the establishment of dams and hydroelectric schemes comes long before even a bucket of soil or rock has been removed. After all, without knowing what's under the ground, should one be building on it? The disciplines of geotechnical engineering and engineering geology lie at the very foundation of not only dams, but all large-scale infrastructure projects – quite literally.

Geotechnical investigations of both soil and rock are among the specialised functions of the Tshwane branch. Plichta expands: "We primarily conduct geotechnical investigations for a wide variety of projects, both locally and internationally. This includes specialist stability investigations for areas underlain by dolomite, such as large parts of Tshwane." The latter is a vital service in the city, Plichta explains, as dolomitic areas may be at risk of sinkhole formation, which can be disastrous for residential developments.

He adds, "We also have experience with large dam design and dam safety inspections, which include the investigation of foundations, construction materials, borrow pits and quarries. Most ancillary infrastructure, such as

roads and pump stations, also requires geotechnical investigation." Access to reliable geotechnical information is vital in the design of infrastructural earthworks and foundations. "Unforeseen project costs and delays often occur where problematic soil and rock conditions have not been identified, with the cost implications becoming even more severe on large-scale projects," explains Van Tonder.

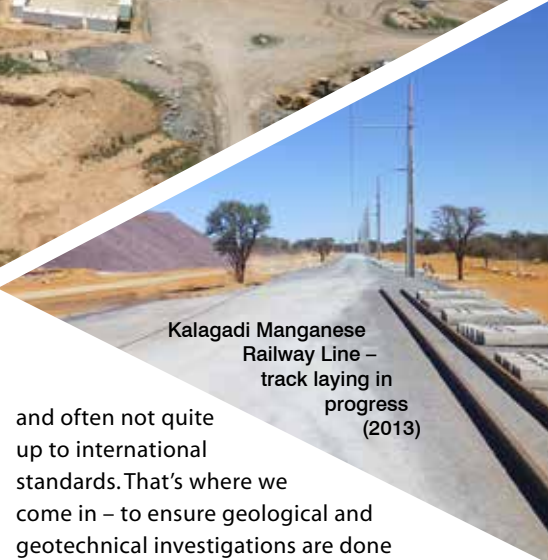
It pays in the long run to secure investigations done by a specialist engineering geologist and geotechnical engineer, and the ideal situation sees these professionals engaged in the project beyond the initial investigative work. "It is preferable for both to be involved with the earthworks to ensure conditions are in agreement with the geotechnical report," advises Plichta. "As soil is not a homogeneous material, there will also be some variation in the conditions across a site, so a specialist should be there to assess the actual founding conditions and advise contractors accordingly. Geotechnical engineers can also assist with earthworks construction quality control to ensure that the work done meets the appropriate specifications."

Expert consulting into Africa

Much like its hydroelectric project footprint, Knight Piésold is involved in providing geotechnical consulting services across the continent.

In Africa, where specialist skills might not be available locally, a consulting firm like Knight Piésold can make full use of its extensive operational footprint, offering an "almost local" service owing to its relative proximity.

"Geotechnical engineering knowledge in the rest of Africa is somewhat limited,



Kalagadi Manganese Railway Line – track laying in progress (2013)

and often not quite up to international standards. That's where we come in – to ensure geological and geotechnical investigations are done properly, so that construction can proceed safely. We get involved in a lot of the larger infrastructure projects in Africa, especially where international investors are involved," comments Van Tonder.

True to the firm's roots, a large percentage of Knight Piésold's geotechnical work takes place in the mining sector, with notable African projects including the Ambatovy Mine in Madagascar and the Asanko Gold Mine in Ghana.

Closer to home, on the dam engineering side, the firm has also done investigations at the Neckartal Dam in neighbouring Namibia, the Berg River Dam in the Western Cape and at Ingula.

By embracing a combination of local knowledge and global expertise, Knight Piésold has become a proudly South African force to be reckoned with on the international stage, with its Tshwane branch leading the way in the fields of geotechnical and hydropower engineering. 🌍

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