

# Terms of engagement



**Putting the right people in the right place at the right time continues to be critical in the mining EPCM space, Dan Gleeson reports**

“The problem with project expertise is exactly that: it is project based,” Morgan Lekstrom, President and CEO of Silver Hammer Mining Corp, says.

Lekstrom, who has a technical, project and mining background, has been on both sides of the mining EPC/EPCM (engineering, procurement and construction/engineering, procurement and construction management) equation – working for mining companies progressing a project through construction and a contractor providing input on a huge underground mine build.

While focused on his executive role at a junior mining company (Silver Hammer Mining), Lekstrom also provides consulting for engineering firms on project builds. He believes the contractor and mining company dynamic in the mining EPC/EPCM space needs to evolve. This, he says, is vital to coping with the well-documented skills shortage and to ensuring well-constructed projects become well-run mining operations.

“Where I think the mining industry is going to have to lean on the EPC/EPCM contractors is on the human capital side of things; there is a lack of human capital coming into the mining and engineering space, in general, so those houses that have got the in-house expertise will be highly sought after,” he told *IM*.

At the same time, mining companies need to change the rules of engagement to ensure contractors are not employed purely as a way of getting more bodies on site.

“When you talk about the design-build of processing plants, there is definitely an argument for employing a contractor with the requisite skill set to take this on and let them run with it,”

Lekstrom said. “When it comes to sinking shafts, underground works and other types of development, however, miners should be running



*“For a long time, we have designed mines around the resource, but that is going to take on a new meaning going forward. The ‘resource’ will be viewed not only from a geological perspective, but from a human capital perspective,” Morgan Lekstrom says*

*WSP Golder acted as the Project Management Consultant to help deliver over \$10 billion worth of infrastructure for the Roy Hill iron ore operation in Western Australia (photo: WSP Golder)*

those projects, only employing contractors with the required expertise to fulfil specific functions.”

A clearer distribution of tasks to contractors, as well as a pledge to bring operations teams into the thinking around the design and construction phase, could lead to integration that has positive ramifications beyond commissioning, Lekstrom argues.

“If you completely rely on an EPCM contractor without integrating your operations and maintenance team then there is going to be a significant amount of change along the construction path,” he said.

“I believe there is a hybrid method where there is an integration of the EPCM contractor and the mining operations group into the wider construction model, so, when the build is complete, there is the operational expertise on hand to ensure a seamless transition into operations.”

This is even more important in times like today where resources are thin on the ground; a factor that could further accelerate a move towards employing new technology.

“For a long time, we have designed mines around the resource, but that is going to take on a new meaning going forward,” Lekstrom said. “The ‘resource’ will be viewed not only from a geological perspective, but from a human capital





*Stantec provided the feasibility study, definitive feasibility study, detailed design and package management for a new mining ore hub for the Eliwana mine in Western Australia. The scope also included the mine's ore processing facility, mining development, and associated infrastructure such as mine roads, buildings, camps, telecommunications networks, electricity, water, sewage and wastewater facilities*

perspective. Mines will have to be designed around the realities of finding and employing the people needed to carry out the job, with automation more readily coming into the plan.”

**Integrated thinking**

Stantec is also seeing more automation consideration throughout mining projects, with Steve Rusk, Vice President, Mining, Minerals & Metals, EPCM, noting that functional safety with control systems and automation is becoming much more common.

“Automation is a big part of technology these days, so we frequently design with automation in mind,” he said.

This trend is likely to continue, Rusk says, reinforced by the very nature of mining and the outlook of the potential workforce.

“People are not as keen to want to do the ‘dirty jobs’, and the industry is highly motivated to increase safety,” he said. “This is something I learned a long time ago, and it’s similar to what drove mechanisation in underground mining.

“The more attractive employment categories are in trades, technical, professional and administrative jobs related to surface mining or environmental services, for example. In underground mining, it is even more pronounced – it can be quite challenging to generate interest with potential new employees.

“This has been a challenge for decades and I expect that trend to continue.”

Integration of operations teams and EPCM contractors is, again, key to addressing these skills shortages and planning to incorporate automation over the long term.

“The skills shortage is a major consideration for everybody – not just consultants, but owners, suppliers and constructors too,” Rusk said. “To mitigate the impact of turnover, we use a lot of integration on projects. This helps both sides: the client and the consultant can be better prepared in case people leave either company.”

Yet, this integration is easier said than done, due to the exact issue Rusk raises – the potential for teams to be dismantled over a project’s lifetime.

As a result, consultants are often called on to fill operational gaps to cover project reviews and



**AFRY**  
Å F PÖYR Y

# Transforming ideas to solutions

Based on our depth of knowledge, we can help clients at every step and in any scale of a project.

From exploration to mining and mineral processing, further beneficiation, smelting and end-product refining and manufacturing, and ultimately, end-of-life recycling.

Making Future



provide a level of risk mitigation, according to Rusk. This, he says, continues to ensure mines get built and produce to design specifications.

When Stantec provides such operational input during EPCM engagement, it is able to back this up over the long term; something that clients continue to appreciate.

“For example, we still have someone working on a very large underground operation that we had supported with EPCM services seven years ago,” Rusk said. “We provide operational readiness and other support during and after the construction period.”

Despite all the challenges Rusk raised, he saw the integration on projects within the EPCM space improving in many areas, with some exceptions.

He explained on the latter: “To take this one step further, we see the big push for net-zero goals. But some operations are not proceeding in an integrated way, and there are some pretty ambitious goals out there. Are the goals going to be achieved with a retrofit or bolt-on solution that comes later?”

The integration of wind or solar power to an already-constructed energy system may be an approach mining companies look at today, but, according to Rusk, the stronger, more integrated approach is to build an expandable energy storage and balance system into the original project design to take advantage of power recovery opportunities, as well as alternative power options.

“We know it can be done,” he said of such integrated thinking. “Think about how we look at safety in the design phase. We don’t design and build a facility only to come along afterwards and install platforms and handrails. We’re fully integrated with safety in our mine designs. We need to make the same transition with energy systems if we want to get to net zero in a timely and effective way.

“There is the urgency now to start making these changes, and that’s what we’re encouraging clients to do – plan for incorporating energy-reducing, recovery and alternative elements in the design stage: don’t wait until it’s already built!”

### ‘Build it twice’

As a collaborative organisation with a history of partnerships, alliances and integrated owners team delivery models, **WSP Golder** is focused on aligning with project goals, and developing and maintaining relationships within projects, according to Damian Wilson, Director of Mining Infrastructure & Project Delivery.

Against a backdrop of industry skills shortages, this has seen WSP Golder focus on more partnership-type models on large infrastructure projects in mining, he said.

One such example is the Roy Hill iron ore operation in Western Australia, where WSP Golder acted as the Project Management Consultant to help deliver over \$10 billion worth of infrastructure for an operation that has a nameplate 55 Mt/y capacity. This included a 344-km heavy haul railway from mine to port and a new two-berth port facility at Port Hedland.

Delivered to practical completion of the EPC contract with Samsung C&T in May 2016, a project of this size and complexity was helped by WSP Golder embedding operating and maintenance systems into the operation during Roy Hill’s development.

And projects being designed today can build on new building information modelling (BIM) expertise with a digital twin, according to Wilson, who pointed to this modelling development as the area of greatest potential for mining.

“The ability to ‘build it twice’ – once in a virtual environment through 4D and 5D simulation, and then only once in the field – has reaped enormous benefits in terms of efficiency and assurance for mining clients,” he told *IM*. “Through IoT and digital twinning, there’s enormous potential for the mining industry in terms of automation and the ability to harness artificial intelligence (AI) to improve efficiency.”

WSP Golder’s experience in digital engineering in the infrastructure sector and success in other markets such as transportation, water utilities and buildings – where the implementation of these technologies is more mature – allows the company to rapidly deploy mining-ready solutions, according to Wilson.

Such tools will be useful not only for the major miners WSP Golder serves, but also early-stage junior companies seeking the ability to test out new flowsheets or mine layouts in the digital

world before issuing equipment selection details in technical reports usually leveraged to raise mine development finance.

“We tailor our approach depending on the maturity of the clients’ systems and processes and adapt to the needs of the project as it develops,” Wilson said. “Our deep and rich history in mining across the globe allows us to assist junior miners in the early stage of project development in understanding the project development pathways, infrastructure required and capital costs, without exhaustive studies and engineering.”

And, like Stantec, WSP Golder is aware of the critical need to include operations teams as key stakeholders for the success of any EPCM project it works on.

“We recognise this stakeholder element and understand that, whilst critical to project success, it also needs to be deliberately managed to ensure efficient progress and delivery of the project in an EPCM environment,” Wilson said.

“Our focus is centred on gaining alignment on project objectives at the commencement of each of the project development stages. Ensuring alignment on objectives by all stakeholders, particularly for operations in the EPCM stage, allows decisions during project execution to be made with clear end objectives and promotes efficient delivery of the project.

“Our clients are aware of the need to involve operations expertise, and our having a deliberate framework and process to bring that into the EPCM project environment is highly valued.”

### Tailored treatment

Nordic-based engineering and consulting company, **AFRY**, has seen a divergence in



*AFRY has had a presence at Boliden’s Kevitsa mine, in Finland, for more than a decade, continuing to provide local engineering services to the mine well after initial project implementation back in 2010-2012 (photo: Boliden)*



approach from its mining clients in the last few years, noting that junior firms with battery minerals interests, for example, are focused on expediting the project decision-making process, whereas established miners are evaluating roles and responsibilities within an integrated project team scenario.

On the former, Janne Tikka, Head of Mining & Metals at AFRY, said: “These green capital expenditure-type client projects are being developed while simultaneously advancing several options in order to shorten the overall project time schedule. Obviously, this method is labour-intensive and requires more project resources than a traditional approach. It also requires that both the owner and the consultant are agile and fully committed to the project in close partnership.”

This strategy is often driven by commitments around their mining projects – it could be offtake agreements, for instance – with AFRY, the client and various technology suppliers and consultants working together to deal with the schedule-based challenges.

Tikka added: “As regards established mining companies, we have seen them leaning towards more integrated project teams where project management is carried out in close co-operation with engineering companies, but with clear roles and responsibilities.

“AFRY, as an EPCM services provider, is welcoming this way of working since seamless co-operation with the project owner improves the quality and awareness of time-critical items.”

Like other companies in this sector, AFRY is often asked to continue working with its clients beyond an EPCM remit – it has had a presence at Boliden’s Kevitsa mine, in Finland, for more than a decade, continuing to provide local engineering services to the mine well after initial project implementation back in 2010-2012.

AFRY’s impact on projects is set to be even longer lasting thanks to the digital engineering platform the company regularly produces and consults with during a project’s construction phase.

This platform, according to Tikka, is now enabling a full digital twin of the mine during operations.

“The challenges seen in the last years (like COVID and market competition) has shown the importance of development work done in the past years at AFRY and also motivated us to take even more advanced working tools and methods forward in our project delivery work,” he reflected.

These tools also allow the company to tailor the technology solutions it recommends to clients – whether big or small – ensuring that capital expenditure is spent on items that maximise value throughout the mine’s life, he said.

With the mining sector looking to bring more projects online in an increasingly complex environment, AFRY’s understanding of the whole value chain and ability to seamlessly integrate with operations teams will ensure it continues to deliver for mining clients, according to Tikka.

“Based on our depth of knowledge, we can help clients at every step and in any scale of a project – from early exploration to mining and minerals processing to further beneficiation, smelting, end-product refining and manufacturing, to end-of-life recycling,” he said. “But responding to the operating personnel needs is always the core.

“The owners team involvement regarding operational expertise has, luckily, been intensive in AFRY’s past EPCM mining projects. This obviously facilitates project ramp-up and ensures optimal return on owners’ investment.”

**A model provider**

Fluor’s ability to provide optimal return on investment to its clients is tied to delivering on an established partnership model cemented in the early-study stages.

“This allows us to fully understand specific value drivers and design and







build a project reflective of the owner's strategic framework and asset portfolio," Leonardo Kaid, Vice President, Head of Global Business Development & Strategy, told *IM*.

This even goes as far as establishing the local

content requirements of its clients before any major infrastructure is built on site.

"Requirements and conditions vary by country, but we always aim to maximise local content for workers and suppliers, viewing each project as

*Fluor kicks off 'operational' activities long before work at site starts, according to Leonardo Kaid, working with the owner's team to leverage opportunities in logistics, design engineering, modularisation and prefabrication and other areas*

### Bridging the gap

**Fuse Advisors** says it takes a client-first approach to delivering high quality services, priding itself on remaining fully aligned with stakeholder interests through a set of deep-rooted values.

"These values allow Fuse to offer a unique, integrated approach to providing support to the owner's team without bias or competing interests," it says.

Fuse works for various companies in the resource sector, including junior mining exploration and development companies, mine operators, EPCM consultancies and private equity firms.

"Our company model is such that we typically act as extensions of mining company teams to help them manage their consultants," Ryan Weymark, President of Fuse Advisors, told *IM*. "As such, we typically work in an integrated manner that is more of a partnership with mining companies."

Weymark said the divide between mining companies and EPCM consultancies in project engagements has only widened in recent years, with companies needing to internalise more roles and engage groups like Fuse to help "bridge the gap".

"Over the past 12 months, we have seen companies leverage our company to help them grow their teams and have seen owners' teams growing in size to manage consultants," he said.

This has only been exacerbated by the retirement of experienced project leaders recently, with personnel exits in key strategic leadership areas having the biggest impact on projects in the pre-construction phase.

Weymark says the industry continues to struggle to reconcile the risk allocation between mine owners and consultants under the standard EPC/EPCM models, with his company offering another interface to align all interests and successfully steer projects through to completion.

"Owners are continuously frustrated with a lack of 'skin in the game' from consultants under the EPCM model, but don't want to pay for the risk allocation under an EPC model," he explained.

This can see Fuse's remit grow from initial project engagement, to overseeing consultants with tailored tools and systems within a project integration remit.

"NexGen Energy is an example of a company where I came in to help manage the conclusion of their feasibility study for the Rook I uranium project in 2020/2021 and have continued to support their project development team through front-end engineering and design stage of development (2022-plus)," Weymark said.

Another example is Benchmark Metals Lawyer's gold-silver project, in

British Columbia, Canada, where Fuse supported with the completion of a preliminary economic assessment and is now supporting with the next stage of development.

Fuse also has operational experience to call on – Weymark previously worked for Teck in a variety of Mine Engineering roles in its Coal Business Unit for several years, for instance – allowing the company to engage with companies of all different sizes and stages.

This is reflected in Fuse offering a variety of commercial agreements involving shares, options and more standard payment terms to clients.

For Weymark, there is a contrast between the size and experience of companies and how they effectively integrate such operations experience into typical project-focused EPCM contracts.

"I think a lot of junior non-producing companies still struggle to understand when to bring in commissioning and operational experience, and often bring it on far too late," he said.

"A lot of multi-asset producers have well-established processes where they utilise operational subject matter experts from existing operations to support with projects (or have dedicated resources within their project groups) – the challenge with some majors is that the operational teams get embedded too early and can cause project scope to grow significantly."

The ideal scenario, Weymark says, is a balance of the two, with projects led by "generalists" that have backgrounds in both projects and operations and know when to bring on the appropriate expertise.

He concluded: "Mining companies can't rely on consultants to define their projects and need to ultimately own the project scope, and that requires deep operational experience. Independent consultants can help bridge the gap for early-stage companies that simply can't justify full-time resources."

*"Owners are continuously frustrated with a lack of 'skin in the game' from consultants under the EPCM model, but don't want to pay for the risk allocation under an EPC model," Fuse's Ryan Weymark says*



an opportunity to leave a lasting legacy,” Kaid said.

“Depending on the location, the starting point might be different, but we always follow the same methodology to develop a local workforce that can run an operation after project execution.”

Collaboration with universities and clients has proven to be fruitful in regions where Fluor has a large footprint, acting as a differentiator for clients that continue to struggle to resource major projects over the medium-to-long-term.

And within Fluor’s talent development methodology, gaining hands-on experience of a site environment is an important component, building the knowledge base for plant operability.

This, as mentioned, is becoming an even more important consideration during a project’s engineering phase.

It is not only the skills and resource shortage that has seen operational expertise grow in importance across the EPCM space, according to Kaid.

Occurrences of unsuccessful non-EPCM execution models that underestimated proper equipment integration and balance-of-plant impacts over the last few years have also played a role. This has resulted in an uptick in client demand for commissioning services, according to Kaid.

He explained: “We kick off activities long before work at site starts, working with the owner’s team to leverage opportunities in logistics, design engineering, modularisation and prefabrication and other areas.

“This collaboration has evolved from ‘construction-driven execution’ to ‘commissioning-driven execution’ with operations and maintenance in mind. This full spectrum of involvement and client interfacing enables seamless advancement through the project life cycle.”

Fluor is being aided in this advancement by what it claims to be most sophisticated AI model yet of an EPCM project.

Kaid explained: “EPC Project Health Diagnostics (EPHD) supports Fluor in providing fact-based, early insights and warning indicators on project execution performance to support project decisions, early mitigation actions and drive more certainty into project schedules and cost.”

This tool is hosted on IBM Watson, a leading AI platform developed in IBM’s DeepQA project, and powered by one of the world’s most powerful supercomputers, according to IBM.

While EPHD was developed prior to the onset of COVID, it has supported Fluor in driving efficiency in project execution throughout the pandemic and in mitigating skill shortages, Kaid said.

On top of this, Fluor continues to see the implementation of several new automation strategies on projects it works on, such as integrated remote operation centres (IROC), autonomous vehicles, automated underground mining, autonomous blasting and robotics applications in maintenance – all of which help mitigate industry labour shortages and COVID risk.

The influx of this new technology has been seen mostly at larger projects owned by established mining companies, but Fluor, like AFRY, recognises it needs to take a different project approach for those clients in the ‘strategic’ commodity markets.

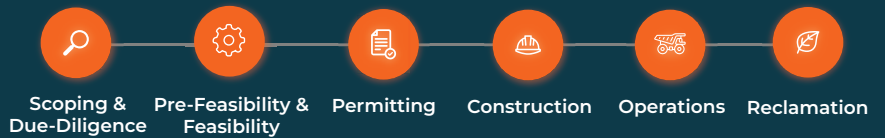
“Project funding is one of the top hurdles,” Kaid said of this sector. “Projects need to be developed quickly and, in some cases, we need to expand our service offerings deeper into the value chain to accelerate development of regional ecosystems in energy storage technology, renewables and other future-facing technologies.”

Fluor has, therefore, consolidated a team to serve this market, actively engaging with the junior sector as well as larger clients.

“Treating critical minerals as a special market segment allows us to tailor our value proposition to the target client base, to support key needs and accelerate the project development cycle,” Kaid explained. 



## FUSE ADVISORS




**Project Manager**



**Owner Representatives**



**Technical Advisors**

### Project Management

- Scoping Studies
- NI 43-101's (PEA to FS)
- Engineering
- Permitting Programs
- Environmental Baseline Programs
- Construction Projects
- Process and Systems Development for Integrated Projects



**Project Control Specialists**



**Engineering Managers**



**Market Researchers**

### Advisory

- Technical Due-Diligence
- Project Risk Assessments
- Multi-Criteria Decision Making
- Commodity and Industry Analyses
- Third-Party Reviews and Audits
- Integrated Permitting and Project Development Strategy
- Contract Strategy and Claim Management