



Turner & Townsend

Capability statement

Estimating services

making the **difference**

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The estimating challenges facing today's project teams

Predictability of project cost outcome is more important than ever

In the current economic climate, the challenge faced by the mining industry is to deliver projects safely, to budget and schedule, and demonstrate value to stakeholders. To enable the board to make informed and therefore confident decisions, owners and operators require estimates that are within the accuracy parameters defined by their governance structures; delivered in a transparent and timely manner.

Our understanding

- Our experience indicates that a significant number of natural resource projects completed recently (or currently in execution) were subject to cost 'blow outs' and schedule overruns.
- The current challenges testing the estimating function include global factors such as unfamiliar territory, multiple and often remote locations and increased project complexity. Global supply chains, new methods of contracting, sovereign risk and increased governance are added challenges.
- Although industry tools and systems support the development of estimates, they do not address these factors.

What is needed is a greater understanding of what drives the variance between final outturn cost, and the original bankable feasibility study. This requires in-country expertise, estimating experience, benchmark data and a robust methodology underpinned by tried and tested tools and processes.

Making the difference

EstimaTTor is Turner & Townsend's estimating service that will **provide the most accurate estimate possible. It is a combination of:**

- Robust, first principles, resource based analytical estimating systems including Aspentech, CCS Candy and WinEst. This gives our estimators the facilities and reports they need to depict project resources and costs accurately across the lifecycle of a project.
- An extensive and fully maintained cost database built up across regions, over time
- Benchmark data from projects we have undertaken
- A global network of:
 - Estimators who understand local markets
 - An economics team who provide forecasts of how costs will change
 - Commercial mining subject matter experts with project experience that extends from pre-feasibility, through setup and execution to project close-out and includes related infrastructure and housing projects

The impact of underestimating the cost of project scope

As projects get larger, more complex and in many cases, more remote, predictability of project outcome is more important than ever.

The impact of underestimating project scope and cost can include:

- Insufficient funds to complete the project
- Lost time interrogating and explaining variance
- Delays on the go/ no go' decision
- Team disruption, with loss of focus on delivery
- Risk to approvals for future projects
- Negative impact on the value of the business (stakeholder dissatisfaction)

Companies can gain a competitive advantage by ensuring their projects are completed on schedule and within budget.

Turner & Townsend's combination of decades of estimating experience and expertise, an extensive and fully maintained cost database, and a first principles, resource based analytical estimating system delivers increased estimating accuracy through all stages of the project cycle.

Our global team has estimating expertise and experience in mine development, mine infrastructure including camps, rail and port, ROM processing and mineral beneficiation plants. This, in combination with our data management and tools, deliver increased estimating accuracy and reduce your project risks.



Estimating throughout the project lifecycle

Turner & Townsend delivers reliable, independent cost estimating services at all AACE International estimate classes from concept to close-out.

Our team of experienced estimators can support owner teams with independent estimating services which are unbiased, free of stakeholder influence and a single source of truth for project managers and company decision makers.

Rough order of magnitude estimates AACE class 5 and class 4

Class 4 and 5 estimates are prepared for strategic planning, concept screening, alternative scheme analysis and preliminary budget approval. This can include capacity factored and/ or parametric modelling.

Conceptual estimates AACE class 3

Class 3 estimates are prepared to provide assurance or project cost definition for specific project options. We apply the most suitable estimating tools and system, both proprietary and in-house, according to facility and design definition. This can include parametric modelling, equipment factored or industry standard tools and systems.

Detailed estimates AACE class 2

To prepare full class 2 estimates, we either undertake quantification through manual measurement and our quantity, weight and cost assurance service, (QuanTTum), or we can adopt and verify contractor quantities.

AACE class 1

Class 1 estimates are generally prepared for discrete parts of the total project, typically by subcontractors for bids or by owners for check estimates. These include detailed equipment, MTO and unit cost; vendor quote and competitive pricing; estimate assurance; project close-out and benchmarking.

Key benefits:

Effective estimating practice contributes value to operators in several direct and indirect ways:

- **Backing the right projects:** estimating by an independent (non-engineering) party, such as Turner & Townsend, improves confidence that you are investing in the right projects
- **Improving accuracy:** effective estimating will help the project team maintain the assurances they give
- **Reducing risk:** Using a rigorous estimating framework helps to deal with the unknowable. A reliable process using relevant historical project data and experienced estimators increases confidence and reduces uncertainty.
- **Managing costs and resources:** CAPEX approval processes are under increasing scrutiny and doing more with less is now the reality for owners and operators. We can help you understand who, what, where, when and how costs and resources will be consumed, supporting you to control your project and spend efficiently.

Turner Townsend has provided high quality estimating, quantity surveying and tendering services to AGA. Projects are completed within budget. The personnel are not only thorough in their work but also easy to work with, and always willing to discuss our concerns and respond to questions.

AngloGoldAshanti.

Estimate assurance

Verifying the accuracy of a cost estimate is a unique challenge, requiring a structured and systematic approach.

When providing estimate assurance services, we typically review the following:

1. **Estimate methodology:** We establish an appropriate estimate methodology to ensure a reliable estimate. This will be aligned to the project work breakdown structure and schedule and any internal governance/approval processes of the operator.
2. **Scope:** Verify the level of scope definition and understand the cost drivers
3. **Assure:** Quality assure the estimate
4. **Risk:** Use industry recognised risk analysis processes
5. **Benchmark:** Use data from similar projects

Our estimate assurance services consider the key factors highlighted in this diagram:



Key benefits

Our estimate assurance services have the following key benefits:

- **Independent, unbiased outputs:** Inform leadership and influence decisions on cost allocations and potential savings via value engineering
- **Make the best use of project funds:** An effective, well defined and consistently applied estimate assurance process is more likely to result in better planning and more effective use of project funds
- **Understand the risk:** Provide an indication of probable outcomes based on an assessment of the current risks
- **Provides greater transparency:** as well as collective accountability for outcomes and a better position for negotiating final prices. If we are not directly involved with the preparation of the original capital/operating cost estimate, then we can provide an independent view of the validity and accuracy of the estimate produced for your project. We can carry out the assurance concurrently with the estimate preparation to reduce the possibility of extensive rework and to enable the team to meet the estimate deadline.

Our framework for estimating excellence is supported by our extensive knowledge base in mining; our people and our systems.

Independent, post-project estimate reviews

Making future projects more successful

Our post-project review of the sanctioned estimate will test the robustness of the estimate against actual costs.

Our post-project estimate reviews are conducted to determine:

- 1 Which project costs exceeded their estimate and why?
- 2 Which projects came in lower than estimated and why?
- 3 Where project costs differed to original estimates, was the difference related to market conditions, design changes, contractual issues, scope creep, time, estimating error?
- 4 Did the project procurement strategy deliver the savings anticipated?

- 5 Did the value engineering exercises deliver the value add?
- 6 Did the estimate align with the business case?
- 7 Were scope changes dealt with effectively from savings within the estimate?
- 8 Did the low cost sourcing centre deliver the expected saving?
- 9 Was the estimated cash flow linked to programme reflective of actual cash flow?

Key benefits

- **Improved accuracy:** of future estimates
- **Supports business case development:** for future projects
- **Allows for comparisons:** across different projects
- **Provides critical analysis:** of project outcome and contributes to corporate learning and knowledge management



Estimating support services

Supporting critical decisions about the project

In today's economic climate, owner teams are looking for opportunities to make both short and long term decisions that can positively impact their balance sheets. As well as bringing industry hands-on experience in the development of estimates and estimate assurance, we also provide a range of supporting services.

Evaluating quantities

We use our bespoke electronic measurement tool – QuanTTum to extract quantities from the engineering model and design providing the client's team prompt access to accurate data.

Procurement

This service includes locating suppliers, obtaining quotes, negotiating terms and conditions, developing/ issuing purchase orders, and tracking and expediting deliveries

Market studies – economics

Our team of economists track over 150 different cost indices, collected and analysed to determine cost trends for inputs such as labour, materials, services, equipment and construction trades. We analyse economic data, source statistics, and forecast likely economic changes within the project construction arena to help clients gain an understanding of the evolving economic situation and likely impact on project costs.

Market studies – contractor engagement and fabrication data

This service includes development of request for information documentation and engagement with the contracting and fabrication community to provide relevant in-country data

Client bespoke estimating manuals

These manuals are established from base norms and with location factors applied, developed using our global knowledge base.

Processes and procedures

This service includes development and implementation of standardised processes, procedures and tools as well as templates.

Cost and schedule risk analysis

Our quantitative risk analysis provides a measure of risk exposure allowing us to monitor performance, make informed decisions and determine appropriate contingencies through analysis of both cost and schedule based risks.

Key benefits

One company, covering all your estimating requirements

- **Explore more options, evaluate more quickly:** our global locations and access to in-depth project cost databases allows us to apply data intelligently and support critical decision making
- **Increase your efficiency:** from project resource augmentation to full managed services, we bring additional experience, systems and tools from outside your organization, supporting corporate learning
- **Set standards for your estimating and improve:** by using our local people, who have global experience and leverage global best practice methodologies and processes, we can support and improve your in-house capabilities

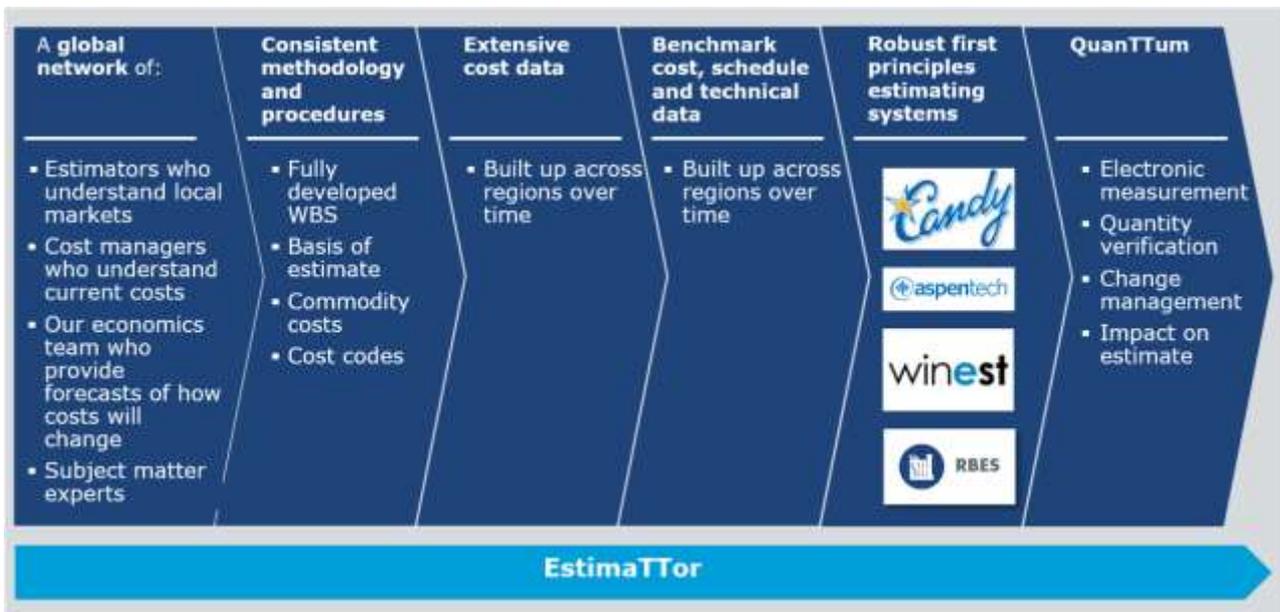
What is Turner & Townsend's EstimaTTor service?

EstimaTTor is...

Turner & Townsend's managed service that provides high quality, accurate estimates in natural resources and related infrastructure projects and programmes

Six pillars of excellence

EstimaTTor is based on six pillars of excellence:



Mining estimating experience



Nickel mine, Tanzania, high level estimate review, 2011-2015

We offered advice for potential areas of capital savings, to help the client gain the necessary financial approvals to progress the scheme. We substantiated our advice with our benchmarking cost information.



Niobium mine expansion, Brazil, cost estimate and schedule review support, 2012-2014

We carried out a review of the cost estimate and schedule at FEL 2 and FEL 3 levels bringing confidence to the capex estimate and schedule.



Coal mine, Australia, estimate assurance review, 2012-2014

We provided an independent assessment of the project FFC. Our final report was described by our client's management as 'the benchmark for assurance reviews'.



Mine, contractual claims review, 2009

We made an impartial assessment of the contractual claims which identified areas for negotiation. Armed with our findings, our client negotiated an outcome that was lower than worst case scenario, and avoided litigation.



Target cost estimate review, Australia, 2011-2013

Using our estimating expertise in the development of coal assets, we provided an independent review of the proposed target cost estimate to support a forward work plan for its future refinement.

Mining estimating experience



Copper plant and zinc refinery, Saudi Arabia, high level capital cost review of a pre-feasibility study, 2016 – ongoing.

In addition to supplying benchmark data for comparisons we highlighted areas where the client could be exposed by 'under' and 'over' provisions in the estimate.



Nickel mine, New Caledonia, cost estimate review, 2009-2012

We were requested to undertake an independent review of the definitive cost estimate to provide our client with the required level of cost assurance.



Gold project, Saudi Arabia, estimate review of FEED, detailed estimate review of work packages, review of RFP and commercial adjudication, 2013-2015

Our client used our report as the basis for the appointment of a preferred EPC contractor.



Tank upgrade, estimate assurance, Australia, 2012-2013

We provided increased assurance on predicted outcomes on cost, progress, and contracts through deployment of a multi-skilled team of consultants.



Low cost procurement strategy, China, 2012

Our client had developed a procurement demand database to forecast requirements. We were requested to review and refine this database such that it was fit for our client's short, medium and long term needs.



Development of standardised global cost coding structures, Australia, 2013

Our client desired a standard capital cost coding structure for major projects globally. Our experience working with coding structures and methods of measurement in the development of estimates provided the background to develop a standard that our client mandated across projects globally.

Mining estimating experience



Fleet management system, estimating services, 2013

Our extensive experience of first principles estimating methodology, validated by historical pricing from our global mining and metals database provided a robust capital estimate to support the request for funding.



Project enabling works and off sites engineering hours, Saudi Arabia, estimating services, 2012-ongoing

We provided our client with the confidence to allocate a budget for engineering services, derived from first principles and verified using benchmarking.



Growth Planning Portfolio Studies Group, estimating services for numerous projects, 2012 – ongoing.

We have established a systematic approach to undertaking estimates, cost and schedule audits. The audits undertaken to date have identified a number of savings.



Concentrator Plant, Africa estimating services, 2013-2014

We were required to assist in developing a new control budget estimate, with particular focus on direct field cost. Our team (estimating, cost management and risk) enabled us to provide a high degree of assurance of the estimate.



New mine development, South Africa, estimating services, 1999

We were requested to review mining options between conventional and mechanised mining methods. In addition to preparing a comparison we also updated the estimate.



UG2 Sub Decline System, South Africa, estimating services, 2002 - 2005

We have delivered estimating services during the pre-feasibility stage and have assisted with the compilation of the cost budget estimate at the feasibility stage.

Mining estimating experience



Potash project, feasibility study estimating services, 2014

We provided estimating services to generate cost rates for the direct field cost estimate. This included the material, equipment and labour components of the estimates.



Capital cost estimate (FEL 2) review, 2014

We worked with our clients project team to bring the estimate towards international standards allowing the project to progress through the review panel.



Managed service including estimating, Australia, 2014

As part of an integrated delivery team made up of two client's and Turner & Townsend, we provided estimating, procurement, contract management services, contract services and project reporting. Our team were based within the client offices in Perth, the mine site, rail camps and the port facilities.



New shaft complex project, Africa, estimating services, 2010.

We assisted with: compiling the estimate framework; producing escalation and cashflows models; high level review and benchmarking of the control budget estimate; compilation of the basis of estimate to be included in the final submission.



Mine rehabilitation projects, South Africa, estimating services, 2014-2016

Quantity surveying services delivered at multiple sites across South Africa included the preparation of various levels of detailed project cost estimates depending on the engineering



Cost estimate assurance, Africa, 2009

We provided an independent peer review of the feasibility study capital cost estimate.

Mining estimating experience



Shaft project, South Africa, estimate review services, 2011

We delivered a full audit report including estimate review and schedule review, the findings of which were implemented immediately and as a result, the project passed the final gate review.



Target cost estimate, Australia, 2011

Using our expertise in the development of coal assets, we formed part of the owner's team to assist in the on-going process of establishing the Project Alliancing Agreement and supporting development of the target cost estimate.



Global benchmarking across 40 major mining projects, 2013 - 2014

To facilitate proactively targeted performance drivers and provide better assurance of project competitiveness and outcomes, we established a benchmarking database with standard processes, coding structures and cost categories covering all mining and metals commodities, and mine, rail and port infrastructure.



Iron ore project, Australia, estimating services, 2009 - 2012

We provided a contractually compliant and auditable estimate of the cost to complete works and assessment of the final account statement submitted by the main contractor. Using our BIM based QuantTum tool to support the re-measurement, we provided a fully traceable and auditable quantification of the works which supported negotiations with the contractor.



Diamonds underground project, Australia, managed service including estimating, 2005 - 2013

Following an initial review to identify gaps and improvement opportunities within the existing project controls, policies and procedures for the project, our role was extended to include estimating and co-ordination of the overall capital estimate. We then joined the integrated delivery team to provide project controls, contract administration, project audits, scheduling, procurement and expediting and claims.



Dam project, Australia, managed service including estimating, 2011 - 2012

We supported our client on both a managed services and secondment basis, as part of their integrated delivery team. We provided multi-discipline services included estimating, project controls, risk management, planning, procurement and management consultancy.

Mining estimating experience



Mine and associated infrastructure, Australia, estimating, 2014 - 2016

We provided contract management and estimating functions to support our client negotiate service agreements and EPC construction contracts. We also managed and coordinated the development of an integrated baseline for cost, schedule and risk.



Mine extension, Australia, definitive estimate services, 2011

Turner & Townsend reviewed the 'costs incurred to-date' vs. 'forecast costs to complete' and brought the many owner's and consulting engineer stakeholders together to produce the definitive estimate. This included the estimate and basis of estimate; together with robust PEP and scope book documents for execution.



Feasibility study, Australia, estimate assurance, 2011 - 2012

We supported our client's study team towards a robust feasibility estimate after reviewing the initial estimate and thereafter via provision of effective estimate management techniques for a proposed open cut coal mine.



Mine closure, demolition cost estimating services, Australia, 2014

We developed the class 3 closure estimate comprising open cut mine, materials handling and processing facilities, stockpiles, mine infrastructure areas, train load out and site wide facilities. Turner & Townsend provided advice on demolition methodology, logistics planning, and disposal strategy in conjunction with developing the estimate. Two estimates were developed based on alternative disposal strategies.



Estimate assurance services, Australia 2011 - 2013

Through implementation of our estimating expertise in the development of coal assets, Turner & Townsend formed part of the integrated owners management teams to provide the functional expertise to assist in the on-going process of establishing the Project Alliancing Agreement and supporting the target cost estimate.



Diamond project, India, estimating services, 2011 - 2013

Coordinating the project team and stakeholders, we provided estimate assurance services and estimating services to develop the detailed capital cost estimate according to our client's guidelines. We also provided technical writing services and an assurance review of the study related reports received from the various disciplines associated with the project.

Estimating contacts



Using a wealth of current costs, outturn costs, estimated costs and budget data



With trusted technology platforms



Our experts will help you make critical decisions about your project

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We are an independent consultancy with a global footprint that maps our clients' project and corporate locations. Our information supports owner teams with independent estimating services for mine development, mine infrastructure, ROM processing and mineral beneficiation plants and delivers outputs that are unbiased and intended to be a single source of truth for projects, project managers and decision makers.

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