INTEGRATED EPC SERVICES FOR METALS & MINERALS PROCESSING PROJECTS
CLOUGH WORKS WITH SOME OF THE WORLD’S LARGEST COMPANIES TO ENGINEER, CONSTRUCT, COMMISSION AND MAINTAIN A COMPREHENSIVE RANGE OF FACILITIES FOR OIL AND GAS, METALS AND MINERALS, AND INFRASTRUCTURE PROJECTS.

Established in 1919, Clough’s services are underpinned by a dedication to project delivery excellence that has spanned almost 100 years. Today the company utilises a workforce of nearly 2,500 people from operating centres across Australia, Asia, Africa, Papua New Guinea, UK, USA and Canada.

Backed by an experienced leadership team, talented people and sophisticated project management systems, Clough is committed to safety, sustainable development and the wellbeing of people, communities and environments.

A Full Project Lifecycle Delivery Model

Clough reduces project risk by providing a complete engineering and project services solution that spans the full asset lifecycle. We engineer to construct and construct to commission, operate and maintain facilities optimising safety, productivity and cost across every phase of a project. This project execution expertise has been developed through our work on some of the world’s most logistically challenging energy and resources projects, and provides a fresh approach for clients looking for a new way of contracting.

Our full asset lifecycle solutions utilise innovative technology and systems to drive performance and provide confidence on delivery schedule. Through a comprehensive reporting regime we make our project teams accountable for early detection and intervention on potential productivity issues, to ensure our projects deliver to cost and schedule promise.

Clough’s full asset lifecycle delivery model
CLOUGH HAS SERVED THE METALS & MINERALS INDUSTRY FOR NEARLY 40 YEARS.

Our comprehensive engineering, procurement and construction (EPC) services assist clients to extract, process, store and export a variety of minerals including iron ore, coal, alumina, aluminium, copper, gold, limestone, mineral sands, nickel, pig iron, zinc and lead.

Clough’s fully integrated EPC services provide value at every phase of a project. With in-house engineering, procurement, and construction capabilities Clough can quickly mobilise people, material and equipment for a flawless project start up.

The unrivalled experience that Clough has with delivering projects in the Australian and Asian market place enables the development and implementation of project specific strategies that reflect the unique conditions of these markets. This includes project management, risk management, human resources and industrial relations planning, and HSE programs.

Together with our parent company, Murray & Roberts, Clough can offer an integrated project delivery solution to African mining projects. This combines Clough’s engineering and project management expertise with Murray & Roberts extensive African-based construction resources, project management expertise and experience in local project delivery.

Engineering and project services are delivered through a number of contract frameworks including Master Service Agreements, EPCM, EPC and construct only models.

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**METALS & MINERALS EXPERTISE**

- Almost 40 years’ experience in metals & mineral processing project delivery
- Fully integrated engineering, procurement and construction services
- Award winning in-house engineering
- Range of contract delivery models
- African project delivery capability - Clough and Murray & Roberts

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**Case Study**

**Boddington Gold Mine**

As part of the AKCMR Joint Venture (with, Aker Solutions and Murray & Roberts) Clough completed the EPCM contract for the major expansion of the Boddington Gold Mine in 2009. Recognised as an engineering feat, the project was the culmination of 10 years work and the contribution of over 12,000 individuals, and achieved 14 million work hours without a lost time injury. Boddington Gold Mine is one of Australia’s largest gold producers, and processes over 35 million tonnes of ore per annum. The project was awarded the 2010 Engineering Excellence awards – WA resource development category.
Clough delivers full asset lifecycle services to four key regions.

**Australia**
Clough’s Australian project delivery service is underpinned by a track record spanning 95-years. Over time we have worked on some of the world’s most challenging projects, and have developed specialist skills in industrial relations, security, logistics and quarantine to service the Australian mining industry. With a head office in Western Australia and operating centers in the Northern Territory, Queensland and Victoria, Clough can quickly mobilise professional teams to deliver mining & minerals processing projects Australia wide.

**Africa**
Together with our parent company, Murray & Roberts, Clough can offer an integrated project delivery solution to African mining & minerals processing projects. This combines Clough’s engineering and project management expertise with Murray & Robert’s extensive African-based construction resources, and experience in local project delivery.

Murray & Roberts is internationally recognised as one of the world’s leading mining contracting company with operations in Africa, Australia and the Americas. Murray & Roberts Cementation has served the mining industry for more than a century and is the reputed leader in shaft sinking, contract mining and raise-and shaft boring technology and services, with a strong track record of successful mine project delivery worldwide.

**Asia**
Clough has been working in Asia since the early 1970s and today has an established presence in Jakarta, Indonesia.

**Papua New Guinea**
Clough has been delivering mining & minerals processing projects in Papua New Guinea for over 30 years and is one of the most experienced contractors in this region. Utilising disciplined processes, tailored project management systems and an excellent understanding of the PNG culture, we deliver a comprehensive range of engineering, construction and operations and maintenance services to the region. Over time we have developed an extensive database of supervisors, superintendents and local construction workers, allowing rapid mobilisation of an experienced workforce to meet project requirements.
### Challenge is Our Tradition

Whether in the deserts of Australia or the jungles of Indonesia and Papua New Guinea, Clough has a history of delivering minerals projects in some of the world’s most technically and logistically challenging environments. Since the 1980s Clough has helped deliver over 50 major minerals projects.

<table>
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<th>Year</th>
<th>Project Description</th>
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| 1980 | Hunter Valley Coal Preparation Plant  
Coal and Allied Operations Pty Ltd  
Ravensworth, NSW  
Noyes Clough JV  
Constructed four cantilevered coal stackers. |
| 1981 | Worsley Alumina Plant  
Worsley Alumina Pty Ltd  
Collie, Western Australia  
Constructed power station infrastructure including 8,000m³ concrete placement, 14km of piles. |
| 1981 | Pipe Conveyor Ship Unloading Terminal  
Port of Geelong Authority  
Geelong, Victoria  
Noyes Clough JV  
Designed and constructed a 28m pipe conveyor – the first ever installed in Australia. |
| 1985 | Paddington Gold Project  
Pancontinental Mining Ltd  
Kalgoorlie, Western Australia  
Installed a crusher, conveyer system, mechanical equipment and piping for a 1mtpa CIL gold plant. |
| 1988 | Hedges Gold Water Pipeline and Tailings System  
Alcoa Australia Ltd  
Boddington, Western Australia  
Installed a 2.5km water pipeline, pump stations and carried out all E&I work. |
| 1989 | Misima Mill Complex  
Placer (PNG) Pty Ltd  
Misima Island, Papua New Guinea  
Placement of 7,000m³ concrete for mill complex. |
| 1991 | Tanjung Bara Coal Mine Site Infrastructure  
PT Kaltim Prima Coal  
Sangatta, East Kalimantan, Indonesia  
Constructed site infrastructure including 700m wharf, materials handling facility, roads, three 500 bed camps, pipelines and pump stations. |
| 1994 | Stacker/Reclaimer Refurbishment  
BHP Iron Ore  
Port Hedland, Western Australia  
Noyes Clough JV  
Designed the upgrade of a 3,000tph stacker and reclaimers. |
| 1992 | Kidston Expansion Project  
Kidston Gold Mines Ltd  
Central Queensland, Australia  
Completed civil work, concrete placement and erection of structural steel for crusher, conveyors, bins and ball mill. |
| 1992 | North Pulau Laut Coal Terminal  
PT Arutmin  
North Pulau Laut, Indonesia  
Noyes Clough JV  
Designed, constructed and commissioned stacker and bucketwheel reclaimer. |
| 1993 | Porgera Gold Mine Stages 1, 2, 3 & 4  
Placer (PNG) Pty Ltd  
Enga Province, Papua New Guinea  
Completed major civil and infrastructure works that included construction of concentrator and refinery buildings, fine ore bins, power house, a crusher, semi-autogenous grinding (SAG) mill, clean in place (CIP) and thickener foundations – all undertaken at an elevation of more than 3,300m. |
| 1993 | EGAT Mae Moh Power Project  
Electric Generating Authority Thailand  
Designed, manufactured, installed and commissioned conveyors, loading and transfer stations, and a stacker. |
| 1994 | Marandoo Iron Ore Facility  
Hammersley Iron Pty Ltd  
Tom Price, Western Australia  
Designed and constructed crushing and screening facility. |
1995
Osborne Copper and Gold Mine Project
Placer Pacific Development
North West Queensland
Fabricated and erected new primary crusher, secondary crusher, coarse and fine ore bins and reclaim tunnels, SAG mills, flotation and reagent areas.

1997
Lihir Gold Mine
Lihir Management Company Pty Ltd
Lihir Island, Papua New Guinea
Completed civil works and ROM pads, designed and constructed a retractable subsea tailings disposal system, and installed structural steel and process equipment for crushers, bins, conveyors, grinding mills, concentrator buildings, autoclaves, reagent facilities and gold room.

1998
Dalrymple Bay Stage 3 Expansion
Ports Corporation - Queensland
Mackay, Queensland
Supplied and constructed two new 3.5km jetty conveyors, installed piles and conveyor galleries and fabricated and installed a 8,000th tph ship loader.

1999
QPL Phosphoric Acid Plant
WMC Fertilisers
Townsville, Queensland, Australia
ABB Clough JV
Completed a turnkey development for a 500,000tpa phosphoric acid plant. Clough also completed a contract at the Townsville Port involving the design, construction and commissioning of a product receival, storage, reclaim and outloading facility.

Dampier Iron Ore Port Upgrade
Hamersley Iron Pty Ltd
Dampier, Western Australia
Clough Sandwell JV
Designed, constructed and managed port upgrade including installation of a ship loader, conveyors, bridge reclaimers and site electronics.

2001
Cape Lambert Jetty Upgrade
North Limited
Cape Lambert, Western Australia
Supplied and installed upgrade works to extend and widen a 2.7km jetty.

2002
Sally Malay Nickel Project
Sally Malay Mining Limited
Kimberley Region, Western Australia
Engineering studies for a 1mtpa Nickel sulphide plant and mine development.

2003
Dalrymple Bay Stage 6 Expansion
Prime Infrastructure Group
Mackay, Queensland
Supplied and constructed a new 264m berth with new conveyors, mooring and berthing dolphins and access bridge, while installing a separate 7,200th tph ship loader.

Boroq Gold Project – Process Plant
Boroq Mongolia Mining Corporation
Solenge Province, Mongolia
Designed, constructed and commissioned a 1.75mtpa CIL gold processing plant including 8kms of buried tailings and water recovery pipelines.

2005
HiSmelt Kwinana Plant
Rio Tinto
Kwinana, Western Australia
Kvaerner Clough JV
EPCM of a world first 800,000tpa HiSmelt Plant, recognised with Australia’s highest engineering excellence award.

2006
Catalytic Plant Development
Iluka Resources Ltd
Western Australia
Pre-feasibility studies for a new mineral sand plant, mining unit and 200 bed accommodation village.

Cowal Gold Mine Project
Barrick Australia Pty Ltd
New South Wales
Clough Seymour White JV
Civil and concrete works for a 4mtpa gold process plant and support infrastructure including crushers, bins, reclaim tunnels, SAG mill, ball mills, conveyors, CI, tanks and reagent areas.

2009
Murray Basin Stage 2 – EPCM
Iluka Resources
Ouyen and Hamilton, Victoria
Detailed feasibility studies and EPCM for a mineral sand mining and processing plant. Design and construction management of the track mounted mining unit and re-locatable concentrator plant.

2012
Boddington Gold Mine
Boddington Joint Venture
Boddington, Western Australia
Aker Solutions, Clough, Murray and Roberts JV
EPCM for gold and copper processing facilities capable of handling 35mtpa. The project was recognised with an Engineering Excellence award.

2013
Roy Hill ECI
Hancock Prospecting
Port Hedland, Western Australia
Clough Forge JV
Detailed review of preliminary and bankable feasibility study (BFS) documentation to assist with development of the final scope for the construction phase.

Wafi-Golpu Early Works
Marobe Mining JV
Papua New Guinea
Completed early works to develop support infrastructure including roads, bridges, a 500 man construction camp, power and water supply.

2014
Cape Lambert Power Station
Rio Tinto Iron Ore
Wickham, Western Australia
Completed process, mechanical and piping engineering for a new Combined Cycle Gas Turbine power plant facility.

2015
Anderson Point Facility (APS)
Fortescue Metals Group
Port Hedland, Western Australia
BAM Clough JV
Design and construction of a 306 metre wharf extension, seven berthing dolphins, and the supply and installation of wharf conveyor modules.

Current Projects
Oyu Tolgoi Civil Works
Oyu Tolgoi LLC
Southern Gobi Desert, Mongolia
GCR Mongolia JV
Bulk and detailed earthworks, civil and concrete works for major concrete structures, buried services works including, 35kV, 10.5kV electrical cabling and multiple pipeline scope works consisting of HDPE and carbon steel, decommissioning of 35kV overhead powerlines including the removal of 8 tower structures.
THROUGH THE TARGET ZERO AND MAP PROGRAMS, CLOUGH DELIVERS INDUSTRY LEADING SAFETY AND ENVIRONMENTAL PERFORMANCE WHILE PROTECTING AND GIVING BACK TO LOCAL COMMUNITIES.

Safety excellence

Safety is a value on which we never compromise. While Clough’s safety performance is significantly better than the global contracting industry average, we continue to work towards a workplace that is incident and injury free by driving safety leadership accountability and developing our people.

Our Target Zero safety program takes a full project lifecycle view on safety - from design through to execution and operations. We employ behavioural based safety programs across every phase of a project. Leading indicators play a key role in the measurement of our safety performance.

Clough’s Major Accident Prevention (MAP) brings offshore safety case principles to the onshore construction environment. By analysing activities with potential for major accidents or events, and implementing critical controls, MAP provides lifesaving tools to provide real-time, line of sight management of potential major hazards.

Environment

Clough is committed to continuous improvement in environmental performance throughout our global operations.

Over and above the commitments stated in our HSE policy, we actively seek out ways to continually deliver environmental excellence for our clients and the communities in which we operate. Our environmental management processes are embedded into our business delivery processes, championed by our environmental specialists and delivered by our management, engineering and project teams.

Community

Clough embeds dedicated community relations professionals on our projects to implement programs that deliver tangible community benefits while achieving project objectives. Community engagement strategies are developed to facilitate community support and involvement, meet local stakeholder needs, minimise disruption and provide local and indigenous employment opportunities.

We understand the importance of giving back to the communities in which we live and work. Through Clough’s dedicated Charitable Trust, The Clough Foundation, Clough supports a range of local community groups to provide sustained benefit to local communities, strengthen stakeholder relationships and encourage employee involvement in community initiatives.
CLOUGH IS FOCUSED ON DEVELOPING THE PEOPLE, SKILLS AND CAPABILITIES TO SERVICE THE METALS & MINERALS SECTOR AND CONSISTENTLY DELIVER HIGH QUALITY OUTCOMES FOR OUR CLIENTS.

Clough’s ‘Pursuit of Excellence’ philosophy is fundamental to our high performance culture and sits at the core of our value system. Recognising that project managers are critical to the success of a project, Clough has invested in a Project Management Academy. This structured program aims to have “Clough certified” project managers recognised as the best in the industry.

We take a long-term view to people development, to avoid hiring off the street. Talent development and succession programs ensure that we have a strong pipeline of future leaders, from graduates to executives. Our aim is to ensure we fill core positions on our projects with talented Clough employees who understand our project delivery systems and culture. We are also investing in a Leadership for High Performance framework, to create an organisational climate that promotes high performance.

Key to delivering strong project performance is a reward and recognition program that drives the right focus on safety, cost and schedule.
Clough offers multi-disciplined engineering design services for a wide range of metals & minerals processing development projects. We adopt a full lifecycle ‘Total Installed Cost’ approach to design and project implementation, to enhance project value without compromising safety, quality or schedule.

Over time we have grown and shaped engineering technology, and today are widely recognised as a market leader in the digital engineering space. Our engineers have significant experience and capability in the use of Intergraph’s SmartPlant Enterprise suite while our systems, procedures and workflows enable effective and efficient project management, cost control and concurrent, multi-discipline design. By utilising 3D modelling and intelligent design systems (Smart 3D), we maximise the benefits of data integration throughout the engineering, fabrication and construction phases of our projects.

Engineering disciplines provided by Clough, include process, safety, piping, mechanical, civil structural, electrical, instrumentation and controls and communications.

Clough is recognised as a pioneer in the development of integrated project management systems that take a full asset lifecycle approach to project execution. This is achieved by controlling the links between engineering, procurement, construction commissioning and operations and maintenance.

We harness new mobile platforms and tools to drive information into our geographically dispersed operations, and have invested significantly in data, systems and technologies. The result is an ability to sustain field variations to less than two per cent.

SmartPlant Foundation is used for document management and control while SmartPlant Materials provides materials management and procurement. Cost control and subcontract management are catered for via PRISM, with Primavera providing scheduling and planning controls.

Clough’s project management systems are supported by a core team of systems experts who are disciplined in system compliance, and focused on real time information provision and continuous improvement to optimise safety, cost and productivity performance on every project.
PRODUCTIVITY

CLOUGH’S DISCIPLINED PROJECT DELIVERY MODEL IS SUPPORTED BY PROPRIETARY CLEARVIEW SYSTEMS AND WORKFORCE OPTIMISATION MODELS TO PROVIDE CONFIDENCE ON COST AND SCHEDULE DELIVERY.

With almost 100 years of construction experience, Clough’s engineers know how to design to construct. Constructability is built into every engineering design we produce through a process of ‘front-end loading’. This involves spending more time in the early phases of design to optimise construction. This approach improves productivity during the execution phases, significantly reducing construction costs.

Clough implements a lean workforce model, conducting the majority of engineering work out of our global network of operating centres. This minimises the number of permanent personnel mobilised to site and more efficiently manages work demand, resulting in significant cost savings.

Clough’s proprietary software reports project progress daily against a detailed look-ahead plan. This enables our project management team to intervene early on issues that might impact overall project cost or schedule, and helps project and construction managers to continuously improve performance.

Logistics Innovation

Clough provides an integrated supply chain solution supporting all phases of the work it conducts. With access to industry leading global and local service and transport providers, Clough ensures the timely sourcing, logistics, management and distribution of materials to meet strict quality, preservation and scheduling requirements for projects of all sizes. This service is underpinned by experienced supply chain professionals supported by systems and processes fully integrated with engineering and project management.