DRIVING COST EFFICIENCY - AN INTEGRATED CSG SOLUTION
As one of the most experienced Coal Seam Gas (CSG) contractors in the industry, Clough understands the unique and changing requirements of Australian CSG projects.

As a result we have developed a dedicated coal seam gas team to drive cost efficiency across the full spectrum of CSG services, from concept, FEED and detailed design, through to procurement, construction, commissioning and long-term operations and maintenance.

Our CSG personnel have a comprehensive understanding of the unique challenges associated with Australian CSG projects, backed by Clough’s extensive experience in pipeline and gas projects, and proven project management systems and processes.

Clough’s CSG services range from engineering studies to full turnkey CSG project delivery solutions and include:

**Project Management and Engineering**

State of the art field development design packages, from well-head systems through to infield pipelines, field compression, flowlines, central compression and export pipelines.

**Upstream CSG Surface Infrastructure**

Innovative, cost effective EPC solutions for gas and water gathering challenges associated with CSG projects. We work closely with clients to optimise the design and installation for gathering systems.

**Processing and Compression Facilities**

Process and compression facility design and construction, specialising in well head facilities, infield manifolds and valving, compressor stations, water solutions and pipelines.

**Gas and Water Pipeline and Plant**

Full asset lifecycle services, from concept to commissioning, operations and maintenance or any part thereof, across all disciplines of downstream gas and water transmission pipeline developments for any terrain, within Australia and internationally.

We specialise in all diameter, long distance, cross country buried pipelines designed and constructed to Australian Standard AS2885.

**Construction and Fabrication**

Clough has over 95 years construction experience, enabling the provision of comprehensive construction capabilities, specialised equipment and fabrication services to the CSG industry. Utilising local Queensland production facilities, we deliver structural steel, piping and offsite package assembly and testing.
This integrated EPC delivery model incorporates seven key factors that underpin our CSG services and are critical to the successful delivery of CSG projects:

- Experience and track record in the Surat and Bowen Basins
- Commitment to Zero Harm
- Dedicated and project ready CSG teams
- Innovative in-house engineering
- Modular construction methodology
- ClearView project performance reporting
- Clough logistics and supply chain services
Clough’s full asset lifecycle project delivery model has been developed through extensive experience on major CSG projects in the Surat and Bowen Basins.

Clough has delivered more than 70 CSG projects, including more than 50 CSG FEED studies

**Arrow Project**
- Daandine Compression Project - Concept, FEED, EPCm
- Node 2 Compression Project EPC (self perform)
- Arrow Upstream Pre-FEED and FEED
- MGP Field Development
- Node 4 Gathering
- Surat Tek Park Pipeline
- Concept development of multi wellhead skids (Above Ground and Below Ground)
- Hydraulic Modelling of Gathering Systems

**Santos GLNG Project**
- Construction of the K128 Upstream Facilities
- Project Management of Concept Studies for Electrification
- CRWP Looping Pipelines
- Arcadia Concept Scope of Work Documentation
- Gladstone LNG Commissioning Management Services

**QGC QCLNG Project**
- Narrows Crossing Owner’s Engineer
- 8+2 Stage 1 Construction Packages (FCS, CPP, Pipelines)
- Process Studies
- Argyle and Bellevue Compression Station Detailed Design
- E04 Pipeline - Concept, FEED, Detail Design

**Origin APLNG Project**
- Process Safety Engineering
- Talinga Gas Plant Brownfield Expansion
- Taloona and Spring Gully Metering Skid EPC
- RO Pump Study
- Upstream Commissioning
TODAY CLOUGH PROVIDES A FULL SUITE OF ENGINEERING, CONSTRUCTION, COMMISSIONING AND OPERATIONS AND MAINTENANCE SERVICES TO CSG PROJECTS, AND IS CONTRIBUTING TO THE SUCCESS OF A NUMBER OF KEY PROJECTS IN THE SURAT AND BOWEN BASINS.

**Arrow Upstream FEED**
- **CLIENT:** Arrow Energy
- **LOCATION:** Surat and Bowen Basins, Queensland
- **CONTRACTING ENTITY:** Clough AMEC
- **SCOPE:** Front End Engineering Design for the full upstream development for Arrow CSG to LNG development. Includes gathering, field compression, central compression and associated pipelines and infrastructure.

**Daandine Expansion Project (Concept and FEED)**
- **CLIENT:** Arrow Energy
- **LOCATION:** Surat and Bowen Basins, Queensland
- **CONTRACTING ENTITY:** Clough
- **SCOPE:** Master Services Agreement for conceptual studies, FEED and detailed design work across multiple projects.

**GLNG Project K128 Upstream Facilities**
- **CLIENT:** Santos / Fluor Australia
- **LOCATION:** Surat Basin, Queensland
- **CONTRACTING ENTITY:** Clough Downer JV
- **SCOPE:** Construction of more than 400 kilometres of gas and water transmission pipelines, two compression facilities, six water storage dams, an 800-person camp and expansion of the existing Fairview compression facilities.

**GLNG Project Commissioning Management Services**
- **CLIENT:** Santos
- **LOCATION:** Surat Basin, Queensland
- **CONTRACTING ENTITY:** e2o
- **SCOPE:** Commissioning management services for the upstream field development, and commissioning of the pipeline for the upstream project.

**APLNG Project Upstream Commissioning**
- **CLIENT:** Origin
- **LOCATION:** Surat and Bowen Basins, Queensland
- **CONTRACTING ENTITY:** e2o
- **SCOPE:** Commissioning, structural design and implementation of the completions/commissioning management software (CCMS).
SAFETY, ENVIRONMENT & COMMUNITY

Our Target Zero Vision

// Zero Harm to our people, the community and the environments in which we work. //</p>

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.

As an emerging industry, Australia’s CSG industry has had some significant safety challenges, and is currently underperforming when compared to the industry globally. Using lessons learned from the industry, Clough has created CSG specific safety programs around major accident and event management, people engagement and governance and assurance, to meet the unique needs of the CSG industry.

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. We understand the impact working on agricultural land can have on regional communities, and work collaboratively with our clients to minimise the environmental impact of our 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 employs a core team of project management professionals that are trained in our systems and project execution methods. These professionals are allocated to key leadership positions on our CSG projects. This core team is supported by a depth of talent in engineering and construction, and access to ready-now teams of experienced CSG personnel to enable rapid mobilisation for CSG projects.

Key to delivering strong project performance is a reward and recognition program that drives the right focus on safety, cost and schedule.
CLOUGH’S IN-HOUSE ENGINEERING TEAM OFFERS LEAN, STATE OF THE ART FIELD DEVELOPMENT DESIGN PACKAGES FOR CSG PROJECTS. WE ADOPT A FULL LIFE CYCLE ‘TOTAL INSTALLED COST’ APPROACH TO DESIGN AND PROJECT IMPLEMENTATION, TO ENHANCE PROJECT VALUE WITHOUT COMPROMISING SAFETY, QUALITY OR SCHEDULE.

Our aim is to maximise the use of modularisation in construction, while producing designs suitable for field development plan variability. Value improvement processes are incorporated into the design to optimise the client’s total installed cost and/or schedule. During the FEED phase Clough draws upon its construction expertise to maximise value and efficiencies during execution, such as hot work savings and construction sequencing optimisation.

Clough uses the latest engineering technology to maximise the value from engineering deliverables across the asset lifecycle. 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.

Our global network of engineering centres use Cloud based technology to enable 24/7 engineering support for our clients.

Our multi-disciplined engineering design services adopt a full life cycle ‘Total Installed Cost’ approach to design and project implementation, to enhance project value without compromising safety, quality or schedule.

**Innovation in CSG design**

Clough’s CSG engineers utilise lessons learnt and apply innovation in design to solve complex problems and adapt to the changing needs of the CSG industry. CSG design innovations include:

- **Multi Well Pad Designs with optimised separation**, developed in conjunction with our CSG clients. These have included arrangements such as, individual skids per well, one combined separation for the pad, and underground separation using pipe expansion.

- **Well Pad Surface Facilities** - Well head designs for optimised capital and operations costs, achieved by removing separators and sharing of infrastructure at well pads.

- **Footprint Minimisation** - Working closely with the construction teams, Clough has reduced the required Right of Way (ROW) widths through use of new construction strategies and equipment, and have decreased the number of single in-situ concrete pours and piling by joining foundations.

- **FCS Compression Equipment Mobility** – Ensuring compressors and associated infrastructure can be relocated to suit gas demand and field development needs, providing significant cost savings.
CLOUGH APPLIES THE OVERSEAS MODULARISATION APPROACH USED IN MAJOR LNG DEVELOPMENTS TO UPSTREAM CSG INFRASTRUCTURE, TO REDUCE COST AND DEVELOPMENT TIME.

Modularisation reduces onsite construction times and increases overall project productivity. Clough’s approach to maximising the benefit from modularisation is to design with a modularisation mindset from the start of the project.

Our modularisation service draws on established relationships with client-approved fabrication yards in Asia and encompasses:

- Transportable and redeployable standardised skid designs (Lego block approach)
- Standard modules sized to maximise container volumes and minimise freight costs
- Compression modules designed for a flexible train approach allowing for scalability as the fields develop and mature
- Designs suited to low-cost Asian assembly line fabrication processes.
CLOUGH’S DISCIPLINED PROJECT DELIVERY MODEL IS SUPPORTED BY PROPRIETARY CLEARVIEW SYSTEMS AND WORKFORCE OPTIMISATION MODELS TO PROVIDE CONFIDENCE ON COST AND SCHEDULE DELIVERY.

**Productivity**

- Construction optimised engineering
- Workforce optimisation models
- Project reporting enabling early detection and intervention on potential productivity issues
- Progress reported against a detailed look-ahead
- Project and construction managers accountable for driving performance

**Front End Loading**

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.
Project Management Systems

Clough is recognised as a pioneer in the development of integrated project management systems that take a full asset lifecycle approach to project execution, 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 focussed on real time information provision and continuous improvement to optimise safety, cost and productivity performance on every project.
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 Asset 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.