fluid

KGAL consulting engineers

Keeping you up to date with ***KGAL Summer 2025***

More of the same, but every one different! These are the projects and challenges we deal with, each one having a unique set of problems requiring a bespoke set of solutions. It's what we do!

Dave Griffiths** | **CEO

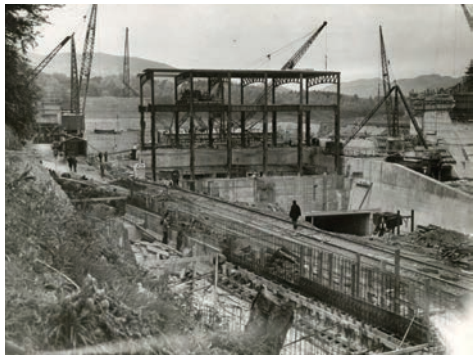
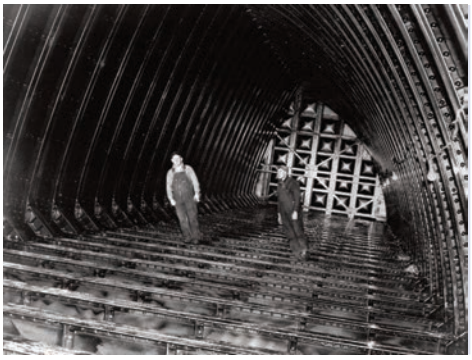
Pitlochry Dam

SSE Framework Agreement continues

KGAL has been privileged to work with **SSE** under a framework agreement since early 2009. Through the intervening years we have provided a range of services and support to the **SSE Generation Teams**; from **reliability studies of spillway gates**, providing project management support for MIV replacements at Foyers and Sloy, **project management and site support** for the plant replacement at Storr Lochs, through many **gate surveys and condition assessments**, to the current crop of **intake surveys, transient analysis of valve replacement options** and related studies.

This year **we have signed a further iteration of this framework** and look forward to continuing to provide a wide array of engineering services to support **SSE's** generation and plant operation activities...

Enhancing Reliability at Pitlochry... Drum Gate Analysis Completed


Images courtesy of SSE ... Pitlochry under construction

We have recently completed a detailed reliability study, known as a **Failure Modes and Effects Analysis (FMECA)**, for the *Drum Gates* at **SSE's Pitlochry Dam**. This proactive analysis aims to systematically identify potential areas for enhancement within the drum gate systems, assess their potential impacts, and provide targeted recommendations to support long-term reliability and operational best practice.

The comprehensive **FMECA** involved a thorough review of the drum gates' operation, associated equipment, and instrumentation, drawing on established industry methodologies.

Key Insights from the Analysis:

The analysis highlighted several key areas for ongoing attention and management:

- **Siltation Management**:
  The study confirmed that managing silt ingress into the control water system is an important aspect of maintaining optimal performance. This can potentially affect various components involved in the automatic operation of the gates. Recommendations focus on continued and potentially enhanced silt mitigation strategies and ongoing preventative maintenance for key components.
- **Structural Integrity Considerations**:
  As with any long-serving critical asset, the analysis considered the structural integrity of the drum gates under extreme conditions. It was recommended to review existing structural assessments in line with current standards to ensure continued resilience.
- **Emergency System Readiness**:
  The reliability of backup systems, such as the emergency valve, is crucial. The analysis pointed to areas for routine checks and potential refinements to ensure its continued dependability.
- **Mechanical Component Performance**:
  The study also reviewed various other mechanical components. Some were identified as benefiting from focused maintenance and performance reviews to ensure they continue to operate as intended.

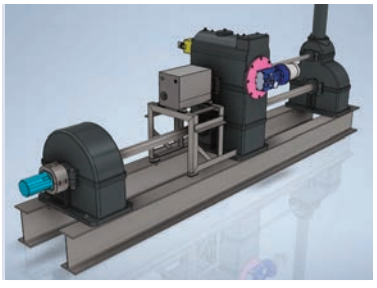
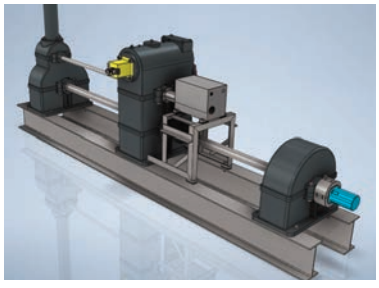
The **FMECA** provides **SSE** with valuable insights to support their ongoing maintenance and asset management strategies. Key recommendations focus on proactive measures for **silt management**, **structural reviews**, **emergency system checks**, and **refinement of preventative maintenance for specific mechanical items**.

We have also been appointed by SSE Ltd to provide a new actuation system for the Emergency Draw-off Gate at Pitlochry Dam, using a 110-volt motor and gearbox setup. The existing arrangement had raised concerns about reliability, so a more dependable method of operation was required.

The new design incorporates a 110-volt motor and gearbox, which reduces the operating speed of the main gate lifting gearbox by approximately two and a half times. To integrate the new system, additional monitoring features have also been included, such as a hunting-tooth limit switch and a rotary encoder.

KGAL is committed to supporting **SSE** in their efforts to ensure the continued safe and reliable operation of the Pitlochry Dam drum gates, which play a vital role in water level control and flood management.


The existing set-up

CAD drawings of the new design

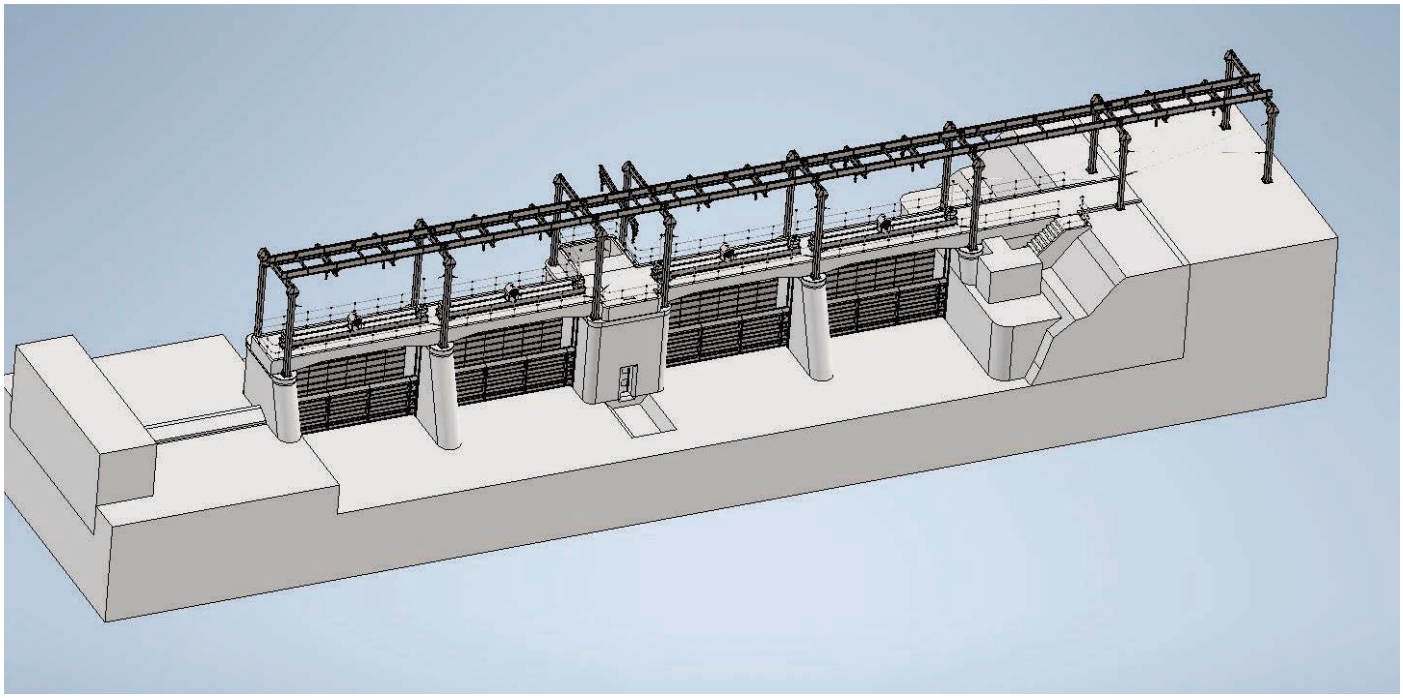
Achanalt Barrage

The initial phase of the outline design of **Upstream Stoplogs** and **Installation Gantry** for **Achanalt Barrage**, has now been completed on behalf of **SSE**.

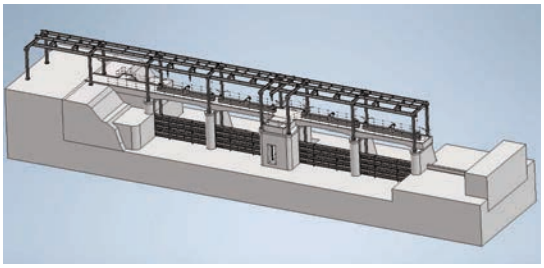
The barrage controls the level in **Loch a'Chuilinn** releasing water into **Achanalt Power Station** and consists of **four vertical lift roller gates**. The **new stoplogs** will be used to isolate each of the gates in turn to enable scheduled refurbishment to be carried out. The gantry will allow the stoplogs to be simply lifted from suitable transport and moved into position using the gantry-mounted trolleys, then lowered into existing stoplog grooves via chain blocks, to enable channel dewatering.

The gantry will also allow each gate, gate operating equipment and the central fish pass penstocks to be removed and installed as required.

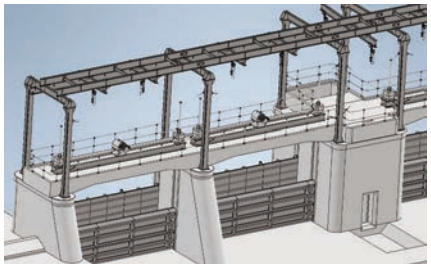
The second phase of the design work is to carry out site checks to finalise the design and then compile detailed drawings, specifications and calculations to enable construction and installation.



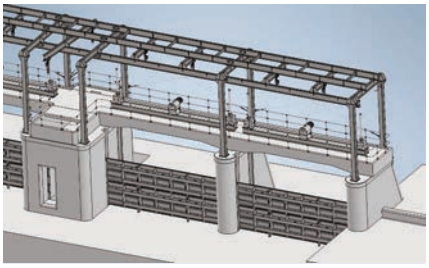
Achanalt Barage Upstream



Achanalt Barage Downstream



Achanalt Barage Upstream



Achanalt Barage Downstream

Finlarig

Following on from earlier work on the pipeline and penstock system at **SSE Renewable's** Finlarig Power Station, near Killin, we are working to further review the hydraulic capacity of the pipeline and penstock as part of wider assessments on the future of the power station.

River Basin Management
Aqueduct intakes

To meet the developing river management requirements of the **Scottish Environment Protection Agency (SEPA)**, we are working with **SSE Renewables** to review the options to provide hands-off flows at six intakes across Scotland.

KGAL Poised to Support Bristol Entrance Lock Assessment

We are anticipating involvement in a significant project with **Bristol City Council (BCC)** to undertake a comprehensive condition assessment of the historic **Bristol Entrance Lock**. Following positive discussions, and with funding understood to be secured by **BCC**, we have submitted a detailed proposal for this crucial work, which is hoped to commence in the near future.

The project's primary goal is to provide **Bristol City Council** with a thorough understanding of the current condition of the lock's vital mechanical and electrical systems. **KGAL's** proposed scope is designed to deliver a clear pathway for maintaining this key asset. It encompasses **detailed site inspections** and **surveys of the lock gates** and their **operating equipment**. This will be followed by the development of an **Event Action Plan** and a comprehensive **Options Appraisal** to inform **BCC's** future maintenance and refurbishment strategies, ensuring the lock's longevity and reliability.

Key phases of the proposed work include:

- **Detailed Condition Surveys:**
  In-depth mechanical inspections of the inner and outer lock gates (North and South Leaves), including their structure, pintles, seals, and corrosion protection. This will be complemented by **Electrical, Instrumentation, Control, and Automation (EICA)** surveys of the associated operating systems.
- **Engineering Analysis & Short-Term Solutions**: The proposal includes **Finite Element Analysis (FEA)** of the existing gates to understand their current structural behaviour and the development of a design for short-term remedial works to address any immediate concerns identified.
- **Strategic Planning**: Creation of an **Event Action Plan** to ensure robust responses to potential operational scenarios, and an **Options Appraisal** to evaluate longer-term strategies for the lock. This will assist **BCC** in making informed decisions for the future of this important piece of maritime infrastructure.

This prospective project highlights our extensive experience in the specialist field of inspecting, assessing, and designing solutions for complex, moving, hydraulic structures. We're enthusiastic about the potential to collaborate with **Bristol City Council** and their strategic partners, contributing our expertise to safeguard the **Bristol Entrance Lock** for continued service to the vibrant Bristol Harbour.

Leigh Barrier Upgrade Forges Ahead...
Protecting Communities and Infrastructure

We're proud to continue our role as engineering consultant for the **Environment Agency's Leigh Expansion** and **Hildenborough Embankment Scheme (LEHES)**. This critical flood defence project on the River Medway is of considerable importance, safeguarding thousands of homes, businesses, and vital infrastructure in Hildenborough and Tonbridge from the devastating impacts of flooding. The works at the Leigh **Flood Storage Area (FSA)** are crucial for managing river levels during high flow, offering enhanced protection and peace of mind to the local communities.

The project involves the replacement of the three original radial gates and their drive mechanisms with three new, **upgraded radial gates and modern Dyneema rope winch systems**. This significant enhancement will not only improve operational reliability but also increase the impounding height, substantially bolstering flood protection capabilities for the area. **KGAL** has been instrumental in designing the new gates and winches, including **Factory Acceptance Testing (FAT)**, and designing an improved moving platform for better access to winch equipment for inspection and maintenance, ensuring the long-term effectiveness of this vital defence. We're excited to report significant advancements on site as we move through the construction support phase:

- **South Gate Complete**:
  Following its successful installation (previously reported as starting Q2 2024 and noted in a **GOV.UK** announcement in October 2023 when the first gate was lifted in), the South Gate has now been successfully **Site Acceptance Tested (SAT)**. This is a major milestone for the project, bringing one of the key protective elements online.
- **Centre Gate Progress**:
  The old Centre Gate has been fully removed and the new Centre Gate has been installed in the channel, which involved successfully lowering in the gate leaf and attaching it to the arms. These arms are now successfully located within the new pivot brackets, which are mounted to the existing built-in parts in the civils. This marks another significant step towards full operational capability.
- **North Gate Next**:
  The North Gate is scheduled for installation following the Centre Gate, moving the project closer to overall completion.

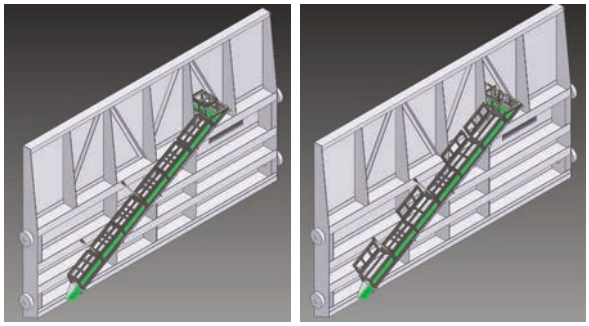
We continue to provide dedicated engineering support to **JBA** and the **Environment Agency**. The project remains on track with the overarching goal of having all three new gates operational to enhance flood resilience for the community, with the programme targeting completion before winter 2025.

We look forward to sharing further updates as this important project nears completion, ultimately delivering a more resilient flood defence system for the region.

fluid
KGAL consulting engineers

Horseshoe Sluice Eel Tray Screens, Ipswich

KGAL has been commissioned by **Jackson Civil Engineering** on behalf of the **Environment Agency** to design **anti-predatory screens** to be installed on the existing open eel pass tray on the downstream side of one of the automatic vertical gates at **Horseshoe Sluice**, on the River Gipping in Ipswich, Suffolk.



Horseshoe Eel tray screen 1 & 2

The sluice forms part of the **Ipswich Flood Defence Management Strategy**, which plays a crucial role in managing the tidal water levels and preventing flooding in the area.

In 2010, the **Environment Agency** undertook a £185k maintenance project at **Horseshoe Sluice**, in which **KGAL** was involved. This work incorporated removing the flood gates for repainting, and installing the eel pass to facilitate the migration of eels to/from the Sargasso Sea for spawning.

Over the years, it has become apparent that the eel tray was being used as an easy source of food for the cunning predatory birds, whereby they merrily feasted away on the eels as they migrated up and down the open eel tray.

The protective screens will prevent the continued predation and also include hinged lids to enable easy inspection and cleaning to be carried out to the trays as required.

Exposure

Join Us at HYDRO 2025 in Thessaloniki

We're excited to announce our participation in HYDRO 2025, the premier international hydropower conference and exhibition, taking place from 22–24 October in Thessaloniki, Greece.

This key industry event is a fantastic opportunity to connect with friends, colleagues, and customers - both old and new. We warmly invite all visitors to come and say hello at **Stand 135**, where our team will be on hand to share updates, insights, and good conversation.

We'll also be proudly joined by our parent company, **Whessoe Sdn Bhd**, making this a great chance to learn more about our wider capabilities and collaborative expertise.

See you in Thessaloniki !

News in brief

Bermuda CAT 3

Further afield, **KGAL** provided a specialist stage 1 and 2 CAT 3 review of a bascule bridge for **COWI** on behalf of the **Government of Bermuda**. The review encompassed the moving elements of the bridge, covering the mechanical, electrical power & controls and the hydraulic operating systems.

KGAL consulting engineers

Hydro Power | Water Control | Moving Bridges

UK Offices
Poole +44 (0) 1202 786430
Wakefield +44 (0) 1924 249825

Representative Offices
Kuala Lumpur, Malaysia +603 5161 6613
Vientiane, Lao PDR +856 21 315 881

email@KGALglobal.com | KGALglobal.com

designed and produced by www.claytoncreative.co.uk