

Keeping you up to date with KGAL - July 2022

**The application of gates and hydraulic steel structures is widespread throughout the flood defence, river control, hydropower and ports & harbours sectors around the world. The criteria for each individual design depend on a wide range of critical factors unique to each individual site and project. In this issue, we cover a small selection of these.**

## Bridgwater Flood Defence

KGAL has been retained by Atkins to prepare the M&E designs for the new Bridgwater Tidal Barrier, one of England's biggest flood defence schemes, on behalf of the Environment Agency. The barrier, located on the River Parrett in Somerset, will form part of a wider flood defence scheme to protect residential and commercial properties in Bridgwater.

KGAL's specific brief includes the design of the two new vertical lifting gates, the associated hoist mechanisms and the electrical power/control systems, along with the design of a stoplog system to enable the long-term maintenance of the new gates. The lifting gates will be closed at very high tides to prevent water from overwhelming existing flood defences upstream.

Construction of preliminary works at the barrier site is expected to start next year.



All of the new Bridgwater Barrier

## Garstang Flood Gates

The Garstang flood gates control the discharge from the Garstang flood storage reservoir located on the River Wyre in Lancashire, which is used to protect up to 390 downstream properties from the effects of fluvial flooding.

The flood gates were originally designed to be operated on average once every 5 to 10 years, but this has occurred more frequently in recent years. In addition, the operation sees a rising challenge from an increasing amount of silt depositing in and around the gate channels.

The flood basin surrounding the barrier includes a number of public footpaths. Any uncontrolled movement of the structure can be potentially dangerous to users of these footpaths and the operation of the gates are therefore heavily reliant on manual operation and rigorous pre-movement inspections by the Environment Agency response team.

KGAL was instructed by Jacobs to conduct a M&E condition survey, with the aim of predicting the remaining life and improving the safety and resilience of the asset over the coming years.

Our condition assessment received a very positive response from the Environment Agency, and as a result, we received further instruction to lead and facilitate a hazard and operability (HAZOP) workshop from a high-level perspective. With information from this workshop, we have provided M&E costings for multiple options, including improving the current asset or constructing other types of flood defence systems to replace the existing one.



The flood gates at Garstang

## Holme Sluice

KGAL has been appointed by Arup, under their Environment Agency NGS CDF Framework, in the Midlands Hub, to provide technical support relating to the sluice gates and associated operating equipment at Holme sluice on the River Trent.

The barrage has five large vertical wheel gates and is one of the Environment Agency's largest assets on the River Trent. KGAL's work scope is still being developed but is likely to include a HAZOP study, site inspection and remaining life assessment work.



## Mucomir

KGAL has been appointed by SSE to carry out a remaining life asset assessment of three vertical lift wheel gates at Mucomir in the Scottish Highlands.

The gates, built in the 1950s by Ransomes & Rapier, are each circa 30ft clear span x 7ft high. They form part of Mucomir Hydropower Station and control the discharge from Loch Lochy.

The work will require a site inspection, which can only be carried out at times of low flow when the gates can be closed, followed by calculations and computational analysis to determine the remaining structural integrity and capacity of the gates. In addition, the associated operating equipment will be inspected and assessed.

It's 'deja vu' for Brent Imisson, our Associate Director responsible for the project, since he started his career as an apprentice engineer with Ransomes & Rapier back in the 1970s.



Mucomir wheel gate



Mucomir gate operating gear

## Morar

Global Energy (Group) Ltd has appointed KGAL, on behalf of SSE, to develop and design a temporary works solution to facilitate the isolation and refurbishment of a large span drum gate at Morar, near Malaig in Scotland.

The drum gate is circa 14.5m span and there is very limited access for mobile cranae. The temporary works solution will comprise a waling beam and vertical skin panels. The Beam will be designed to be assembled on site and lowered into the water using a mobile crane, then floated into position for installation.

The gate forms part of the Morar Hydropower Station and regulates the discharge and level of Loch Morar.



Morar drum gate looking upstream.

## Progress at Rotherham FAS as gate and support structure installed

Progress continues at the Rotherham Renaissance Flood Alleviation Scheme (FAS) as the built-in gate and supporting structure is installed at Forge Island on the River Don in Rotherham.

KGAL was appointed to design the gate and operating system by Pell Frischmann for the end client, Rotherham Metropolitan Borough Council. The vertical wheeled gate was designed to be operated beneath the supporting arch structure to prevent flood water from passing through.

The photos show the installation by Centregreat Engineering for Jackson Civil Engineering, the main Contractor.



Installation of Rotherham FAS gate and supporting arch



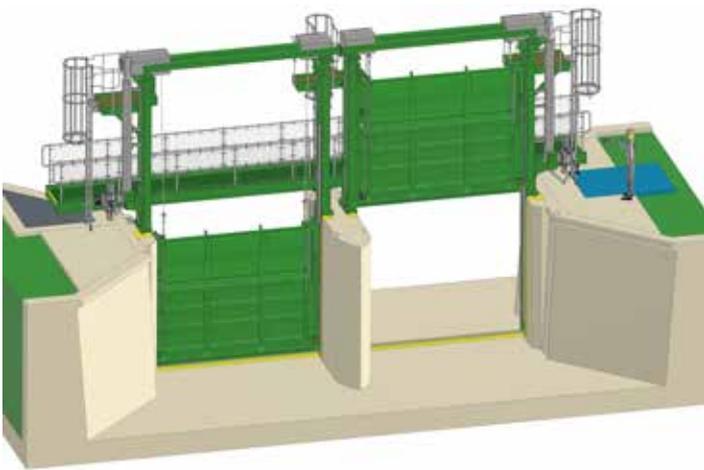
Gate and supporting arch in situ

## Replacement gates at The Star Inn, Pevensey

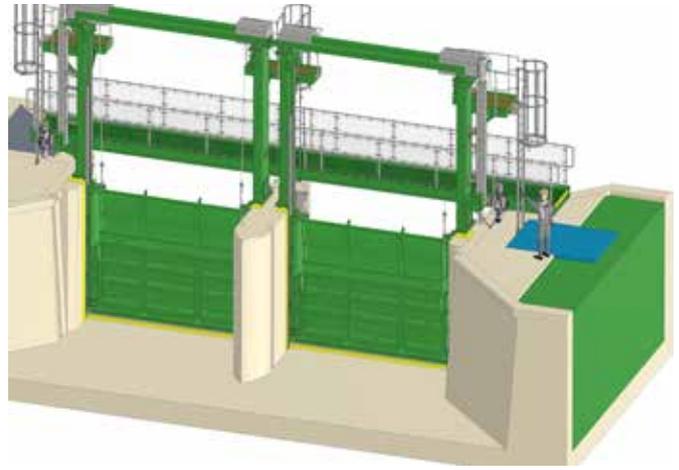
KGAL has been subcontracted by JBA Consulting to provide the detailed design for a set of gates to replace the existing set installed in the 1950s, which are now in poor condition.

The gates are primarily used by the Environment Agency to maintain water levels critical to the Pevensey Site of Special Scientific Interest (SSSI) within the east of the Pevensey Levels in East Sussex.

The new gates will be a pair of electrically operated hybrid tilting weir vertical lift gates. Our scope includes the detailed design of the gates and hoist equipment, along with a performance specification for the gate hoist controls, all of which are now in the latter stages of review and approval prior to commencement of the construction phase.



3D model of the gates with one open

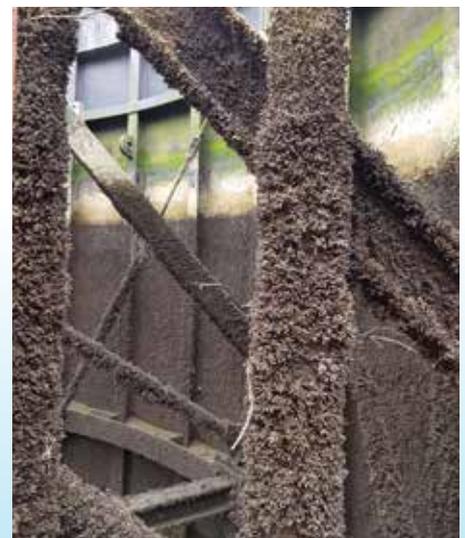


3D model of the gates, both closed

## Swansea Marina Inner Lock Gates Refurbishment

KGAL has been engaged by Swansea Council to provide technical support to the Council and their contractor, Centregreat Engineering, on the refurbishment of the Swansea Marina inner lock gates. This follows on from our involvement in the refurbishment of the outer lock gates in 2009.

The gates were removed to Centregreat's facility for cleaning, inspection and refurbishment and were reinstalled in early July.



The gates before removal for refurbishment

## Golovnaya Hydropower Station, Tajikistan

KGAL, in consortium with Gruner Stucky Ltd and Sofreco, has been working on the rehabilitation of the Golovnaya hydropower station in Tajikistan since 2016. The consortium of consultants forms the Project Implementation Consultants for the owner, Barki Tojik. The ADB funded rehabilitation works have been undertaken by Sino Hydro Joint Venture from China.

Covid travel restrictions have prevented attendance on site during the majority of the works, but this year we have finally been able to visit the site to review the works to date as a contribution to the Dam Safety Certificate.

More recently, KGAL has been on site to witness the first steps in the commissioning of the new spillway gates. The initial dry commissioning is now complete, including a leak test of the gates. Final wet commissioning will be carried out once permission is received to discharge water.



Golovnaya Hydropower Station



The powerhouse



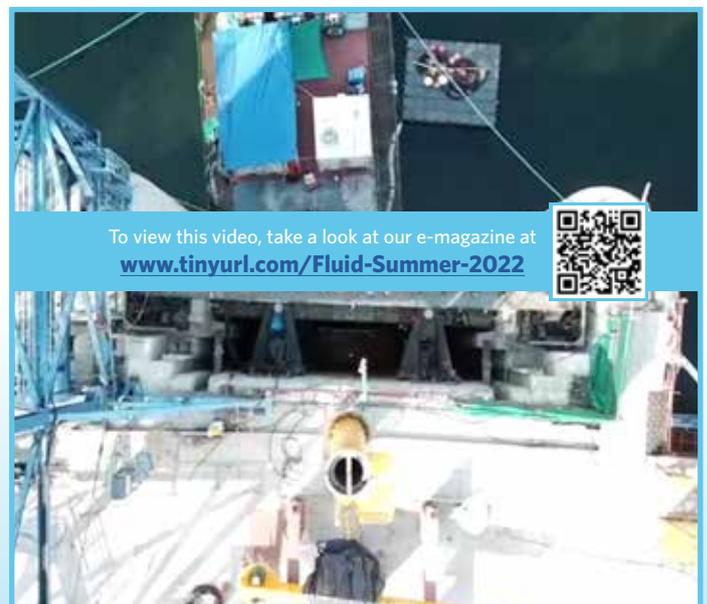
Commissioning of the spillway gate

## Kariba Dam 13th Joint Mission

KGAL Associate Director and member of the Panel of Experts for Kariba Dam, Nick Crosby, recently attended the 13th Joint Mission with funders, ZRA, giving him the opportunity to take this photograph of the view downstream from the dewatered Sluice 2 with the gate lifted, and the Zambezi River 90m below the flip bucket.



Sluice 6 was the first to be dewatered using the KGAL designed cofferdam. Before the scaffolding was installed, there was a brief opportunity to fly a drone up the 35m height of the cofferdam and to the top of the portal frame used for installation of the cofferdam, as shown here:



To view this video, take a look at our e-magazine at [www.tinyurl.com/Fluid-Summer-2022](http://www.tinyurl.com/Fluid-Summer-2022)



Footage courtesy of Cyril Bleton of Hydrokarst



## News in brief...

**Alouette Dam, Canada:** As part of their process for designing a preliminary upgrade to the existing adit gate system at Alouette Dam in British Columbia, BC Hydro has retained KGAL to investigate the reliability of the upgrade. The scope includes a HAZOP study, along with a FMEA and FTA on the proposed design to inform the design process going forward and ensure that reliability considerations are embodied within the design.

**Cleveland Dam, Canada:** We have been awarded a reliability study into the gate operations at Cleveland Dam in British Columbia by Metro Vancouver. This will include an analysis of all water pathways over and through the dam. The process will involve a HAZOP, FMEA and FTA to establish the overall reliability of the water control systems.

**Colwick Sluice:** We are pleased to announce that we have been appointed by Jackson Civil Engineering to design and detail a radial sluice gate with associated operating gear, a set of maintenance stoplogs with operating gantry, automatic lifting beam and access footbridge for a new fish and eel pass facility at Colwick Sluice on the River Trent.

**Holderness Drain at East Hull Pumping Station:** We have witnessed the successful factory acceptance testing of four pumps at the works of Bedford Pumps. The pumps are destined for East Hull pumping station, which is under construction close to the exit point of the Holderness Drain into the Humber Estuary. These works form part of a larger scheme for flood alleviation on the Holderness Drain, the main feature of the Land Drainage scheme for the area of Holderness to the east of the River Hull in the East Riding of Yorkshire.

**Kenwith Pump Station HAZOP:** Working for A&T Services Ltd on behalf of the Environment Agency, KGAL has been carrying out a HAZOP study on the Kenwith Pumping Station in Bideford, Devon. The study will establish the key issues in terms of specific equipment failure modes within the existing installation that could potentially lead to hazardous occurrences, and then provide guidance to assist the Environment Agency in preventing them. This is just the first of an extensive programme of reliability studies on Devon and Cornwall's flood defence assets.

**Looe Harbour Flood Defence Gate:** We have been retained by MWJV Ltd to provide the outline business case M&E design for a proposed new flood defence barrier for Looe Harbour in Cornwall. The proposed barrier, which is likely to be a mitre gate, will have a 30m clear opening. Auxiliary sluicing may be required, which could be accommodated within new civil abutments or within the gate itself, or a combination of the two.

**Rock Island Dam, USA:** Hatch Associates (Seattle) has been awarded a contract by Chelan PUD to examine various aspects of the gate operations at Rock Island Dam in Washington State, with a view to making logistical improvements and reducing the time needed to respond to flood events. We have been retained by Hatch to provide specialist advice of various M&E elements and the Phase I initial options report has now been submitted to the Client. Phase II (30% design) will now commence, which aims to provide feasible costed designs for the Client to consider.

## EXPOSURE

### ICOLD

As the UK representative on the ICOLD Technical Committee V (Hydromechanical Equipment), our MD, Russ Digby, took part in the meeting held in Marseille on 29 May to finalise the new Bulletin on the Reliability of Spillway Gates.

### MEICA Seminar

A half-day seminar on Reliability and Functional Safety including the use of HAZOP was delivered to the Environment Agency's National MEICA team and senior engineers by KGAL MD, Russ Digby, and Dr David Smith of Tehcnis on 31 May.

### British Dam Society (BDS) Workshop

Russ will be co-hosting a workshop on Qualitative Risk Assessment for Dam Gates with Jonathan Hinks (HR Wallingford) during the BDS Conference being held at Nottingham University on 14-17 September.



## KGAL supports accommodation initiative for refugees from Ukraine

We're very pleased to support an initiative being led by Leeds Building Society (LBS) in conjunction with Peterborough Council.

In response to the ongoing crisis in The Ukraine, a two-story commercial property in Peterborough is to be converted into emergency accommodation for the Ukrainian refugees. The proposed plans involve creating seven bedrooms, each with its own dedicated living space, a large communal kitchen and dining area, separate male and female bathrooms, and laundry and storage facilities. There will also be a management office and a meeting/quiet space.

Time, materials and other resources have been generously donated by suppliers, customers and the public to this DIY SOS style project. KGAL will be contributing £1,000 towards furnishing the accommodation.

If you'd like to make a donation or contribute towards this heart-warming project, please visit <https://www.justgiving.com/fundraising/lbsdec>

Or contact Richard Fearon, CEO at Leeds Building Society (<https://www.linkedin.com/in/richard-fearon-574a302>)

**Don't miss out!**

**Sign up to receive our Fluid newsletters straight to your inbox.**

We won't bombard you - we publish three per year.

<https://www.kgalglobal.com/register-for-enews>



**Hydropower | Water Control | Moving Structures**

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](mailto:email@KGALglobal.com) | [KGALglobal.com](http://KGALglobal.com)

© 2022 KGAL Consulting Engineers Ltd all rights reserved