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the newsletter from KGAL **Spring/Summer 2019**

State-of-the-art new bridge to cross Lowestoft's Lake Lothing

The Lake Lothing Third Crossing is a new rolling-lift single leaf bascule bridge to cross Lake Lothing in Lowestoft. Led by Suffolk County Council as the promotor, its principle aims include the reduction of congestion in the town and on the existing bridges; promoting regeneration and development in Lowestoft; and supporting the Port of Lowestoft and the off-shore renewable energy industries. Funding from the Department for Transport of £73m was agreed in March 2016 and the crossing is due to open in 2022.

KGAL has worked with WSP Ltd to produce the Outline Approval In Principle documentation; hydraulic, mechanical and electrical systems designs; and outline structural configuration for the bascule span. These deliverables support the application for the Development Consent Order (DCO) required for Nationally Significant Infrastructure Projects (NSIPs) under the Planning Act 2008.

We worked closely with a multi-disciplinary team including the WSP's Civil Engineers, Landscape and Urban Design Consultants, and Architects to deliver high quality designs which align to the design narrative for the Scheme. The design narrative echoes Lowestoft's future, reflecting renewable energy industries through sleek minimal design, with forms derived by their function. Through an interactive and collaborative process, we arrived at an architecturally-beautiful design which minimises the self-weight of the span (to reduce the construction costs of the in-water piers) and yet is correctly balanced. Emerging designs were presented to independent third party experts from Design Council CABE and received positive feedback; a Senior engineer from KGAL attended the session to explain the mechanism design and constraints to the Panel.

The key challenge during the outline design phase was the requirement to meet the requested cycle time (the elapsed time from stopping to re-starting vehicular traffic flow) during which time the bascule span must raise, allow vessels to pass, and lower again. To support this, we created Matlab Simscape models of the moving span and the associated hydraulic system to simulate the raising and lowering of the bridge and to validate the outline hydraulic system design.

We were active too in the handover of the outline designs to Arup / BAM Nuttall to undertake the detailed design and construction phases. This involvement ensures good project continuity as the outline designs are taken forward.

Further information about the crossing may be found here:

https://www.suffolk.gov.uk/roads-and-transport/transport-planning/lake-lothing-3rd-crossing/

The Scheme is currently under examination by the Planning Inspectorate, details of this process and the application for a Development Consent Order (including documents and drawings) can be found here:

https://infrastructure.planninginspectorate.gov.uk/projects/eastern/lake-lothing-third-crossing/?ipcsection=overview

AI image of the new bridge, courtesy of WSP UK Ltd

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Lifting ships in Eire

We've been helping to lift ships in the Emerald Isle this Spring.

The Department of Agriculture, Food and the Marine (DAFM) contracted the working team of AECOM and KGAL Consulting Engineers Ltd to visit, inspect and report on their shiplift facilities at both Howth, near Dublin, and at the largest fishing port in Eire - Killybegs in County Donegal. Both shiplifts, which are nearly identical, were originally built and installed by Pearlson Engineering of the USA in 1979 and both have given valuable and reliable service to the local fishing and boating industry for the last 40 years. Everything, however, has it's day.

Our Electrical Engineer Nicolas Cudsi and Mechanical Engineer Andy McGhee inspected the shiplift in Howth and Killybegs on the West Coast of Eire in late March, together with Civil Engineer Alistair Chan, Associate Director from AECOM.

The DAFM requested advice, guidance and a strategy on how to continue to successfully operate their ageing facilities for the next 40 years. This involved analysis of the spares, the design and the condition of the shiplifts and proposals to modify the maintenance regimes, the spares holdings and exploring the technical and financial merits of re-design in the operating and control systems.

Another case where KGAL, together with a partner such as AECOM, can offer the complete package of technical expertise to clients with large hard working assets. All the better when in such a beautiful part of the world, and it is true, the Guinness does taste better in Eire!

One of eight winch mechanisms making up the shiplift

The vessel launch at Howth shiplift

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Ensuring an uninterrupted safe haven for vessels at Caernarfon Castle

The Aber Swing Bridge in Caernarfon

KGAL is supporting Gwynedd Council with the refurbishment of the mechanical and electrical systems within the Aber Pedestrian Swing Bridge in Caernarfon, North Wales. Located adjacent to the historic Caernarfon Castle and built around 1974, this bridge sees hundreds of thousands of pedestrian crossings annually.

The M&E equipment requires modernisation to ensure the ongoing safe and reliable operation of the bridge. Operational requirements, however, mean that the modernisation needs to be carried in such a way as to minimise the impact to the public and to mariners. The bridge cannot be closed to river traffic for extended periods of time since the harbour provides a 'safe haven' for vessels. It must also be available for members of the public to use, particularly during the summer months.

With this is mind, we are working with Gwynedd Council to define and deliver 'work packages' related to the various aspects of the bridge equipment. We initially undertook a condition inspection of the M&E equipment related to the slewing of the bridge, the associated pedestrian gates and bridge locking equipment. Following this, we are providing functional design specifications for the M&E systems to facilitate the tendering of these works.

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Projects continue in Lao PDR with Xayaburi nearing completion and work starting on Nam Kong 3

During a recent visit to Lao PDR, our CEO, Dave Griffiths, visited two of KGAL's live project sites at Xayaburi HEP, near Luang Prabang in the North of the Country, and Nam Kong 3 HEP located near Attapeu, close to the Cambodian border in the South.

Whilst Xayaburi is approaching completion, NK3 is in the early stages of construction. The civil construction work is still underway in preparation for Whessoe/KGAL to install the steel liners and penstocks. Whessoe/KGAL are providing control and closure gates to these locations.

Meanwhile in Xayaburi, after breaking ground on site in 2012, the first of 8 turbines was being prepared for wet testing during our recent visit to site in December 2018.

The two images show the view along the upstream side of the power house with the intake gate operating cylinders clearly visible, and across the spillway with the water around the final impounded level.

Whessoe/KGAL are continuing to install various gates and mechanical equipment within the extensive fish pass facilities adjacent to and within the power house. The total weight of hydraulic steel structures designed, manufactured & installed by Whessoe/KGAL, on this project, is around 34,000 Tonnes.

The intake tunnel and high-pressure outlets to the power house under construction at NK3

Construction of the river diversion tunnel and bottom outlets at the bottom of the dam site at NK3

The intake gate cylinders at Xayaburi

Xayaburi spillway at impounded level

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O&M training for the Xayaburi operating team

In early March, KGAL provided the latest in a series of training sessions on the Operation & Maintenance of the Hydraulic Steel Structures at Xayaburi HEP. Technical Director Stewart Wingrove spent 5 days in Lao PDR providing classroom lectures together with on-site demonstrations. Having already covered the navigation lock, spillway and powerhouse, with installation near to completion, the gates and fish crowder/lifting equipment are accessible in dry conditions.

KGAL's Stewart Wingrove with the "Class of 2019"

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The power of the Mekong at Khonephapheng Falls

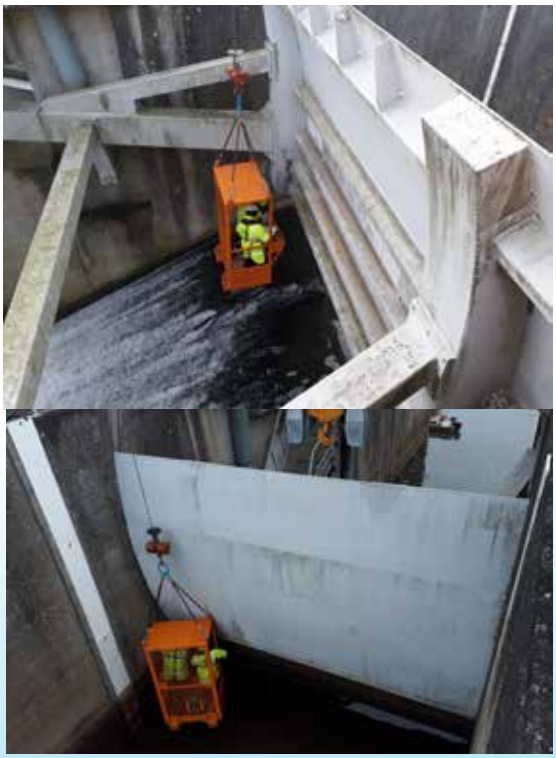
Whilst travelling South to Nam Kong 3, Dave visited the Waterfalls at Khonephapheng, where the Mekong River passes over a natural fault. The highest falls reach to 21m (69 ft) and the succession of rapids stretch 9.7 km (6.0 mi) of the river's length. The average discharge of the cataract is nearly 11,000 m3/s (390,000 cu ft/s), with the highest flow on record at over 49,000 m3/s. There is no better place to witness the natural power of the Mekong River.

Surveying the gates at the Leigh Barrier

Working with Atkins and VolkerStevin on behalf of the Environment Agency, KGAL carried out a two-day structural condition survey of the 'Leigh Barrier' gates back in January.

The barrier consists of three large radial gates, installed on the River Medway circa 1980, which are used to protect the downstream towns of Tonbridge and Hildenborough in Kent from flooding during high river flows. These hold water in a man-made bund upstream of the gates, known as the Leigh Flood Storage Area (FSA), which has a capacity of approximately 5.8 million m^3.

The condition survey included taking overall dimensional and metal/paint thickness measurements to the accessible gate structure and built-in parts. Access to all the gates was via a crane-operated man-riding basket and built in access platforms on the outer gates.



Accessing the gates at Leigh Barrier

Watch the Ipswich Tidal Flood Barrier under construction...

Time-lapse video showing the full construction of the Ipswich Tidal Flood Barrier - two years in just a few minutes!

To view this video, please visit : https://tinyurl.com/Fluid-Spring-Summer-2019

"KGAL at the helm have been frankly phenomenal!"

We actively encourage feedback from our clients because we strive to ensure we meet – or, even better, exceed – their expectations, and it is always great to receive positive feedback. Commenting on KGAL's contribution on a recent project of theirs, the Environment Agency said "Over the past few months the [KGAL] team has been amazing, going above and beyond and delivering some really fantastic quality work in very short timescales. As a team they are always willing to discuss options and also share opinions/experiences. We have pulled together and it feels like a well-oiled machine. KGAL at the helm have frankly been phenomenal!"

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EXPOSURE

MEICA Aspects of Dams

Russ Digby and Ken Grubb gave an evening presentation to the British Dam Society at the ICE headquarters in Great George Street, London, on 14th January. Their talk covered many mechanical, electrical and control issues that are directly relevant to the use of gated structures within dams. The lecture was shown live in various BDS national hubs and is also available online to ICE members at *https://www.ice.org.uk/eventarchive/aspects-of-dams-london.*

ICOLD 2019

(9-14 June Ottawa)

Russ Digby and Ken Grubb will be presenting a conference paper at ICOLD 2019 on best practices with respect to procurement of dam protection gates, highlighting how custom and practice has not really kept up with the newer risk-based approach to design and showing how this can be addressed. They will also be available to meet and chat to during the event on the KGAL exhibition stand. Do come along to say hello if you are also there!

Flood & Coast 2019

(18-20 June Telford)

We'll be exhibiting again this year, so please pop by to Stand B11 to say hello.

HYDRO 2019

(14-16 October, Porto)

We'll be exhibiting on Stand 003 at HYDRO 2019 in Porto, Portugal, in October.

See you there!

AFRICA 2019

(2-3 April, Namibia)

We exhibited and presented a paper outlining our work at Kariba Dam in Zimbabwe in early April at Africa 2019, the 3rd regional conference for water storage and hydropower development in Africa, this time held in Windhoek, Namibia.

L to R - KGAL's Dave Griffiths and Nick Crosby with two engineers from Cameroon

Joining the KGAL team...

Gustavo Alfonzo

Senior Engineer based in Wakefield specialising in hydro. Gustavo joined us when he moved from Venezuela to UK in November last year.

Clive Smith

Senior Engineer based on Poole specialising in FEA (finite element analysis). We welcomed Clive to the team in January.

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