



On Thursday and Friday afternoons delegates will be given the choice of attending site visits or technical workshops. Selection of these sessions will be made via an on-line questionnaire that will be emailed to each delegate following successful registration and payment. Places on all sessions are limited and will be allocated on a first come first served basis.

FRIDAY AFTERNOON SESSION

Choose from the following:

- One site visit from a choice of two (S3 & S4)
- or**
- Two technical workshops - one workshop from early afternoon session (F1-F5) **and** one workshop from late afternoon session (F6-F9).

Friday (All Afternoon) - Site Visits	
S3	National Botanic Garden - Regency Restoration Project
S4	Dwr Cymru Welsh Water Reservoir - Usk Reservoir

Friday Early Afternoon - Technical Workshops	
F1	CFD Modelling
F2	Remote Monitoring (Part 1)
F3	Emergency planning, incident management & post-incident reporting (Part 1)
F4	Mechanical and Electrical Aspects of Dams*
F5	Using recent guidance – Floods & Reservoir Safety 4th edition

Friday Late Afternoon - Technical Workshops	
F6	Using recent guidance – Guide to drawdown capacity
F7	Remote Monitoring (Part 2)
F8	Emergency planning, incident management & post-incident reporting (Part 2)
F9	Valves and pipework (with Blackhall Engineering)
F10	Geotechnical aspects of the design, construction and inspection of tailings dams – an introduction

Remote monitoring (Parts 1 & 2) will have different content and delegates do not have to attend both sessions.

Delegates attending the 'Emergency planning, incident management & post-incident reporting' are encouraged to attend both Parts 1 & 2 as the teaching provided in Part 1 will be applied in the scenarios in Part 2.

BRITISH DAM SOCIETY 20th BIENNIAL CONFERENCE – SWANSEA UNIVERSITY**Conference Tour – Friday 14th September 2018****National Botanic Garden of Wales, Middleton: Paradise Regained, Reclaiming a Regency Rarity**

The tour will visit The National Botanic Garden of Wales (the Garden) and its Regency restoration project that is due to commence construction in May 2018. The tour will leave the university at 13:00 and return by 17:00.

The Garden is situated at Llanarthne in the historic Tywi Valley, Carmarthenshire. It is a registered charity and opened to the public in May 2000, as one of three Millennium projects in Wales. The parkland belongs to the historic estate of the Middleton Family, who settled in the area in the late 16th Century. The grounds and gardens at the centre of the estate were formally laid out in the 17th century, but transformed by Sir William Paxton in late 18th century. His grand vision for the estate led to



commission and design a new grand Hall and to create gardens and landscape in an elaborate design of interconnecting lakes, ponds and streams, dams, sluice, bridges and cascades. It is an embodiment of the old and the new, with surviving 18th century features, set alongside the futuristic, iconic single span glass house designed by Foster and Partners. The Great Glasshouse has become an international landmark for Wales and the garden is recognised as a national asset for the people of Wales.



Paxton's landscape fell into disrepair over the course of early 20th century. Today, plans to restore parts of the landscape are commencing. This includes work to be undertaken at two reservoirs namely Llyn Mawr and Llyn Felin Gat. The reconstruction of Llyn Mawr is subject to the provisions of the Reservoirs Act 1975 and the works that are due to be undertaken here will have a Construction Engineer appointed to them. Works included in the reconstruction are repairing the dam, restoring the existing masonry cascade and re-profiling of the silt bed. Llyn

Felin Gat does not come within the ambit of the Reservoirs Act, however the appointed ARPE will, nevertheless, have similar, but non-statutory responsibilities for this reservoir. Work here will include spillway reconstruction and re-profiling of the silt bed.

The proposed construction period for the works is May 2018 to March 2020.

BRITISH DAM SOCIETY 20th BIENNIAL CONFERENCE – SWANSEA UNIVERSITY
Conference Tour – Friday 14th September 2018
Dŵr Cymru Welsh Water- Usk Reservoir

The tour will visit Dŵr Cymru Welsh Water's Usk reservoir and will provide an insight into the Capital Investment programme of works that is currently being undertaken at the reservoir. The tour will leave the university at 13:00 and return by 17:00.



Usk reservoir was completed in 1955 and is located in the Upper Usk Valley, situated in between the counties of Carmarthenshire and Powys. Located in the Beacon Beacons National Park, it is surrounded by the Black Mountain range. It stands at 1,050 feet (320m) above sea level, provides 12.3Mm³ of storage for water supply. Usk reservoir is formed by a 31m-high earth embankment dam and a crest length of 480m, with a clay core wall and a concrete cutoff wall through the foundation. The reservoir has a free overflow spillway, leading to a concrete chute and stilling basin.



In 2014, approximately 60 years after construction, leakage was noted from the spillway chute area. The mass concrete forming the chute had cracked and required refurbishment. Geophysical investigations revealed the possible presence of many voids under the spillway area downstream of the weir and under parts of the chute. Intrusive investigations revealed deterioration in the soft bedrock which was thought to have resulted from leakage past the cutoff wall and groundwater movement under the spillway structure.



The construction works for wide-ranging remedial and improvement works to the spillway structure commenced in early 2017 and include contact, consolidation and curtain grouting, underdrainage provisions and relining of the chute and stilling basin in reinforced concrete. Remedial and improvement works are also planned for the bottom outlet (scour) pipework in 2018.

Workshop Title:	CFD (Computational Fluid Dynamics) Modelling
Workshop No:	F1
Date:	Friday 14 th September
Time:	13:40 – 15:20
Facilitator:	TBC
Technical Lead:	John Chesterton (Mott MacDonald)
Contributors:	Mutlu Ucuncu (Arup)

Reservoir engineers need a general understanding of the requirements and limitations when commissioning physical hydraulic models of spillways and may often become involved in drafting specifications and witness testing. As we see more spillways and other hydraulic structures modelled numerically, there is a need for practitioners to understand the limitations and benefits of these methods as well.

While physical modelling has been well documented and is somewhat intuitive, the requirements and issues encountered in numerical modelling are different and may be difficult to understand without training or good guidance. To manage this process, the engineer needs to understand what constitutes good modelling practice, what to specify to promote this, and what questions should be asked to be satisfied that the required outputs and accuracy are achieved.

The CFD Modelling workshop will showcase tangible examples, describe some of the standard techniques in use today and outline what is considered good practice to ensure accurate modelling. Data extraction and visualisation will be discussed with respect CFD model outputs, such as water levels and velocities, how the data should be managed and understood and how it may be affected by the modelling method employed.

A range of examples taken from UK dams and reservoirs will be used to illustrate some of the current limitations of numerical modelling and its accuracy in predicting various hydraulic phenomena.

Finally, the workshop will provide a forum for discussion around what should be included in a numerical modelling specification, as a preamble to the production of a high level guidance document for practitioners to help them commission CFD modelling, interrogate the model, assess and interpret model outputs.

The workshop will close with a discussion forum that will allow an opportunity for questions and contributions from delegates.

Workshop Title:	Remote Monitoring (Part 1)
Workshop No:	F2 [Content will be different to the Part 2 Workshop, F7]
Date:	Friday 14 th September
Time:	13:40 – 15:20
Facilitator:	Darren Shaw (Arup)
Technical Lead:	Tony Bruggeman (Atkins)
Contributors:	Pam Rigby (United Utilities)
	Nick Slater (ITM Monitoring)
<p>The Remote Monitoring workshop will be presented in two parts during the Friday afternoon session. Delegates can attend one or other, or both.</p> <p>The Part 1 workshop will provide a valuable introduction to this topic, taking an overview of currently available and emerging technologies.</p> <p>Both Remote Monitoring workshops will include presentations by representatives from suppliers of relevant technologies, along with industry technical specialists.</p> <p>Areas covered will include:</p> <ul style="list-style-type: none">• Opportunities and limitations of remote monitoring;• Benefits, challenges and risks associated with the use of remote monitoring for dams and reservoirs;• Automation of data collection;• Barriers to the adoption of remote monitoring for dams and reservoirs.	

Workshop Title:	Emergency planning, incident management & post-incident reporting training
Workshop No:	F3 & F8 (Double Session) Delegates should attend both sessions
Date:	Friday 14 th September
Time:	13:40 – 15:20 & 15:50 – 17:20
Facilitator:	Tony Judge (Scottish Water)
Technical Lead:	David Windsor (Canal and River Trust)
Contributors:	Jon Holland (Stillwater Associates)

This workshop will be divided into the following three parts.

1. The workshop will provide an introduction to On-site (Emergency) Plans and explore the differences between On-site Plans for owners of small, medium and large reservoirs. This will include an overview of the templates available for the development of On-site Plans, with specific examples of a number of On-site Plans for various organisations. There will be a brief discussion around the relationship between On-site and Off-site plans and interactions between key stakeholders.
2. Representatives from several reservoir owners will then discuss their processes for emergency planning/incident management and exercises, either desktop or site-based, that have been completed to date or that they have planned and how the scenarios developed.
3. Attendees will be divided into groups to work through a short reservoir incident exercise, using an On-site Plan provided by the Facilitator. During this exercise assistance and input will be provided by the workshop Facilitator and contributors. A nominee from each group will feed back to the whole workshop on the details of their specific scenario, how the scenario unfolded, and how their group worked through their response to the incident using the On-site Plan.

This will provide an opportunity for open discussion on the contents, preparation and ongoing maintenance of On-site Plans, and application to different sizes of reservoirs and different types of owners.

Workshop Title:	Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) Aspects of Dams
Workshop No:	F4 (Session repeated from Thursday - T4)
Date:	Friday 14 th September
Time:	13:40 – 15:20
Facilitator:	Matthew Hill (Stantec)
Technical Lead:	Russ Digby (KGAL)
Contributors:	Ken Grubb (KGAL);
	Rob Pitt (KGAL)
	Paul Jones (KGAL)

The purpose of this workshop is to share current knowledge and best practice pertaining to the application of MEICA-related equipment to the dams and reservoirs industry. The workshop will be of interest to Inspecting Engineers, Supervising Engineers, Consultants, Clients, Dam Owners and Contractors, providing an improved understanding of the major issues involved in the design, construction, installation, operation and maintenance of MEICA assets such as hydraulic steel structures.

The workshop will cover the following aspects:

- An overview of the main types of MEICA assets deployed in dams;
- Critical information that reservoir engineers should know or be aware of in relation to MEICA assets;
- When and how reservoir engineers should seek expert MEICA advice;
- Examples of specific advice that the MEICA expert can provide;
- Specific risks that reservoir engineers should be aware of associated with MEICA assets;
- Management and maintenance of MEICA assets for long-term reliable operation;
- Life expectancy of MEICA assets;
- Overview of the Reliability Assessment process for MEICA assets.

Workshop Title:	Floods & Reservoir Safety - 4th edition
Workshop No:	F5
Date:	Friday 14 th September 2018
Time:	13:50 – 15:30
Facilitator:	TBC
Technical Lead:	Martin Hewitt (Mott MacDonald)
Contributors:	William Allsop (Independent Consultant)
	TBC

The 4th Edition of “Floods and Reservoir Safety” was published in 2015. The workshop will highlight and discuss the guidance and on-going research since its publication. Topics to be covered will include:

- The launch and use of the FEH13 rainfall depth-duration frequency (ddf) model and ReFH_2 run-off model. Key question: does the FEH13 rainfall ddf model replace the FSR rainfall ddf for 10,000 year return period events? The workshop will include discussion around comparisons with previous models for 1,000 year events.
- Publication of the EuroTop2 Manual for wave overtopping estimates: the EuroTop2 Manual includes refined equations.
- Current research/developments on tolerable overtopping rates: the EuroTop2 Manual suggests all waves below a certain size are tolerable.
- Examples of the use of a risk-based approach.

Workshop Title:	Guide to Drawdown Capacity for Reservoir Safety and Emergency Planning
Workshop No:	F6
Date:	Friday 14 th September
Time:	15:50 – 17:20
Facilitator:	Steven Gledhill (United Utilities)
Technical Lead:	Andy Courtnadge (Jacobs)
Contributors:	TBC

This workshop is aimed at reservoir engineers and Undertakers who may need to assess the drawdown capacity of reservoirs in accordance with the recent guidance published by the Environment Agency in 2017. The workshop will comprise two parts:

- An initial presentation including a worked example, followed by;
- An opportunity for delegates to carry out an assessment themselves with support from the facilitators.

The initial presentation will briefly explain the background and purpose of the guidance, and the basis for how it was developed. This will include the key findings from research carried out in the initial stages of the project. An overview of the guidance will then be presented to explain the main concepts and the recommended approach for determining drawdown capacity and assessing whether it is adequate.

The assessment procedure will be demonstrated using a fictional embankment dam.

In the second part of the workshop, three different examples will be available for delegates to put the procedure into practice for themselves, in relation to either an embankment dam, a concrete gravity dam or a service reservoir. The workshop facilitators will be on hand during this exercise to help advise and support.

The workshop will conclude with a question and answer session and general discussion to summarise the key learning points.

It is recommended that delegates bring a calculator and/or laptop and a copy of the guide.

Workshop Title:	Remote Monitoring (Part 2)
Workshop No:	F7 [Content will be different to the Part 1 Workshop, F2]
Date:	Friday 14 th September
Time:	15:50 – 17:20
Facilitator:	Darren Shaw (Arup)
Technical Lead:	Pam Rigby (United Utilities)
Contributors:	Jon Crowther (Sensor Group)
	Chaz Dixon (Telespazio)
	Richard Robson (Mott MacDonald)

The Remote Monitoring workshop will be presented in two parts during the Friday afternoon session. Delegates can attend one or other, or both.

The Part 2 workshop will focus on specific technologies that can be applied remotely at dams and reservoir sites, exploring the benefits these technologies can bring to improving reservoir safety whilst potentially reducing operating costs and helping to avoid the need for unplanned and costly maintenance or repairs.

Both Remote Monitoring workshops will include presentations by representatives from suppliers of relevant technologies, along with industry technical specialists.

This workshop will include presentations from:

- Telespazio: satellite and radar technologies.
- Sensor Group: intelligent membranes for leakage detection and monitoring.
- Mott MacDonald: thermal imaging for routine surveillance and monitoring.

Workshop Title:	Emergency planning, incident management & post-incident reporting training
Workshop No:	F3 & F8 (Double Session) Delegates should attend both sessions
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Time:	13:40 – 15:20 & 15:50 – 17:20
Facilitator:	Tony Judge (Scottish Water)
Technical Lead:	David Windsor (Canal and River Trust)
Contributors:	Jon Holland (Stillwater Associates)

This workshop will be divided into the following three parts.

1. The workshop will provide an introduction to On-site (Emergency) Plans and explore the differences between On-site Plans for owners of small, medium and large reservoirs. This will include an overview of the templates available for the development of On-site Plans, with specific examples of a number of On-site Plans for various organisations. There will be a brief discussion around the relationship between On-site and Off-site plans and interactions between key stakeholders.
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3. Attendees will be divided into groups to work through a short reservoir incident exercise, using an On-site Plan provided by the Facilitator. During this exercise assistance and input will be provided by the workshop Facilitator and contributors. A nominee from each group will feed back to the whole workshop on the details of their specific scenario, how the scenario unfolded, and how their group worked through their response to the incident using the On-site Plan.

This will provide an opportunity for open discussion on the contents, preparation and ongoing maintenance of On-site Plans, and application to different sizes of reservoirs and different types of owners.

Workshop Title:	Valves & Pipes
Workshop No:	F9 (Session repeated from Thursday – T9)
Date:	Friday 14 th September
Time:	15:50 – 17:20
Facilitator:	Tim Hill (Mott MacDonald)
Technical Lead:	Dave Richmond (Blackhall Engineering)
Contributors:	Blackhall Engineering

Technical input to this workshop will be provided industry specialist suppliers.

Aspects covered will include:

- Introduction to different valve types for dams and reservoirs applications;
- Selection of the correct valve for a particular application;
- Potential pitfalls of using the wrong valve;
- Rehabilitation of old and historic valves in dams;
- Advice on management, testing and maintenance of valves.

This will be a “hands on” workshop providing a practical demonstration of types of valves, how each type works and appropriate applications. There will some sample valves and components available to pass round and examine. Our supplier colleagues will share from their wealth of knowledge and practical experience with both new installations and rehabilitation of old valve systems associated with dams.

This information sharing workshop will include opportunities to discuss issues around reservoir outlet arrangements, providing answers to your specific questions.

Workshop Title:	Geotechnical aspects of the design, construction and inspection of tailings dams – an introduction
Workshop No:	F10
Date:	Friday 14 th September
Time:	15:50 – 17:20
Facilitator:	Rafael Monroy (Wood. plc)
Technical Lead:	Mike Cambridge (Cantab Consulting Ltd)
Contributors:	TBC

This workshop is targeted at reservoir engineers and all stakeholders with an interest both in the safety and stability of storage facilities for fine particulate extractive waste products and the associated geotechnical and regulatory considerations. The workshop will review extractive waste facilities in a UK context and introduce the recently-published European Guidelines and the developing European Standard on the hydraulic transport and storage of extractive waste. The presentation will be in four sessions:

- 1) Introduction to regulatory (statutory) inspections
- 2) Design and construction principles
- 3) Geotechnical characterisation
- 4) Summary

Opportunities for delegates to discuss key regulatory and technical issues raised by the contributors will be provided between each session.

Session 1 will comprise a general introduction to both UK and EU Regulations and to the statutory requirements for competence in design and construction. The presentation will develop the inspection and monitoring requirements in further detail to ensure regulatory compliance of both operating and abandoned mine waste facilities. Delegates will be encouraged to present any examples from their own experience for discussion and consideration.

Session 2 will develop the specific geotechnical considerations involved in the design and construction of a tailings dam, with particular emphasis on the differences between water supply and tailings confining embankments. The key design parameters will be presented with respect to staged construction, to the provision of ongoing storage capacity for both the particulate waste and flood provision, and to emergency planning.

Session 3 will present the geotechnical characterisation of all geomaterials involved in the construction of such facilities and introduce the specialist testing requirements associated with both the confining embankment and the stored materials. The non-standard tests developed for hydraulic fills and scheduled to be included in the Earthworks Standard as a separate part of prEN16907 will be discussed.

Session 4 will summarise the key issues arising from both the presentation and from the question and answer sessions.

A list of key reference documents will be provided