



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.

THURSDAY AFTERNOON SESSION

Choose from the following:

One site visit from a choice of two (S1 & S2)

or

Two technical workshops - one workshop from early afternoon session (T1-T5) **and** one workshop from late afternoon session (T6-T10).

Thursday (All Afternoon) - Site Visits	
S1	Caerphilly Castle
S2	Dwr Cymru Welsh Water Reservoirs - Shon Sheffrey / Rhymney Bridge 2

Thursday Early Afternoon - Technical Workshops	
T1	Geophysical Investigations for Reservoir Safety Assessments
T2	Flood Storage Reservoirs - Design Aspects
T3	Concrete Dam Lessons
T4	Mechanical and Electrical Aspects of Dams*
T5	Innovative technologies for improving the management of dams etc

Thursday Late Afternoon - Technical Workshops	
T6	Reservoir Safety Advisory Group - Past, present and future
T7	Managing Reservoir Confined Spaces
T8	Reservoir Discontinuance
T9	Valves and pipework (with Glenfield Valves)
T10	SE application guidance / S12 report writing

BRITISH DAM SOCIETY 20th BIENNIAL CONFERENCE – SWANSEA UNIVERSITY
Conference Tour – Thursday 13th September 2018
Caerphilly Castle Moats

The tour will visit Caerphilly Castle and its extensive medieval moat system which form two of the oldest reservoirs in the country. The tour will leave the university at 13:00 and return by 17:00.



Caerphilly Castle is the second largest castle in the whole of the UK and is situated in the heart of Caerphilly town centre. Its moats are held back by dams of masonry and earthwork construction and have been described by prominent historians as "the most elaborate water defences in all Britain". The castle was constructed by Gilbert de Clare in the 13th Century, as part of the Anglo-Norman campaign to conquer south Wales in the face of extensive resistance by the native Welsh rulers.

The condition of the castle declined during the Tudor period, and by the mid-16th Century had fallen into disrepair, with the moats having drained away leaving marshland in their place.

The moats were reflooded as part of substantial restoration works in the 1950s and 60s, but at that time it was not recognised that they fell under the ambit of the Reservoir (Safety Provisions) Act. This was remedied in 2000 and a Construction Engineer was appointed to oversee additional works to ensure the safety of the reservoirs, with a Final Certificate issued under the new Act in 2005.

Remedial measures have been required in recent years, which have included two phases of drill and grout works to remediate increased leakages through the northern embankment, and associated subsidence.





Today, the castle and moat system are operated by Cadw, Welsh Government's heritage body. The Inner Moat has a volume of approximately 75,000m³. The Outer Moat has a volume in excess of 10,000m³, and has recently been registered as a High Risk Reservoir in its own right, following amendments to the Reservoirs Act in Wales.

BRITISH DAM SOCIETY 20th BIENNIAL CONFERENCE – SWANSEA UNIVERSITY**Conference Tour – Thursday 13th September 2018****Dwr Cymru Welsh Water - Shon Sheffrey and Rhymney Bridge Reservoirs**

The tour will take in three Earth embankment retained reservoirs with two, Rhymney Bridge 1 and 2, being at the head of the Rhymney valley and Shon Sheffrey at the head of the Sirhowy valley, South Wales. The reservoirs are interlinked as a raw water resource by pipelines and can also receive waters indirectly from the Carno reservoirs further along the A465 Heads of the Valleys road. The tour will leave the university at 13:00 and return by 17:00

Shon Sheffrey reservoir, completed in 1896 with an overflow level 1.8m lower than the present level, was built to supply the Tredegar area. The dam crest and overflow level were raised in 1945–48. The reservoir is impounded by an earthfill embankment dam about 260m long, with puddle clay core. Most of the dam is straight, but a short length at either end is angled upstream. The overflow weir, together with an auxiliary spillway, are located at the right (south) abutment. The wet-well valve shaft is located within the upstream shoulder just upstream of the crest towards the right end of the main section of the embankment and discharges via pipework passing through a tunnel that is plugged in line with the core of the dam. The longest axis of the reservoir, which is about 500m long and 250m wide, is oriented approximately northwest to southeast, with the dam at the southeast end.

Recent improvement works at the reservoir have consisted of a new RC concrete spillway with Labyrinth weir to accommodate the PMF. Renewal of the draw-off pipework and valves within the wet-well shaft. Pressure grout curtain along the line of the core of the dam to tackle seepage through the core and along the side of the spillway interface.



Figures 1& 2. New Spillway and Labyrinth Weir at Shon Sheffrey Reservoir

Rhymney Bridge 1 and 2 reservoirs are Pennine type dams that are in cascade along the river valley of the Rhymney sitting just north of the A465 Heads of the Valleys road. The N° 1 reservoir was built by the Rhymney Coal and Iron Company in about 1860. In 1901, the company completed construction of the N° 2 reservoir a short distance downstream. Following this the direct supply from the N° 1 reservoir was taken out of service with flows being released down the stream to the N° 2 reservoir instead. In 1921 the reservoirs were transferred to the Rhymney Valley Water Board and later on to Dwr Cymru Welsh Water.

In 2013 the spillway at Rhymney Bridge 2 reservoir failed due to uplift pressures following a storm event. Emergency repairs were carried out at the time and more recently permanent repairs have been undertaken. These have included a new reinforced concrete spillway at and grouting works to stem seepage, as well as the refurbishment of the batter valve (Penstock) at Rhymney N° 1.



Figure 3. Ariel Photo of Rhymney Bridge No.1 & 2



Figure 4. New Spillway at Rhymney Bridge No2



Figure 5. Refurbished Batter Valve at Rhymney Bridge No1

Workshop Title:	Geophysical Investigations for Reservoir Safety Assessments
Workshop No:	T1
Date:	Thursday 13 th September
Time:	13:50 – 15:30
Facilitator:	TBC
Technical Lead:	Martin Hewitt (Mott MacDonald)
Contributors:	Alasdair Walker (Mott MacDonald)

In 2017 the Environment Agency in collaboration with the British Dam Society commissioned research into “Geophysical methods for reservoir safety investigations”. One of the findings from that research was that many geophysical survey methods are well-researched and long-established as cost-effective alternatives to traditional investigation techniques, but have yet to be adopted commercially on a significant scale. The research paper concluded that there is a need to bridge this apparent gap in knowledge and understanding of reservoir engineers.

A key objective of this workshop is to promote greater awareness within the dams and reservoirs community of the available geophysical investigation techniques and how and in what circumstances they can be used.

The workshop will be split into three parts:

- Presentation and explanation of available geophysical techniques;
- Case studies, based on papers being presented at the Conference;
- Discussion, including Q&A with a panel of industry specialists.

Workshop Title:	Design Aspects of Flood Storage Reservoirs
Workshop No:	T2
Date:	Thursday 13 th September
Time:	13:50 – 15:30
Facilitator:	Jon Holland (Stillwater Associates)
Technical Lead:	James Penman (Mott MacDonald)
Contributors:	Alan Brown (Stillwater Associates)
	David Neeve (Arup)

A number of flood storage reservoirs have been designed and constructed in recent years, for the Environment Agency, local councils and private developers.

This workshop will look at the key aspects of design of flood storage reservoir embankments, discussing best practice and available guidance.

The key elements presented, and for discussion at the workshop, will be:

- Embankment design
- Interpretation of FRSv4 for spillway design
- Spillway arrangement / reinforcement
- Stilling basins
- Control structures
- Culverts
- Trash screens, security grilles and log posts
- Requirements for auxiliary drawdown
- Future maintenance aspects
- Protection against burrowing animals
- Instrumentation and telemetry

Workshop Title:	Concrete Dam Lessons
Workshop No:	T3
Date:	Thursday 13 th September
Time:	13:50 – 15:30
Facilitator:	Dave Cook (Arup)
Technical Lead:	Peter Mason (Stantec)
Contributors:	Stuart King (SSE);
	Tony Morison (Jacobs)

The workshop will consist of a technical presentation of:

- The types of concrete dams in the UK;
- Fundamental design principles and assumptions;
- The essential inspection and monitoring requirements for concrete dams with some examples;

The presentation will also include a focus on Alkali Aggregate Reaction, how to recognise it, monitor it and the implications for the structure.

This workshop will be relevant to all reservoir engineers, noting that spillway headworks can also be concrete dams in their own right, and many of the principles of concrete dams will apply.

Workshop Title:	Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) Aspects of Dams
Workshop No:	T4 (Session repeated on Friday - F4)
Date:	Thursday 13 th September
Time:	13:50 – 15:30
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:	Innovative technologies for improving the management of dams and reservoirs
Workshop No:	T5
Date:	Thursday 13 th September
Time:	13:50 – 15:30
Facilitator:	Werner Delport (Atkins)
Technical Lead:	TBC
Contributors:	TBC
<p>External suppliers and manufacturers will be invited to showcase various new products and technologies designed to improve the management of dams and reservoirs.</p> <p>Short presentations will be given by each supplier followed by open forum which will allow an opportunity for questions and contributions from delegates.</p> <p>Details of those companies already confirmed for this workshop are as follows:</p> <p>Bibby HydroMap – Advanced acoustic and laser survey techniques</p> <p>Telespazio Vega UK Ltd. – Satellite technologies for dam structural health monitoring</p> <p>MOBA (Mobile Automation) – Automated roller compaction including full reporting systems to reduce conventional compaction testing methods.</p> <p>British Geological Survey (in collaboration with ITM Monitoring) - Proactive Infrastructure Monitoring and Evaluation (PRIME): remote condition monitoring of earth dams using a novel low-power autonomous ground imaging system</p> <p>Drone Major Group – Advancements in relevant areas of the drone industry and how such technologies could be applied to dams.</p>	

Workshop Title:	Reservoir Safety Advisory Group <i>'Come & shape the future of reservoir safety research in the UK'</i>
Workshop No:	T6
Date:	Thursday 13 th September
Time:	16:00 – 17:30
Facilitator:	Tracey Williamson (Arup)
Technical Lead:	Chrissy Mitchell (Environment Agency)
Contributors:	TBC
<p>The Reservoir Safety Advisory Group (RSAG) oversees a programme of research and development that helps target current and anticipated future industry requirements. The Group focuses on the following key areas:</p> <ul style="list-style-type: none"> • System behaviour – <i>Threats, Deterioration, Operations, Monitoring</i> • Planning and design – <i>Investigations, Repairs, Maintenance, Construction</i> • Societal impact – <i>Risks and Hazards, Tolerability, Safety, Emergency Planning</i> <p>This session will provide an oversight of past work already available for you to apply and take a look at what's currently underway. Now we need your help to identify what's important to you.</p> <p>At this important workshop, you can help to influence the direction of dam and reservoir R&D.</p> <p>Specific Aims of the Workshop:</p> <ol style="list-style-type: none"> 1. To improve engagement with future R&D undertakers and users, raising awareness and advising how to best engage with RSAG and when; 2. To highlight recent developments and how they are applied; 3. To ensure R&D of the future is targeted and applicable to user needs, building on areas of concern or recognised potential needs. 	

Workshop Title:	Managing Reservoir Confined Spaces
Workshop No:	T7
Date:	Thursday 13 th September
Time:	16:00 - 17:30
Facilitator:	Sam Tudor (DCWW)
Technical Lead:	TBC
Contributors:	TBC
<p>Many of the dams we operate, inspect, or visit include elements that are, or could become, confined spaces. The existence of confined spaces in most cases is known and managed. But what about those times when it's not clear if there is a confined space? And what do you do when you arrive on site faced with the unexpected potential of a confined space, without the equipment or resources to implement a safe system of work?</p> <p>This workshop will start with a brief introduction to, and discussion around, when a space is a confined space, and measures that can be taken to manage the hazard.</p> <p>The next part of the workshop will consider design aspects of dams and appurtenant works, focusing on elements often required within dams, inviting open discussion around approaches that can avoid the creation of a confined space, or minimise the need for or frequency of accessing existing confined spaces.</p> <p>Finally, the workshop will introduce existing or emerging technologies that could be considered, either as part of designing new works, where the confined space cannot be designed out, or in existing structures where a confined space exists and inspections or physical works need to be carried out.</p> <ul style="list-style-type: none">• Can we make more use of CCTV, and is this an acceptable option to be designed into new structures, and can it, at least to some extent, substitute physical inspection?• Are there other remote sensing technologies that we should be using more, as part of new designs, or within existing situations?• To what extent is remotely operated equipment acceptable for carrying out inspections, and what are the other risks and disadvantages of using it?• Do the opportunities exist for using drones for inspections?• Is there or could there be the potential for artificial intelligence to be used, and how would we build confidence in this type of approach – for inspections? - for carrying out physical works?• Are there lessons we can learn from other industries, such as the offshore oil or nuclear industries? <p>It is recognised that new work is needed in terms of researching, developing and documenting improved and new approaches and practices. It is the intention of this workshop to stimulate and capture new thinking and ideas which can kick-start an updated review of confined space best practice, with a specific focus on dams.</p>	

Workshop Title:	Reservoir Discontinuance
Workshop No:	T8
Date:	Thursday 13 th September
Time:	16:00 – 17:30
Facilitator:	Mark Acford (Environment Agency)
Technical Lead:	Tom Wanner (Atkins)
Contributors:	Graham Clarke (Atkins)
<p>The workshop will provide an overview of the process of reservoir discontinuance in accordance with the Reservoirs Act 1975. The practical application will be presented using a range of case studies and will include the general engineering associated with discontinuance, along with the advantageous and disadvantages, challenges and lessons learned.</p> <p>Areas of discussion will include:</p> <ul style="list-style-type: none">• stakeholder involvement;• required permits/licences;• river geomorphology;• downstream flood risk;• site access constraints;• material reuse;• Future management and maintenance. <p>Case studies presented will include sites that have subsequently been revisited to monitor how works have developed and performed over time.</p>	

Workshop Title:	Valves & Pipes
Workshop No:	T9 (Session repeated on Friday – F9)
Date:	Thursday 13 th September
Time:	16:00 – 17:30
Facilitator:	Tim Hill (Mott MacDonald)
Technical Lead:	Greg Morris (Glenfield Valves Ltd)
Contributors:	Glenfield Valves Ltd

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

Aspects covered will be:

- 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.

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:	Guidance on Application and Re-applications to the SE Panel; Writing SE Annual Statements and Reports
Workshop No:	T10
Date:	Thursday 13 th September
Time:	16:00 – 17:30
Facilitator:	Rachel Pether (Black & Veatch)
Technical Lead:	Robert Mann (AECOM)
Contributors:	A trainee Supervising Engineer will also contribute

This workshop will be led by an experienced Supervising Engineer and members of the ICE Reservoirs Committee.

There will be a short presentation recapping on the procedures for making applications to the Supervising Engineer Panel, followed by guidance to assist candidates in writing successful applications and interview preparation, followed by a Q&A session.

Attendees will then be encouraged to participate actively in an open workshop on writing Supervising Engineer Annual Statements and reports under both the Reservoirs Act 1975 and Reservoirs (Scotland) Act 2011. Example statements and reports will be provided by the technical leads, and there will be discussion to share good practice, tips and techniques.