

Yearbook 2021





Chair's Introduction

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Welcome to the first British Dam Society (BDS) Yearbook. I'm sure the arrival of this new publication has been a surprise to many of you and hopefully it will be an enjoyable complement to our journal, Dams & Reservoirs.

This new publication, which we hope will in future be published at the end of each calendar year, has been developed for the following reasons:

- Our journal, Dams & Reservoirs, has been a mixture of technical papers, event articles, the gallimaufry, Corporate Member profiles and occasional individual member stories. In order to provide more opportunities for technical papers, the BDS committee has decided to remove all the magazine-style features and focus Dam & Reservoirs on technical papers in line with other journals published by learned societies and the Institution of Civil Engineers. This will increase the technical content of our journal and provide more authors, including our young professionals, the opportunity to publish their work.
- This new Yearbook will provide the BDS with an opportunity to showcase some of the work that it does within its working groups together with a number of articles that don't naturally sit within the scope of our journal, Dams & Reservoirs. This will help you to understand how we work and how you can assist with the running of the BDS, either by standing for the Committee or in one of the other ways that we have identified in this Yearbook.
- Our new Yearbook will provide our members with an opportunity to discover more about our Corporate Members. As you will see towards the rear of this publication, some of our Corporate Members have provided details of projects that they have been working on during 2021. If any of these projects interest you, then do get in contact with the respective Corporate Member using the contact details provided. The intention is that different projects will be showcased each year, and we have been assured that more Corporate Members will be able to provide details of their projects next year.

This year has been rather eventful for the BDS and the reservoir safety industry in many ways. The ongoing and ever-changing restrictions caused by Covid-19 have meant that once again many of our usual activities have either been prevented or had to be run remotely. The committee has adapted well to these difficult conditions and is always looking at new ways to ensure that learning opportunities are provided whenever possible. Many of us did manage to meet in person at the Supervising Engineers' Forum at the University of Nottingham in September, which was well received by those attending, however, sadly this was one of only two physical events held in 2021.

"Fifteen recommendations were made in the Balmforth Report which will give us much to discuss and contribute to in the next few years, and you can be assured that the BDS will help facilitate such discussions and provide input where necessary."

The publication of the Balmforth Report was probably the talking point of the year within the reservoir safety industry. Fifteen recommendations were made in the report which will give us much to discuss and contribute to in the next few years, and you can be assured that the BDS will help facilitate such discussions and provide input where necessary.

We do hope that you enjoy the first Yearbook. We will develop the content of future editions, so if you have any comments about this current issue, or have suggestions for additional content for the 2022 BDS Yearbook then please do contact the publications editor Andrew Pepper (editor@britishdams.org) to discuss your ideas.

David Littlemore
BDS Chair



Meet your BDS Committee

The BDS is governed by a main committee that consists of elected and nominated members and comprises:

- Chair and Vice Chair (two-year term)
- Honorary Officers – Technical Secretary; Website Manager; Dams & Reservoirs Editor; YP Chair
- Up to 12 elected members (three-year term)
- Up to three members nominated by the BDS chair (two-year term)
- The YP Chair is supported by three elected YP members who make up the YP Committee.

In early 2022 there will be an opportunity for BDS members to join the committee as an elected committee member. If you are interested in joining the BDS committee and contributing to the running of the BDS further information will be issued once nominations are open.



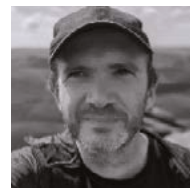
David Littlemore
BDS Chair



Rachel Davies
BDS Vice Chair



Alan Warren
Past Chair



Andrew Thompson
Technical Secretary



Andrew Pepper
Dams & Reservoirs Editor



Rhys Coombs
Website Manager



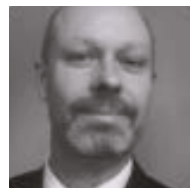
Kyle McLean
YP Chair



Roger Lewis
Informing Opinion WG Lead



Stephen Lockett
Professional Institute Liaison



Paul Marsden
Social Media



Barry Dooley
Knowledge WG Lead



Rachel Pether
Knowledge Database



Darren Shaw
Professionalism
Lead / Evening Meetings



Stephen Cavanagh
Technical Site Visits /
Regional Meetings



John Foster
SE Forum 2021



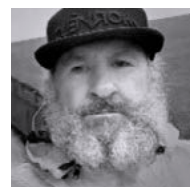
Chris Smith
Education WG Lead



Matt Coombs
Competitions



Natalie Bennett
School Liaison



Dougie Scott
University Liaison



Martin Airey
Reservoirs Committee



Lucy Monkhouse
YP Events



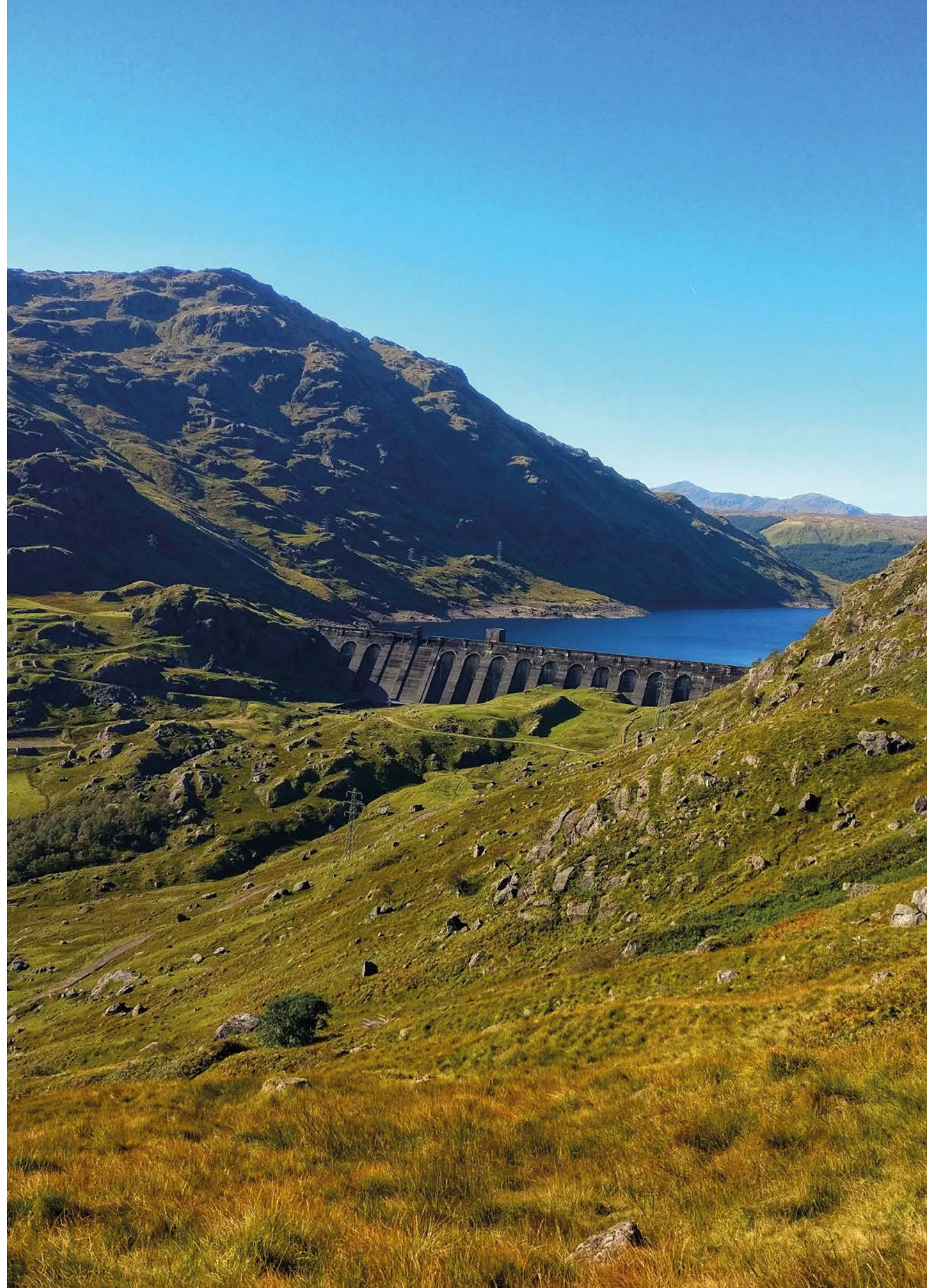
Michael Calder
YP Mentoring



Xavier Bradley
YP Social Media

The BDS committee is made up of the following strategic objective working groups:

- Informing Opinion
- Knowledge
- Education
- Professionalism
- Membership
- Young Professionals



BDS Events Summary 2021

During 2021, the BDS hosted six evening technical meetings and the one-day Supervising Engineers' Forum. A summary of the events is provided below. All of the events were recorded and are available to Listen Again on the BDS website (britishdams.org/meetings-and-events/listen-again).

Monday 11th January 2021 (online only)

The use of dam break risk curves to optimise an ALARP assessment

Hermann Stehle, Jon Holland, Tom Wanner (Stillwater Associates Ltd); Rhys Coombs (CC Hydrodynamics)

An ALARP study was undertaken to determine proportionate reservoir safety improvement works at the Category A Buckshole Reservoir in Hastings, East Sussex. The study examined a range of flood events to develop risk curves associated with the estimated likely loss of life and property damage resulting from dam failure. These were then used to determine the most appropriate level of reservoir safety works giving an improved outcome in terms of reduction in risk and the cost to the reservoir owner.

Monday 1st March 2021 (online only)

Spillway design and inspection – some practical guidance

Dr Peter J Mason (Stantec)

The presentation outlined the hydraulic and other factors needed for the sound design of spillway chutes. It focussed mostly on concrete chutes and on both rock and soil foundations. It also touched briefly on stepped masonry chutes and on the selection of terminal, energy dissipation structures. Some guidance was provided on inspection and maintenance aspects.

Monday 26th April 2021 (online only)

Emergency Planning for Reservoirs

Jan Kiernan (Defra) & Tony Deakin (Environment Agency), Sam Harris & Ian Hope (Severn Trent Water), Matt Coombs & Jo Parkinson (Natural Resources Wales)

The first presentation covered On-Site Emergency Flood Plans – The New Requirements in England. In the second section, Severn Trent described Exercise Vander Mill and lessons learnt on the organisation and running of an On-Site Plan Exercise at Ladybower Reservoir in 2019. The final presentation, Reservoir Emergencies: Planning, Review and Response, covered NRW's experiences in emergency planning and preparations.

Monday 12th July 2021 (Online only)

The Development of the London Storage Reservoir System – an Historical View

Bryn Philpott (Thames Water)

The presentation discussed the key events and some of the early proposals from the Victorian era to supply water to London. This will be followed by a look at the planning and implementation of the programme for the construction of London storage reservoir system.

Thursday 16th September 2021 (in person at the University of Nottingham)

Supervising Engineers' Forum

Session 1: Application of legislation
Session 2: On-site plans – application and guidance
Session 3: Incidents and lessons learned
Session 4: Future of Supervising Engineers

Further details on the forum can be found on page 28.

Monday 4th October 2021 (One Great George Street and online)

Independent Reservoir Safety Review

Professor David Balmforth

The presentation covered the work undertaken for HM Government to review the safety of reservoirs in England. It set out the approach to the review and the assessment of the current safety management process and the role of various stakeholders. Professor Balmforth explained how he arrived at his conclusions and why he made the recommendations he made.

Monday 22nd November 2021 (One Great George Street and online)

Hydropower Extension Projects at Tarbela Dam, Pakistan

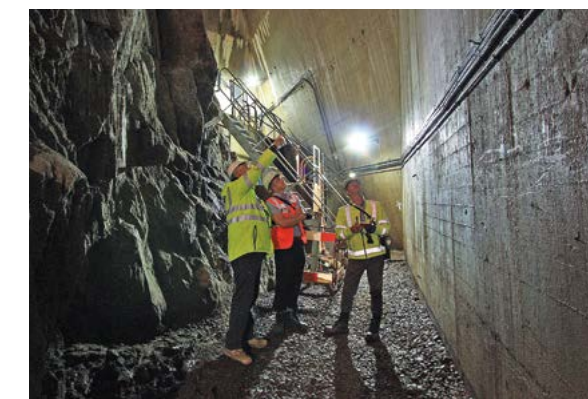
Brian B Darling, Mark D Gill, Gonzalo Montilla Castro (Mott MacDonald)

Tarbela Dam on the River Indus was commissioned in the mid-1970s primarily as a water resource reservoir for irrigation and was at that time the largest rock and earth-fill dam in the world. The presenters discussed the arrangement for the 5th Extension Hydropower Project, ongoing sediment management, construction challenges and how physical and CFD models were used to confirm the operability of the tailrace culvert and canal system whilst ensuring the safety of the existing spillway plunge pools.

BDS Event Planner 2022

Throughout the year we host a number of evening talks, competitions, site visits and other networking activities for our members.

For 2022 the main event being the 21st BDS conference at Nottingham University in September. We also offer local hubs across the country to allow members to virtually join our evening talks and meet with fellow members from your region. Finally our Young Person Group offer networking and CPD opportunities.



Coming up in 2022



Dates for your diary

January	<ul style="list-style-type: none"> London evening meeting (10th January). BDS Prize Competition – opportunity for younger BDS members to present papers they have submitted and end the evening with a cash prize and prestige of becoming the 2021 BDS Prize winner
February & March	<ul style="list-style-type: none"> Site visits to be held at various locations across the country, Covid-19 restrictions permitting London evening meeting (7th March) on Post-Toddbrook Guidance Documents. Regional Hubs will be available DEADLINE for the Committee nominations (1st March) – this year there are four positions available on the main BDS committee
April	<ul style="list-style-type: none"> Annual General Meeting followed by the BDS international lecture (25th April) with regional Hubs available. This lecture is held every two years with a focus on dam engineering internationally.
May	<ul style="list-style-type: none"> DEADLINE for Conference Papers – Last day to submit your paper and be part of the BDS 21st Conference at Nottingham ICOLD 27th Congress in Marseille, France (27th May – 3rd June 2022)
June & July	<ul style="list-style-type: none"> Site Visits to be held at various sites across the country London evening meeting (11th July) on the CIRIA Siphons Guide. Regional Hubs will be available
August	<ul style="list-style-type: none"> Registration for the conference will close in mid-August – book early to avoid disappointment!
September	<ul style="list-style-type: none"> BDS 21st Conference at Nottingham University (14th-17th September) Bateman Award is also presented for the best paper published between conferences.
October	<ul style="list-style-type: none"> London evening meeting (3rd October) on PMP/PMF Determination. Regional Hubs will be available DEADLINE for BDS Photo Competition
November	<ul style="list-style-type: none"> London evening meeting (22nd November) with regional Hubs available. This evening meeting includes the results of the BDS Photo Competition.
December	<ul style="list-style-type: none"> DEADLINE for expressions of interest for the posts of BDS Chair and BDS Vice-Chair 2023-2025

Informing Opinion Strategic Objective Working Group

The group comprises:

Roger Lewis Informing opinion lead

Stephen Lockett Professional institution liaison

Paul Marsden and Xavier Bradley Social media

We have five active initiatives based on the current Action Plan for 2021:

1. Improve and increase the use of Social Media

There is a slow but steady user growth in use across all BDS social media platforms. Paul Marsden and Xavier Bradley are considering improvements to the BDS LinkedIn page. Social media is here to stay, and we would encourage BDS members to engage with the various platforms, as a forum for sharing useful and interesting information. More details about these platforms are given on page 19.

2. Improve our links with Government organisations

The BDS continues to engage with Government organisations on behalf of our members. We publicise announcements and guidance on the website. For example, we published a link to NRW's position statement on the timing of first inspections for newly registered small raised reservoirs. Recently we published an announcement about the new reservoir engineer panels and fees in England and Wales. SEPA, NRW, EA and Defra were all represented at the successful SE forum at Nottingham university on 16th September, providing regulatory updates.

Following on from the 'Emergency Planning for Reservoirs' seminar on 26th April, we collaborated with Defra and the Environment Agency to produce 'questions and answers', arising from Defra's legal Direction for on-site emergency flood plans issued on 22nd April. Discussions continued at the SE forum and will continue to do so, as we all seek to comply with the requirements of the Direction.

Both at the SE forum and at an evening meeting on 4th October, Professor David Balmforth has given presentations about his Part B Independent Reservoir Safety Review. BDS members are continuing to contribute to six reservoir industry guidance documents being produced in response to the Part A Report. The new guidance is due to be published in the first quarter of 2022.

3. Engage with other professional institutions, expert panels and learned societies

Stephen Lockett continues to monitor and provide information that may be of interest to BDS members on events run by other bodies, for advertisement on the BDS website and social media. He has represented the BDS at the ICE CoP (Community of Practice) Water & Sanitation CAB (Community Advisory Board). As part of this involvement, he submitted a response to the Cabinet Office's call for evidence for the National Resilience Strategy.

Future issues to consider are how the BDS wishes to contribute to capital carbon reduction initiatives and a Community of Practice network.

Stephen has also been working with the Water Industry Forum to produce a Water Sector Associations Calendar of events that could be shared on the BDS website.

4. Engage with the media

The BDS media account continues to receive occasional approaches, which are fielded by David Littlemore and Natalie Bennett, the BDS media lead. Natalie has contacted Rob Bell at Channel 5 to offer BDS advice for any relevant upcoming programmes on engineering. Al Jazeera TV approached us for an interview about the Grand Ethiopian Renaissance Dam (GERD). We declined the request as being potentially too politically controversial. Rather obscurely, BriteSpark films approached us for an American civil engineering expert based in London to take part in a documentary about engineering catastrophes.

5. Improve the education of the public on dam safety with positive messages

In the run-up to the centenary in 2025 of the Dolgarrog and Skelmorlie dam disasters, we are looking to strengthen our links to the local communities, so that we can give positive messages and improve public understanding of the important reservoir safety work that our members do. We already have good links

to Dolgarrog Community Council, who maintain their disaster memorial site. Steven Morris and Alun Davies are our local contacts. The BDS contributes £300 a year towards the cost of site maintenance.

During the summer, the Dolgarrog memorial site was cleared and tidied, using our contribution. The rotten wood at the viewing point area has been replaced with galvanised steel. Steven Morris has reported that the pathways and features are in good condition.

We are considering the idea of a plaque or some other way of commemorating the 1925 Skelmorlie dam disaster. We hope to visit the dam site in 2022 with local contacts, to explore the possibilities.

"We are looking to strengthen our links to the local communities, so that we can give positive messages and improve public understanding of the important reservoir safety work that our members do."





Knowledge Strategic Objective Working Group

The Knowledge SOWG has been created with the primary goal of promoting knowledge sharing, learning and development amongst the BDS membership. The SOWG is focussed on publicising emerging UK best practice, guidance and research. This SOWG co-ordinates the process for appointing the UK's representatives to ICOLD and is responsible for managing publications including the quarterly BDS Dams & Reservoirs Journal and the annual BDS Yearbook.

The group currently has three members. Barry Dooley (Stantec) is the SOWG Lead, responsible for co-ordinating Technical Committee representative appointments to ICOLD and maintenance of the ReSRAG theme webpages. Andrew Pepper (Independent) is the editor for the Dams & Reservoirs Journal & BDS Yearbook. Rachel Pether (Binnies) is leading the Great British Dams Initiative and until recently was the interim editor of the Dams & Reservoirs Journal.

The Knowledge SOWG has five active initiatives:

1. Populate and update the ReSRAG theme pages

Eight ReSRAG theme webpages were launched in December 2020. The webpages are reviewed and updated annually, with updates to relevant UK guidance, ICOLD bulletins and BDS resources. Updates to research against the relevant themes is provided.

2. Maintain four issues per year of Dams & Reservoirs Journal

Four issues of the Dams & Reservoir journal were published in 2021. Additionally, the BDS Yearbook has been developed to facilitate transition towards the Dams & Reservoir Journal focussing entirely on technical papers with more administrative and 'in-house' matters to be communicated via monthly newsletter and the new BDS Yearbook.

3. Prepare 'Great British Dams' information for inclusion on BDS website

This initiative will create webpages which showcase a selection of UK dams which have unique or distinguishing features and are therefore likely of interest to BDS members. A shortlist of dams has been produced and a prototype profile for Rutland Water reservoir is being developed with the support of Anglian Water. Other relevant dam owners will be contacted in order to seek support for the initiative in the coming year.

4. Co-ordinate update of Bibliography of BDS papers

Work to update the Bibliography of BDS papers published in the Dams & Reservoirs Journal and from conference proceedings has now been completed by Paul Tedd. The bibliography is now available on the members' section of the BDS website.



How can you help?

The knowledge SOWG relies upon a consistent flow of knowledge which can be shared amongst the membership. Regular updates from TC representatives to ICOLD and ReSRAG theme leads are valuable, allowing us to keep the ReSRAG theme pages current and relevant.

We will also soon be requesting support from specific reservoirs owners as we seek to progress the Great British Dam Initiative so please offer what support you can.

The Dams & Reservoirs Journal continues to provide a valuable resource and depends upon continuing contributions from the membership. We ask that members continue to submit papers for publication into the future.

Committee Members & Roles

Barry Dooley Knowledge Lead

Rachel Pether Knowledge Database

Andrew Pepper Editor, Dams & Reservoirs



Education Strategic Objective Working Group

The goal of the Education SOWG is to enthuse the next generation of dam engineers and technicians.

Current Activities and Progress:

1. Increase the use of BDS teaching resources in schools.

The use of teaching materials to help schools are available within the Education Zone on the BDS Website. Over the last year there has been a steady increase in the material being downloaded from the website.

2. Increase engagement working with Arkwright Scholarship students & schools.

The committee have sponsored two students through the Arkwright Scholarship in September 2020 and again in 2021.

3. Increase awareness of dam engineering in universities and colleges.

Presentations have been made to universities and also we have undertaken site visits to reservoirs with university students as well.

4. Running competitions for the existing British Dam Society members.

Three competitions continue to be run; the Photo Prize, the BDS Prize and the Bateman Prize.

Committee Members & Roles

Chris Smith Education Lead

Natalie Bennett Schools Liaison

Matt Coombs Competitions

Dougie Scott University Liaison & Student Research

Michael Calder Young Person Media Champion

How can you help

The group would welcome assistance and help and it would be great to get other ideas in which we can inspire people into dam engineering.

We have a few competitions which are run and it would be brilliant to have a greater number of submissions for each. It would also be great if you could help to inspire others to take an active involvement.

If you are in contact with universities and they are interested in dam engineering please discuss with us so that we can explore further opportunities to inform and inspire engineers and technicians of the future.





Professionalism Strategic Objective Working Group

The Professionalism group currently has four members:

Darren Shaw (Arup) is the SOWG Lead and co-ordinates evening technical events.

John Foster (Mott Macdonald) organised the very successful 2021 SE Forum.

Stephen Cavanagh (Binnies) is responsible for the regional hubs and site visits.

Lucy Monkhouse (Canal and River Trust) is the Young Professionals representative in the group and co-ordinates YP events.

The SOWG has five key initiatives. Progress in 2021 against these and plans for 2022 are summarised below:

1. Improve attendance at BDS technical meetings and improve the quality and diversity of presentations

We have had a successful series of events in 2021 with a move in October to return to face-to-face events at the ICE Building in London. All the events this year were recorded and are available on the 'Listen Again' pages of the BDS website britishdams.org/meetings-and-events/listen-again. The programme for 2022 has been planned and the events can all be seen on the BDS Events page britishdams.org/meetings-and-events/events-calendar. The ICE has moved to a new online system for live streaming of events and we encourage you all to register in advance.

The regional hubs have not been possible for nearly two years now. These were well attended pre-COVID and offered a valuable networking experience for our members around the UK. We are keen to reintroduce these as soon as restrictions and hosting offices allow. Plans are in progress for restarting the hubs in 2022.

2. Increase the number of site visits

Due to COVID, organised site visits have not been possible over the last year. However, discussions are ongoing with a number of different owners to put together a programme of visits for 2022. As soon as we have details we will let the membership know.

3. Maintain attendance at SE/IE Forums and BDS Conferences

The SE Forum was held at the University of Nottingham on 16th September 2021. All the sessions were recorded and are now available on the 'Listen Again' pages of the BDS website britishdams.org/meetings-and-events/listen-again. A full write-up of the event can be found on page 28.

The committee is now starting preparations for the 2022 conference which will be held again at the University of Nottingham between the 14th and 17th September 2022. A call for papers has been issued and further details for the conference will be provided next year.



4. Improve the 'events' area on the BDS Website

The Events page has been updated to include a number of other events which may be of interest to the BDS membership but are hosted by other organisations and learned societies.

5. Newsletter

The SOWG provides regular updates to the membership through the monthly newsletter on all forthcoming events.

How can you help?

The main purpose of the Professionalism SOWG is to organise the membership-facing activities. These events rely on contributions from the membership in terms of providing presentations and assisting with content for the SE Forum and Conference. If you are willing to present on any particular dams and reservoirs-related topic then please get in touch with Darren Shaw.

2021 Technical Evening Events

Last year we have held six technical events with two of these as face-to-face events in One Great George Street. Topics this year have covered:

- Dam Break Risk Curves and ALARP assessments**
- Inspection of and Defects in Concrete Spillways**
- Emergency Planning for Reservoirs**
- The History and Development of the London Storage Reservoir System**
- Prof. David Balmforth's Reservoir Industry Review**
- The Tarbela Hydropower Project in Pakistan.**

All of the events this year were recorded and are available on the 'Listen Again' pages of the BDS website britishdams.org/meetings-and-events/listen-again



Membership Strategic Objective Working Group

The Membership SOWG is led by Andrew Thompson and supported by David Littlemore and Kyle McLean. The main objective for the group is to increase and diversify membership of the BDS. Within the group there are three simple initiatives:

1. Increase the number of members
2. Increase the number of Young Professionals & student members
3. Increase the number of Corporate Memberships

“The BDS has still been able to provide online events and opportunities during the COVID pandemic which is reflected in our continued growth as a learned society”

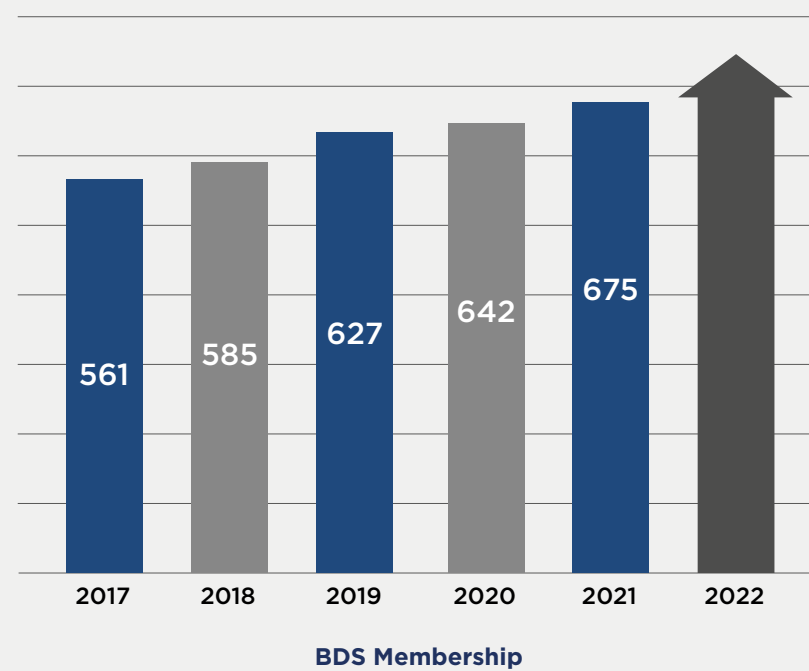


Overall Membership

We look to encourage new members from all disciplines associated with dam engineering with ranging experience. BDS Membership numbers are in a healthy position and have been steadily growing each year despite the impact of COVID restricting our conference and evening meetings since 2020.

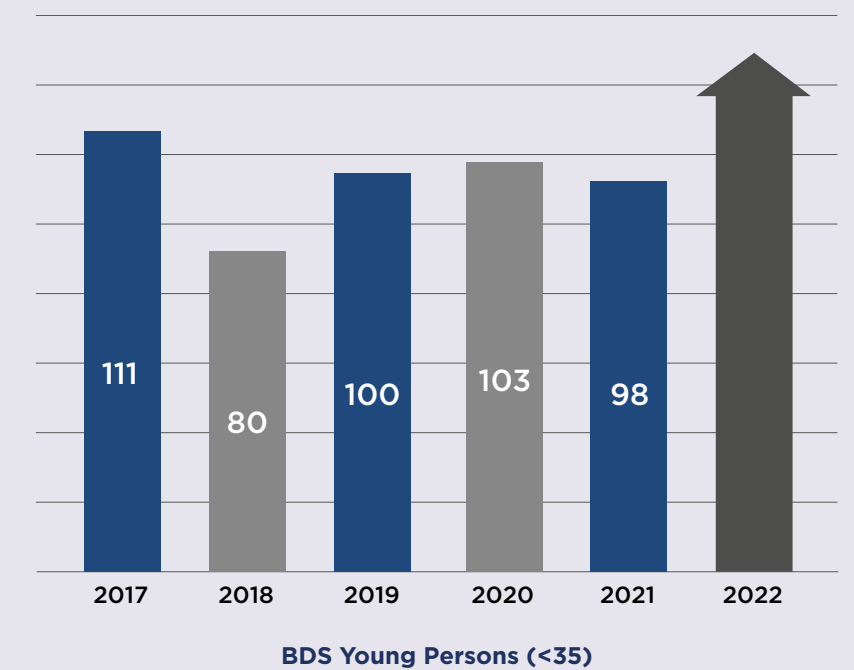
There are currently 675 total members and we expect numbers to continue to rise further in 2022.

In 2022 we are looking to welcome back opportunities for all members to attend site visits, evening meetings, join a local hub and finally be part of our BDS Conference in September 2022.



Young Professionals & Students

The Young Professionals and Student members are key to the future of our industry. The YP numbers represent a significant proportion of our membership. Initiatives developed by the YP committee over the last few years, such as the monthly CPD webinars and the mentoring scheme, aim at encouraging new members and provide opportunities to develop their understanding of common aspects of dam engineering and reservoir safety.

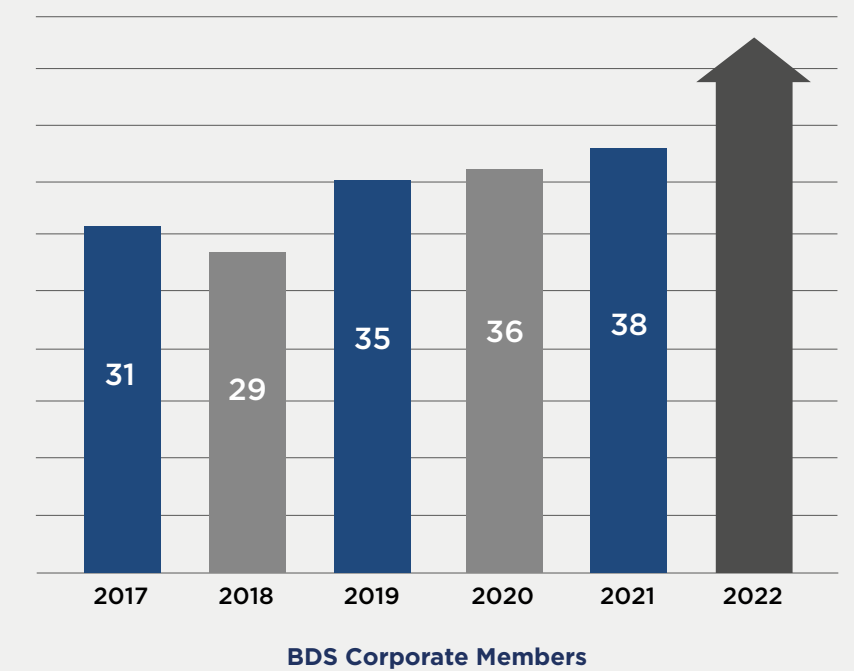


Corporate members

We would like to thank all of our Corporate Members for their continued support, particularly over this difficult COVID period.

Corporate member numbers are increasing each year and along with the publication of this BDS Yearbook, we hope to offer more opportunities for new and existing members to share their expertise and showcase their projects at our 2022 Conference at Nottingham.

As a Corporate Member up to three named representatives can enjoy all the privileges of individual membership, The company details will be published within the Society's "Yearbook" journal, website and advertised before our evening meetings. To find out more please visit our website - britishdams.org/about/corporate-membership



Membership numbers shown are correct as of December 2021

The Young Professionals Group

Hello! It has been another exciting year for the BDS Young Professionals (YP) Group, despite various challenges and adaptations along the way. The new YP committee has been working hard to provide events and opportunities for all members, both virtually and in person.

Who are we?

The Young Professionals group comprises members of the British Dam Society (BDS) under the age of 35. The group has been established to ensure the continuation of interest in the industry by the next generation and to help address the declining number of young members within the BDS.

What do we do?

The YP committee, while part of the wider BDS, exists to engage and support YP members and facilitate professional development and networking opportunities for those working in the industry.

The current YP committee has seven main objectives as follows:

1. Increase the BDS membership base of under 35s.
2. Increase networking opportunities for young professionals within the BDS.
3. Provide workshops for professional development.
4. Provide a mentoring scheme and professional development advice.
5. Assist BDS initiatives in schools, colleges, and universities.
6. Organise social evenings and events.
7. Liaise with other Young Engineers Forums in the ICOLD community to share ideas.

The committee is made up of four members, each of which sit on the committee for a period of two years. The current committee, shown below, will serve until spring 2023.



Kyle McLean
YP Chair



Lucy Monkhouse
Events



Michael Calder
Mentoring



Xavier Bradley
Social Media

CPD Events

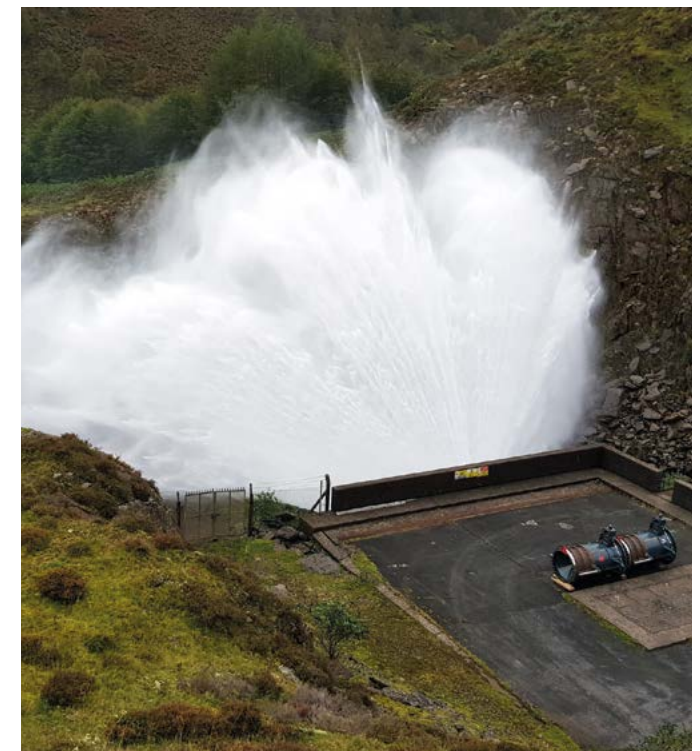
In 2021 we have continued to provide our monthly CPD events on Thursday afternoons and have had some brilliant presentations on topics including: the history of UK reservoir safety legislation; the role of an inspecting engineer; flood estimation and the panel application process. With our events throughout the year averaging 45 attendees per session, it has been great to see so much engagement across the YP membership and we would recommend anyone wanting to widen their knowledge of dams and reservoirs, to take part too!

We would like to thank all presenters who have volunteered to share their knowledge and experience as part of these events and are always looking for new speakers - so please contact us if you would like to take part!

2021 CPD Activity	Presenter	Date
Flood Estimation Basics	Rhys Coombs	January
Incident Response	Billy Sheehy	February
Instrumentation & Monitoring (Dams)	David Newton	March
Valves & Pipework	Stuart King	May
Flood Estimation - Contents of a Flood Study	Rhys Coombs	June
Impounding Reservoir Spillways	Viktor Pavlov	July
Wireless Monitoring of Hydraulic Structures		August
Supervising Engineers' Forum	YP Committee	September
Developments in the Design of RCC Dams	Dr Quentin Shaw	October
Earthquakes in the UK	Dr David Hawthorn	November
Service Reservoirs (observations from site visits)	Dr Darren Shaw	December

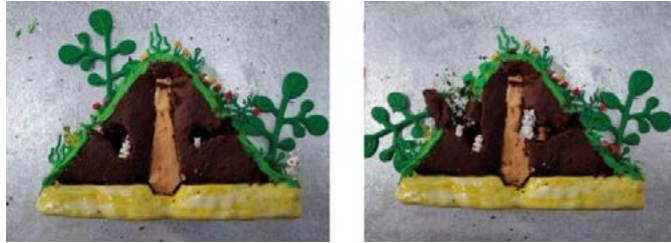
2022 Planned CPD Events	Presenter	Date
The construction of an embankment dam	Steph Benn	January
Toddbrook - producing inundation maps 24/7	Jeremy Benn	February
Developments in the Construction of RCC Dams	Dr Quentin Shaw	March
The reservoirs of Lord Armstrong - lessons that can be learned	Jeremy Benn	April

The YP committee has also been working throughout November to re-establish the mentoring scheme, and applications are now being accepted. The scheme is open to training Supervising Engineers as well as all engineers looking to develop their skills and competencies within the dam industry. We look forward to working with our new mentees and thank all those who have applied to become mentors.



Great British Dam Bake-off

The Great British Dam Bake-off, hosted by the YP group, but for all BDS members, has progressed excellently as a virtual event. We have had some amazing entries, not only proving that we have some of the best engineers in the business, but also the best bakers! Some of our favourites can be seen below.



Young Professionals Prize

Five papers were selected from the entries to the BDS Young Professional Prize which is open to BDS members under 35 years of age. The submitted papers (2,500 words) were on a topic of dam engineering relating to the author's experience in reservoir research, design, construction, operation, maintenance, or supervision.

Thank you to our finalists who presented their papers at the BDS Prize Evening. We are pleased to announce the winners for the Young Professionals Prize:

1st: Amy Carter, Arcadis

Drivers for discontinuance: a multi-disciplinary approach to feasibility assessment

2nd: India Hutchinson, Stantec

Grassholme Reservoir: Northern embankment stabilisation works

3rd: Ciara Gill, Jacobs

Forge Mill Flood Storage Area: Lessons learnt

Thank you to all those who entered; the BDS has been impressed by the high standard of entries this year.

Upcoming Events

Lots of opportunities will be on the horizon in 2022. We are especially looking forward to hosting our first International Webinar with the Canadian Dam Association (CDA) Young Professionals Committee and continuing to deliver the benefits of our mentoring scheme.

We will also be hosting a 'Visitathon' as a way of offering a platform for aspiring Supervising Engineers to play 'catch up' following the Covid-19 pandemic. The idea is to generate a list of Section 10 inspections and Section 12 visits which are being held from February 2022. Please get in touch if you are able provide an opportunity for a visit.

Informal reservoir walks in Hertfordshire and West Yorkshire will be arranged for April/May 2022 as an opportunity for members to come together. The visits will provide opportunity for networking, introduction to reservoir features and background to the unique sites.

Following on from the reservoir walks, in May 2022, we are planning on hosting a virtual training session on responding to an incident at a dam. As mentioned at the SE Forum in September 2021, there is an intention for YP Forum in 2023 but no further details are available at this time. Please get in touch if you are interested in helping to organise the forum.

How we can help

Please feel free to contact us if you have any queries or would like to provide feedback to the YP committee. We are always open to new ideas and suggestions and intend to send out a survey in early 2022 to gauge a better idea on what opportunities would be useful. Please do take part to help us maximise the benefits of your membership.

General Queries:

youngprofessionals@britishdams.org

Mentoring: mentoring@britishdams.org

LinkedIn: [British-Dam-Society](#)

Instagram: [BritishDams](#)

Twitter: [BritishDams](#)

Photo Competition

We are pleased to announce the winners of the 2021 photographic competition:

1st: Caban Coch Dam, Elan Valley, Wales

Antony Butler (rear cover)

2nd: Stwlan Reservoir, Snowdonia

Louise Shaw

3rd: Cilcain Reservoir No. 1

Hermann Stehle

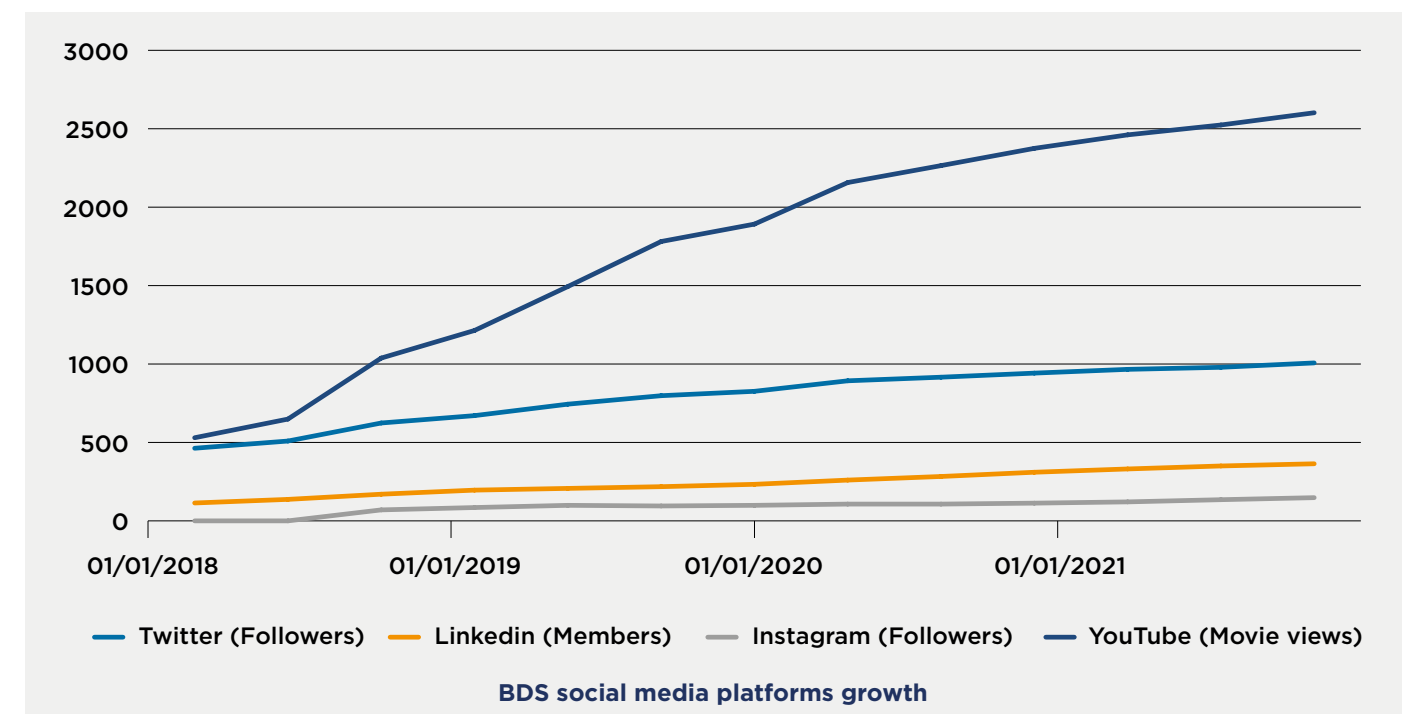
Social media platform overview

The BDS has experienced a strong steady growth across all its social media platforms this year as well as welcoming the addition of a new platform. A LinkedIn page that will complement the existing BDS social media platforms. A summary of all platforms can be found below.

"Our new LinkedIn page aims to grow and promote the BDS, by sharing information more widely."

Platform	Handle	Role	Audience	Annual Growth
LinkedIn Page	British Dam Society	To promote the BDS, grow engagement. Share upcoming events and provide important updates to members. Main form of communication out of all platforms.	Public, Members	n/a
LinkedIn Group	British Dam Society Forum	Act as a forum - a place for the dam community to share, discuss and challenge ideas and information related to dams and reservoirs.	BDS Members	29%
Twitter	BritishDams	To promote the BDS, grow engagement. Share upcoming events and provide important updates to members. An open point of contact for other organisations and individuals to contact the BDS	Public, Members	10%
Instagram	BritishDams	To promote the BDS, grow engagement. Share upcoming events. Key area of focus is to share visually engaging content and provide live coverage of events that occur.	Public, Members	38%
YouTube	British Dams Society	To educate anyone who is interested in learning more about dams and reservoirs through a playlist of videos thought to be of public interest.	Public, Members	15%

The chart below shows that there is slow but steady user growth across all BDS social media platforms



ICOLD Technical Committees

ICOLD (International Commission on Large Dams) is a non-governmental organisation which provides a forum for the exchange of knowledge and experience in dam engineering. ICOLD was founded in 1928 and currently has 104 member states, with approximately 10,000 individual members.

ICOLD's mission statement is to lead the profession in setting standards and guidelines to ensure that dams are built and operated safely, efficiently, economically and are environmentally sustainable and socially equitable. Much of ICOLD's work is advanced by the various Technical Committees (TC), each of which are tasked with advancing the body of knowledge in their subject area. These technical committees contribute to the production of bulletins which upon completion become available to the ICOLD membership. Since 1960, ICOLD has published 171 bulletins which are available to members via their website.

The UK was a founding member of ICOLD and has since been an active contributor, producing one ICOLD

president and seven vice-presidents. The UK currently has representation on 19 of the 31 technical committees. TC representatives and co-opted members work with other TC committee members, typically to produce ICOLD bulletins. UK representatives should ensure that published guidance draws on UK experience and where possible ensure that the outputs are relevant to the UK reservoir industry. Representatives are expected to attend most or all ICOLD Annual Meetings and other meetings of the TC as necessary. Members are also required to liaise with the Reservoir Safety Research Advisory Group (ReSRAG) seeking collaboration opportunities between UK and International dams research. Members are also expected to provide updates to the BDS membership on the activities of their committees, typically through relevant BDS evening meetings and / or contributing to BDS publications.

The current TC representatives / co-opted members for the UK are as follows:

Committee Reference	Committee Name	UK representative / co-opted member
A	Computational Aspects of Analysis and Design of Dams	Loizos Pelecanos
B	Seismic Aspects of Dam Design	Ljiljana Spasic-Gril
C	Hydraulics for Dams	Viktor Pavlov
D	Concrete Dams	Malcolm Dunstan
E	Embankment Dams	Alan Brown / Billy Sheehy
H	Dam Safety	Andy Hughes
LE	Levees	Jonathan Simm / Adrian Rushworth
M	Operation, Maintenance and Rehabilitation of Dams	Craig Goff
O	World Register of Dams and Documentation	Andrew Pepper
P	Cemented Material Dams	Peter Mason
Q	Dam Surveillance	Ian Hope
RE	Resettlement due to Reservoirs	Alison Bartle
S	Flood evaluation and Dam Safety	Alan Warren
T	Prospective and new challenges for dams and reservoirs in the 21st century	Craig Scott
V	Hydromechanical Equipment	Ken Grubb / Russ Digby
Y	Climate Change	Steven Usher
ZX1	Regional Club	BDS Chair
ZX2	Young Engineers	BDS YP Chair

TC representative vacancies

Appointment of TC representatives and co-opted members is co-ordinated by the BDS with vacancies advertised in August each year. TC representative and co-opted member appointments are for up to six years, with the option to extend the mandate by a further three years subject to re-application and re-appointment. The BDS is currently seeking interest from those who would like to serve on Committee G: "Environment"; Committee I: "Public Safety Around Dams" and Committee L: "Tailings Dams and Waste Lagoons".

The UK does not currently have representation on the following additional committees and is not actively seeking representation. However, if anyone has a keen interest in any of the following committees then please speak with the BDS chair directly in the first instance before applying.

Committee Reference	Committee Name
F	Engineering activities with the planning process for water resources projects
J	Sedimentation of Reservoirs
K	Integrated Operation of Hydropower Stations and Reservoirs
N	Public Awareness and Education
R	Multipurpose Water Storage
U	Dams and River Basin Management
X	Financial and Advisory
Z	Capacity Building and Dams

Application process

Applications must comprise the following:

- A summary in less than 500 words detailing why the applicant considers themselves a fit and proper person to serve on the relevant TC. This should include a description of relevant technical expertise and experience of serving on similar committees or technical groups. Reference should be made to the roles described in the Job Description.
- A letter or statement confirming that the applicant commits to attending the majority of TC meetings and, where appropriate, has the financial backing of their employer to support such attendance.
- A letter of recommendation from another member of the BDS. This could be a letter from the previous TC rep, a co-opted member or other member of the BDS.

Application should be submitted in writing to Andrew Thompson (Honorary Technical Secretary) at hontechsec@britishdams.org

Upcoming ICOLD events

The schedule of upcoming ICOLD events as published on the ICOLD website is summarised below.

- 90th Annual Meeting & 27th Congress – 27th May – 3rd June 2022 (Marseille, France)
- 91st Annual Meeting – 11th-15th June 2023 (Gothenburg, Sweden)
- 92nd Annual Meeting – 2024 (New Delhi, India)
- 93rd Annual Meeting & 28th Congress (Chengdu, China)
- 94th Annual Meeting – 2026 (Shiraz, Iran)

For the latest information regarding upcoming ICOLD events, refer to their website, [International Commission on Large Dams \(icold-cigb.org\)](http://International Commission on Large Dams (icold-cigb.org)).

ICOLD New publications

In 2021, the following ICOLD bulletins were finalized and are available to members via the ICOLD website:

- Bulletin 140: Mathematical modelling of sediment transport and deposition in reservoirs – Guidelines and case studies
- Bulletin 159: Supplement to the position paper on dams and the environment from 2012
- Bulletin 161: Dams and water transfers – An overview
- Bulletin 162: Environmental fluid mechanics
- Bulletin 173: Integrated operation of hydropower stations and reservoirs
- Bulletin 175: Dam safety management: Pre-operational phases of the dam life cycle
- Bulletin 181: Tailings dam design – Technology update

Pre-prints of the following bulletins were also released during 2021:

- Bulletin 186: Integrated optimal operation of cascade hydropower stations and reservoirs
- Bulletin 187: Flood evaluation, hazard determination and risk management
- Bulletin 188: Dam failures – Statistical analysis
- Bulletin 189: Current state of practice in risk informed decision-making for the safety of dams and levees



INVITATION FROM ICOLD PRESIDENT



Dear ICOLD Members, Colleagues, Ladies and Gentlemen,

On behalf of the International Commission of Large Dams/Commission Internationale des Grands Barrages (ICOLD/CIGB), it is an honor for me to invite our 104 National Committees to send delegates and their accompanying persons to the 27th Congress and 90th Annual Meeting of ICOLD. The meeting will be held from the 27th May to 3rd June, 2022 in Marseille, France.

The Marseille Congress will be a very special gathering for our ICOLD family as the world emerges from the tragedies of the Global Pandemic. I can think of no place more special for ICOLD than to return to the country of our foundation - France. Our emergence from isolation will be celebrated in the historical city of Marseille - the second largest city in France. A beautiful city-gem along the Mediterranean Sea, Marseille welcomes ICOLD members and our families with open arms, grand vistas, and an exciting adventure awaiting our international travelers.

The French National Committee of ICOLD (Comité Français de Barrages et Réservoirs, CFBR) has worked hard to prepare a wonderful meeting, including many precautions for our personal safety. The technical aspects of our 27th Congress will be outstanding as we consider our latest four ICOLD Questions to our technical members for updates to the current state of the practice, including Concrete Dam Design Innovation and Performance; Incidents and Accidents Concerning Dams; Surveillance, Instrumentation, Monitoring and Data Acquisition; and Dams and Climate Change. These topics cover a wide range of interests to our members and our profession. I anxiously await the presentations and discussions of the authors to advance our professional knowledge as information to be shared by all nations.

My friends, I am convinced that the Marseille Congress in 2022 will be our best and most memorable gathering in years. All of us are ready for a break-out from our confinement to experience the friendship and excitement of a reunion of our ICOLD family. We will gather safely in-person with excitement and expectations for the wonderful memories to be made in Marseille.

We will celebrate many things, including the ICOLD Innovation Award for state of the practice insight in the progression of industry knowledge and recognize the hard work of our Technical Committees through publication of new bulletins. But most of all, we will again visit with our friends - in person - to renew and catch-up on our families and toast to new beginnings.

In closing, I am strongly confident of the resilience of ICOLD as an organization and as individual national committees after almost two years of hardship and challenges. Our ICOLD members have learned that we can continue our work and remain connected to continue our mission of safety for all dams and levees. I continued to be filled with hope that ICOLD has endured this challenge as we have endured other historical challenges over the last 93 years since our founding.

I have been inspired by the hard work of our ICOLD Board, Central Office staff, Technical Committees, and Young Engineers to work together to meet our commitments to the industry and to each other.

I am reminded of a favorite Confucius theme that "the gem cannot be polished without friction nor man without trial."

We have all been through a great trial and we emerge stronger and more polished for the future. Take care for your health and safety, and I look forward to seeing you - in person - in Marseille in May 2022.

Yours faithfully,

Michael F. ROGERS

President, International Commission on Large Dams (ICOLD)
Commission Internationale des Grands Barrages (CIGB)



The Reservoir Safety Research Group

The Reservoir Safety Research Advisory Group (ReSRAG) is supported by the ICE under has a home under the Joint Flood and Coastal Erosion Risk Management R&D Programme (Defra, Environment Agency, Natural Resources Wales, Welsh Government).

It is made up of representatives across academia, industry, government, and other organisations, who advise on research, including future priorities. The group is currently chaired by Alan Warren. Outputs are published at www.gov.uk/government/organisations/flood-and-coastal-erosion-risk-management-research-and-development-programme, where there is an option to sign up to future updates.

The group is connected to a wide range of international developments across many partnerships such as ICOLD and The Centre for Energy Advancement through Technological Innovation (CEATI) & The Dam Safety Interest Group (DSIG).

Currently there are levee breach trials being led by Polder 2Cs (Netherlands/Belgium border) and Electricite d'France (EDF) focusing on coarse grain trials in the Mediterranean. Although mainly focused on flood levees, some of the developments are relevant to soil dams.

Ongoing or recently delivered research

- **Spillways** – As a result of the independent review of Toddbrook reservoir there are a number of improvements underway including R&D for a Spillway examination guide and Spillway design guide. To be published early 2022.
- **Benefits in removing or adapting redundant reservoirs** – Commissioned by the Environment Agency to HR Wallingford this R&D considers not only discontinuance, but adaptation. It draws on a wide number of existing case studies to provide a good practice overview. Expected to publish around Summer 2022.
- **Extreme Flood Hydrograph Estimation and Extreme Flood Estimation** – Assess the suitability of existing methods for estimating Probable Mean Precipitation (PMP) and Probable Mean Flood (PMF) and develop new methods and guidelines to ensure that we understand the risk posed to our highest risk reservoirs from extreme flood events. It will create a catalogue of extreme historical rainfall events, benchmark current methods, review new/alternative methods for estimating PMP and PMF, develop the preferred option for improving PMP and PMF estimation.

- **Breach** – A review of all matters flood levee or soil dam breach related (of which over 80% of dams regulated are soil based). Providing an overview of process and a prioritised list of proposed future research. Led by HR Wallingford and Stillwater Associates. To be published early 2022.
- **Non-Stationarity** – Findings so far show that on average, across England and Wales, including non-stationarity (the changing baseline due to trends such as climate) makes little difference to estimating design flows. However, for individual locations it can show quite a difference and aligns with expected climate trends.
 - ▶ River flow records show general but not universal evidence of an increase in flood peaks
 - ▶ 2/3 of gauging stations in England and Wales show upward trends in peak flows
 - ▶ 21% of stations show an upward trend significant at the 10% level (90% probability that an upward trend is present)
 - ▶ Positive trends are seen across much of England and Wales, with some of the strongest and most statistically significant trends in the north and west. Some areas of central and eastern England also display negative trends

This R&D provides interim national guidance on non-stationary fluvial flood frequency estimation. It carries out a rapid Evidence Assessment of Non-Stationarity in Sources of UK Flooding. Publishing mid-2022.



- **Transitions** – Those interested in potential failure occurring between soft and hard structures (i.e. soil dam and wall) may be interested in this R&D, publishing Spring 2022. An international consortium led by HR Wallingford consisting of representatives from Netherlands (Deltares) USA (USACE) and the UK. New inspection guidance and piloting of the transition zones has been undertaken whilst considering the risks and effects looking at the prioritisation, inspection and engineering of them.
- **Siphons** – Led by CIRIA, this will develop a new guide on the use of siphons, both temporary and permanent. Collating lessons learnt during incidents and case studies of best practice. Publishes in early 2022.
- **Fish & Eels** – Concerned about fish and eel passage? This new guide collates best practice from practitioners. Publishes early 2022.
- **Piling Guide** – CIRIA are leading a refresh of the existing guide.
- **Earthwork stabilisation using bacteria** – Working with Network Rail and Queen Mary University of London to understand if there is potential to naturally feed already existing bacteria in soils and strengthen the soil structure.
- **Real-time monitoring of MEICA performance** – Although predominantly focused on other flood assets, the Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) research may support dam engineering. It will optimise operation and maintenance costs over the whole-life of the asset and move toward the pro-active management of MEICA assets. Publishes in 2023.
- **Carbon offsetting** – The UK has set out in law the target of achieving Net Zero by 2050. To achieve this, the annual emission rates will need to be cut by over 260 MtCO_{2e} (Metric tonnes of carbon dioxide equivalent). Whilst approaches to reducing carbon dioxide (CO₂) emissions in the UK are relatively well documented and understood, those which enable offsetting of residual emissions have been less thoroughly explored. This research explores the evidence behind 17 different carbon offsetting approaches which included mainly nature-based solutions and a smaller number of built environment approaches. Published.



What's next?

The date for starting the following reservoir R&D has yet to be determined, but they are seen as a priority to start as soon as possible.

- **Reservoir leakage and seepage** – What methods are available and applicable to monitoring reservoir leakage and seepage, including real time monitoring and modern SMART sensing technology. Improving best practice from existing developments in this area.
- **A Standard Methodology for estimating loads on and the behaviour of reservoir wave walls of various types and shapes** – To make use of the PMP/PMF outputs (earlier project listed here), to assess a large variety of existing walls in the best way possible, as well as improve and support the design of new or replacement walls. It assesses existing methods across a number of disciplines (wave overtopping, wave forces on structures and soil mechanics) and considers the key inputs/measures for this type of analysis.
- **Modernising Practice** – The ReSRAG Group will also be assisting Defra and the Environment Agency to improve and modernise reservoir safety practice in response to the Reservoir Safety Review undertaken by Professor David Balmforth.

Further information from Dr Chrissy Mitchell, Environment Agency

christabel.mitchell@environment-agency.gov.uk



The British Dam Society would like to congratulate the following members on their appointments to a Reservoir Safety Panel.

Appointed as All-Reservoirs Panel Engineers:



Jon Holland
Senior Engineer
Stillwater Associates

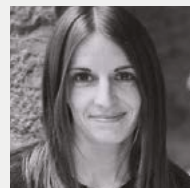


David Neeve
Associate
Arup



Darren Shaw
Associate
Arup

Appointed as Supervising Engineers:



Natalie Bennett
Principal Reservoir Engineer
Canal & River Trust



Rhys Coombs
Director
CC Hydrodynamics



John Greenway
Catchment Engineer
Environment Agency



Fred Hartley
Principal Engineer
Highway Structures
Canal & River Trust



Mark Hayward
Technical Manager
Fairhurst



David Hughes
Reservoir Supervising Engineer
Rullion Engineer Services



Sarah Loughrey
Framework Manager
Jacobs



Keith MacDonald
Reservoir Supervising
Engineer
United Utilities



Rafael Monroy
Senior Geotechnical Engineer
Klohn Crippen Berger



John Pawson
Senior Hydraulic
Structures Engineer
Mott MacDonald



Jenny Clifford
Reservoir Supervising Engineer
Severn Trent Water



Liz Rivers
Associate Director of
Ground Engineering
Jacobs



The 2021 Supervising Engineers' Forum

The 2021 Supervising Engineers' Forum was held at Nottingham University on 16th September 2021. The Forum's four sessions covered the following topics: (1) Application of Legislation (2) On-site plans - application and guidance (3) Incidents and lessons learned (4) Future of Supervising Engineers. These were followed by an open forum for question and answers.

The Forum opened with a welcome speech from the BDS Chair David Littlemore.

The first session (Application of Legislation) was chaired by Matt Coombs with presentations from Myles Cooper-Bradley - Environment Agency (EA), Matt O'Brien - Natural Resources Wales (NRW) and Huw Thomas - Scottish Environment Protection Agency (SEPA).

Myles provided a regulator update on behalf of the EA. The presentation expanded on the notice that was issued in April 2021 which established the EA's interpretation that dates set to complete MIOS in a 10(3) inspection report cannot be extended through re-inspection. Myles clarified that the inspecting engineer must provide sufficient detail to justify, where appropriate, why completion by the previous date is no longer required and that their new date is both reasonable and justifiable.

Matt O'Brien provided an update on behalf of NRW regarding new guidance, risk designation of smaller reservoir and proposals for the future regulation.

This included a progress update on designations as well as outlining the current standard of compliance across Wales. With regards to on-site plans, Matt clarified that NRW expects that plans should be proportionate to the consequence of failure as well as a concise and clear in their nature. A template will be shared by NRW, but it is intended for guidance only.

Huw Thomas gave a general update on behalf of SEPA with focus on the identification of unregistered reservoirs. He presented SEPA's efforts to date using LiDAR data, suggesting that site surveys are an important tool in confirming whether a reservoir should be registered. His presentation included some examples of incidents at unregistered reservoirs.

The second session, chaired by Barry Dooley, covered on-site plans (application and guidance) with presentations from Andrew Thompson (United Utilities), Peter Down (Mott MacDonald) and Roger Lewis (EA).

Andrew Thompson gave an overview of United Utilities' experience in developing (and testing) of on-site plans for a large portfolio of reservoirs. He also presented how the onsite plan was tested at Dovestone reservoir.

In contrast, Peter Down addressed the challenges of on-site plan development for smaller, independent Undertakers, highlighting a number of concerns with the recent Ministerial Direction. His presentation concluded with the suggestion that there is a need for independent, peer reviewed guidance on the development and testing of on-site plans.

Roger Lewis provided an update on reservoir inundation mapping. He confirmed that the revised maps will include flood outlines for two cases: (i) a breach scenario coinciding with a 1 in 1,000-year fluvial flood event downstream and with reservoir level above Top Water Level (TWL), and (ii) a 'dry-day' breach scenario where the reservoir is at TWL. Many of the questions that arose from this presentation commented on the timescale for publication of these maps, which Roger suggested should be published within 2021.

The third session (Incidents and lessons learned) was chaired by Lucy Monkhouse and included presentations from Paul Arnold (EA), Kieron Kenny and Tim Daly (EA), David Brown (CRT) as well as Viktor Pavlov (EA).

Paul opened the session by sharing his experience of managing badgers in flood banks and sea walls, including developing a three-year identification and remediation plan. His presentation included a number of case studies where artificial setts had been introduced with a 67% success rate.

"A successful event with plenty of useful information and a good level of engagement from delegates."

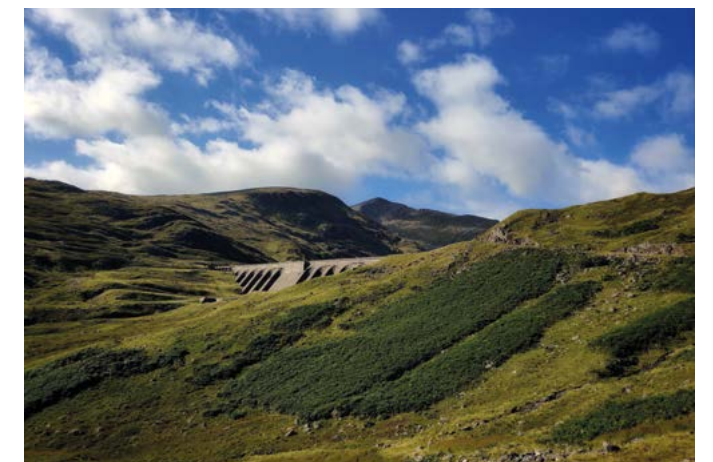
Kieron and Tim discussed guidance being developed for Inspecting Engineers and Supervising Engineers. These are among a suite of guidance documents being developed in response to the Balmforth review (Part A) that followed the incident at Toddbrook reservoir in 2019. Publication is expected in early 2022.

David Brown presented a recent case study at Carr Mill where, following a recent inspection, works were undertaken to replace the scour valves. This involved installing a plug at the pipe inlets using an underwater remote operated vehicle to provide isolation.

Viktor Pavlov (EA) outlined the progress made on developing a guidance note regarding spillway design. He responded to questions regarding how the proposed guide will incorporate lessons from existing international guidelines and explained that the guide is planned to be published in 2022.

The last session of the Forum was chaired by Alan Warren, addressing the future of Supervising Engineers with presentations from Anthea Peters (on behalf of the Reservoirs Committee), Kyle McLean, Lucy Monkhouse and Michael Calder (on behalf of the British Dam Society Young Professionals Group). The session closed with a presentation by Professor David Balmforth under the same title - the future of Supervising Engineers.

On behalf of the Reservoirs Committee, Anthea Peters provided detail on the current process for Supervising Engineer applications, including an overview of recent updates to the application forms and a description of what the review day entails. Anthea provided insights into the criteria for assessment of candidate applications.



The British Dam Society Young Professionals Group (Kyle McLean, Lucy Monkhouse and Michael Calder) highlighted the recent events being organised by the YP network. They outlined their plans to re-establish the mentoring scheme and provide support to aspiring Supervising Engineers. The presentation was closed out by Lucy Monkhouse who spoke about some of the lighter aspects to the network, including the upcoming bake-off competition.

Professor Balmforth spoke about the future of Supervising Engineers in the wake of the Toddbrook incident of 2019 and publication of subsequent independent reservoir safety review reports. He focussed on the importance of regular and frequent operational maintenance and surveillance, highlighting that Undertakers must understand the full extent of their responsibilities and liabilities. He suggested that the role of the Supervising Engineer should be strengthened and referred to his upcoming evening presentation at the Institution of Civil Engineers where more detail would be provided.

The day ended with the Open Forum which posed questions to all the presenters. There were a number of questions for representatives of the EA regarding the recent Ministerial Direction for on-site plans. The requirement to produce on-site plans for not high-risk reservoirs was queried.



The BDS Interview (by Andrew Thompson)

In October 2021, I sat down (virtually via Teams) with two dam engineers who find themselves at opposing ends of a distinguished career within the dam industry. At the beginning of his journey Kyle McLean is a graduate civil engineer (at Mott MacDonald) and is the current BDS Young Professional Group Chair. He is joined by Martin Airey, an All-Reservoirs Panel Engineer (Independent) who can boast to have been in the industry for over 47 years and is currently serving on both the Reservoirs Committee and BDS Committee.

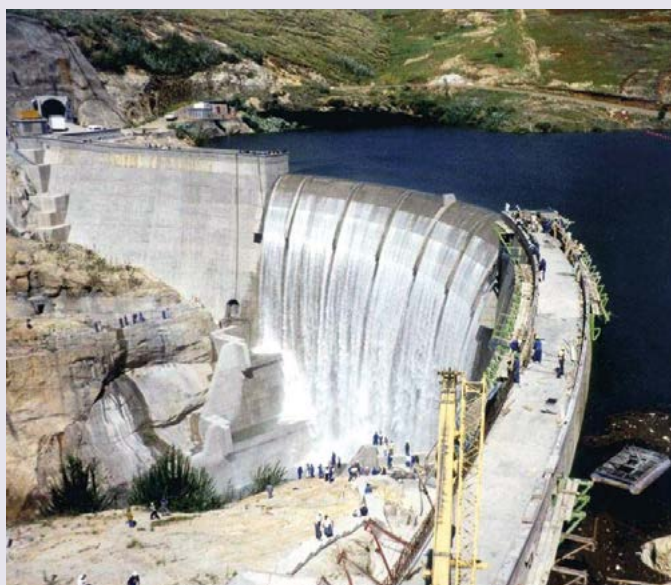
So, with nearly 50 years of experience “between” them I asked their views on our industry.

Let’s start with a simple question. What is your favourite dam and why?



MA - I actually have two favourites. My favourite in this country is one called Errochty, which is in Scotland. I had a two- or three-year period when I worked for the North of Scotland Hydroelectric Board and I was supervising engineer for them and it gave me the opportunity to see concrete dams that we don’t typically have in England. Errochty is a buttress dam and I think it was probably the first buttress dam that I saw in the flesh and so coming close up to that and understanding the problems associated with that type of dam always left a mark.

My second favourite was an arch dam called Muela, part of the Lesotho Highlands water transfer project in southern Africa. I was involved (as the chief resident engineer) with it for upwards of four years, right through from the start of construction to its ultimate completion and commissioning. You don’t get involved with large arch dams in this country, so that was something special for me.



Muela Dam



KM - I went to the University of Sheffield, and I’m a keen mountain biker so I spent much of my spare time biking in the Peak District. I’d say probably my favourite UK dam is Howden dam, not too far from Ladybower. I quite admire its importance in terms of the history it’s had, particularly for the RAF Bomber Command training during WWII, and it’s just a really nice place to visit.

Why did you choose a career in the dam industry?

MA - When I was at university, we had a lecturer in concrete technology, he said “if you get a degree in civil engineering, it opens up the world for you! If you want to go and build tunnels, you can; if you want to go and build dams, you can” ... and I thought, yeah, that’s not too bad.

After graduating I joined Mott MacDonald’s, and more or less on the first day I joined the dam’s department. I was very lucky, as were many others of that era, as in the late 70s early 80s the Reservoirs Act 1975 was implemented, so then there was a requirement for supervising engineers, and there was a much greater focus on the UK reservoir industry. I became a supervising engineer and that was it - my career path was determined for me.

KM - For me, after working a summer placement during my degree I recognised that there was a particular need for engineers, especially within water resources and the water sector. There are the challenges from the impacts of climate change but also the falling numbers of people in the industry particularly at a higher level. So, I thought why not give it a try!

Obviously, there’s a long international history that we have in this country of being associated with designing dams, and I’m definitely keen to travel and contribute to that in some way. So that was one of the main reasons why I wanted to get into the industry. I think there is a lot of opportunity in the water sector to work on completely different and exciting types of projects. For example, you could be working on a small farm reservoir project on one day, then on a large-scale hydropower scheme, the next.

So, can you tell us of someone who mentored you during your early career?

KM - For me, I’m still very early into my career, so I’m constantly trying to find mentors who I can learn from to help me develop further. But I’d say in terms of my role in the BDS, I’ve found Sarah Loughrey, who was the past chair of the YP group, very helpful, particularly for networking opportunities and who best to contact within the industry for certain areas.

In my team, ARPEs and SEs have also been very helpful by providing technical advice and explaining how best to navigate through the industry. They’ve taken me out on section 12 visits and as well as other site visits, quite early on in my career, which I’ve found useful.



Derwent Reservoir

MA - Well, when I first started, I worked for an All-Reservoirs Panel Engineer who looked after a small department. It was sometimes quite difficult to know what was required, but he had a vast technical knowledge and demanded work to a very high standard. For somebody that was new to the industry I was very impressed, and I listened a lot to what he had to say - which was sometimes said in quite a forthright way! But I learned a lot from him.

In the same team I had a colleague who was about 10 years my senior, who I’m still very friendly with. His background was in geotechnical and embankment engineering, and having come from university and focused primarily on concrete and hydraulics and hydrology, that was an area where I felt that I didn’t have much experience. So again, I learned a lot from this individual in terms of the earthworks and geotechnical side of things, which, of course, was very much coming to the fore in those days, and has developed since, of course.

They both had very different styles of working with people and yet by listening to them and working with them, I learned a lot.

So, looking forward to next summer, the 2022 conference is entitled Dams and Reservoirs in a Climate of Change. Martin you’d mentioned to me that it’s coming up to 40 years since your first conference (Keele in 1982). What was that like, compared to recent ones?

MA - Well, they didn’t have the workshops but generally the overall format was very much the same - senior people giving papers on projects that they had done followed with a Q&A session. There were probably more papers on overseas projects, because in those days there were still most of the large UK consultants heavily

involved in overseas development, and there was a lot of overseas work that was being reported.

Over the years it’s become a lot more UK focused, but in many ways it was the same, it’s just that the people were different. As a young engineer, these were just names of people that I didn’t know and looked up to.

What’s the biggest change you’ve seen in the industry during this time?

MA - In terms of management of the safety of our reservoirs, I think the whole process has become more comprehensive, there’s a lot more rigour and control of the system now. The Environment Agency being appointed as the enforcement authority ensured that recommendations are followed through. Previously the follow-up from the different local authorities was very varied, to say the least. Sometimes just nothing would happen.

But from a technical point of view, we did understand all of the technical problems before, but they are now addressed in the normal process of inspection and assessment. Spillway capacity was the first one that I was really involved with, and when you when you look back at the 80s and 90s there were so many spillway enlargement projects that were going on, because the whole idea of the PMF was developed in the 1975 Flood Studies Report. That led on to a whole lot of work and there’s been a gradual development in all fields and all aspects of dam engineering.

The other thing that has really triggered change and development has, of course, been the - fortunately very few - incidents that we have had. You think about Boltby, Ulley and more recently, Toddbrook, and so it will continue - you can never be complacent that something unexpected will not occur.



Toddbrook

A final thing that has changed, not just in dam engineering, but in civil engineering as a whole is the emphasis on safety, not so much safety of the reservoirs, but of the people involved. I don't think we were complacent 40 or 50 years ago, but certainly now in terms of the requirement for risk assessments and how one would enter into confined spaces and things like that. There wasn't the same level of control that there is now and I think that change has got to be a good thing.

Kyle, in contrast what are your expectations for the future of the industry?

KM – That's a good question, I'd like to see a greater focus on carbon emissions, particularly when it comes to the construction of dams, by using innovative construction solutions and sustainable materials that we can incorporate into our designs. I'd also like to see more focus on the use of technology such as remote monitoring, to help reduce the safety hazards and risk element to dam maintenance. I think this sort of technology is the way forward, so we need to embrace it and be ahead of the curve.

With regards to the BDS and the development of new engineers into our industry, the BDS YP group is looking to re-establish the mentoring scheme in the next few months. I'm hoping that by time of the conference we'll have quite a few people on board. I'm quite keen to use the conference as an opportunity to consolidate the work that's being done as part of the mentoring scheme and use that as an opportunity for members to network.

We have been growing our online presence recently to showcase the achievements of BDS members, but we want to go further and inspire more people into the industry by using platforms such as LinkedIn and Instagram.

Looking back, what's your career highlights so far?

MA – Muela was a very important part of my career. I'd been a supervising engineer for a number of years, so I applied for the All-Reservoirs Panel but didn't get on. Basically, the requirement for an ARPE at that time was I needed to be involved with a major dam project during construction. So Muela was a highlight because I managed to gain the necessary experience that allowed me to come back and successfully reapply to the AR panel.

I should also mention that I've had three stints on the Reservoirs Committee, which I've enjoyed very much, and also my involvement over the years with the BDS Committee, where I was vice chair and then chair of BDS.

Kyle, I know it's quite early on in your career to be asking for your highlights but are there any aspirations of where you want to be?

KM – I'd probably say a highlight so far is being elected as the chair of the BDS YP group. I've really enjoyed networking with other members of my age group and trying to inspire more people into the industry. I've also enjoyed meeting people with lots of experience, as part of my work on the committee. I've certainly learnt a lot from their knowledge and technical expertise. In terms of my career aspirations, at some point in the future I'd like to work on a large-scale overseas dam construction project, as I'm quite keen to travel and experience more of the world outside the UK. I'd also like to complete my chartership with the ICE and begin my SE application!

So, one final question to you both. What advice would you give to an engineer looking to start a career in dams?

KM – I'd say go for it. If you have a passion for problem solving, providing solutions which have real life benefits and want to have a career working on a variety of projects, this industry is for you. As we head into the future, renewable energy, irrigation, clean water and protection from flooding will be needed more than ever, so why not be part of helping make that change.

MA – Certainly, if you've got the interest in engineering, and you enjoy identifying problems and solving problems from a practical point of view, then dam and reservoir engineering is a good place to be.

On the world scale, we've still got the problems that we've had for the last 40 or 50 years – not everyone has enough clean water; we need more green energy; we need more flood protection – all of these things are very much still in the news, and dams and reservoirs can play a part in that. It's an industry that there's some good challenging work to be had. I think any individual, if motivated in the right way, can get a lot of fulfilment from the career, so I would say go for it.

BDS Corporate Membership

The Benefits of BDS Corporate Membership

The BDS provides CPD opportunities through the biennial conference, seminars and a programme of technical meetings in London and the regions throughout the year.

These provide an opportunity for the exchange of experience and information with other professionals, clients, competitors and suppliers.

The Society's membership includes many senior staff and managers in top consultancies, dam owner organisations, government agencies and major contractors, who are involved in dams and reservoirs both in the UK and overseas.

The BDS has involvement in national and international technical committees and steering groups, influencing guidance and research projects.

The BDS informs and supports their members on national and international issues and best practice in planning, development, maintenance and operation of dams and reservoirs.

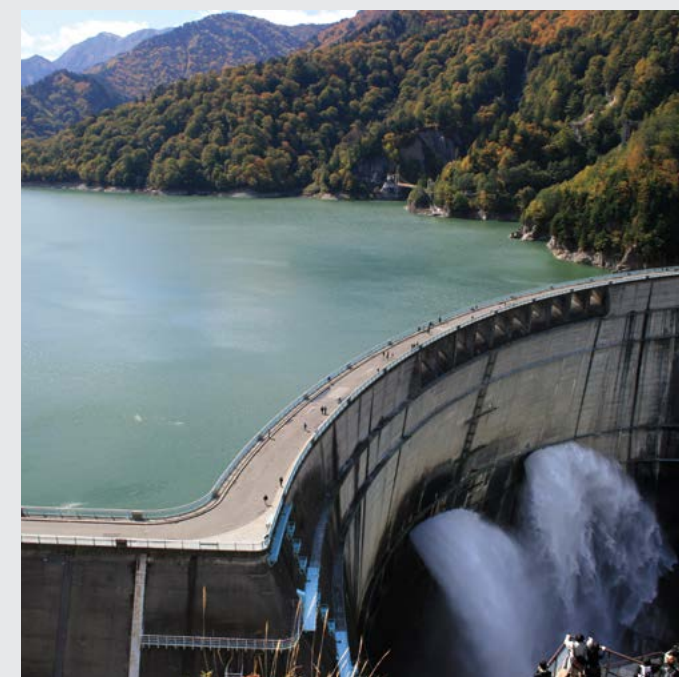
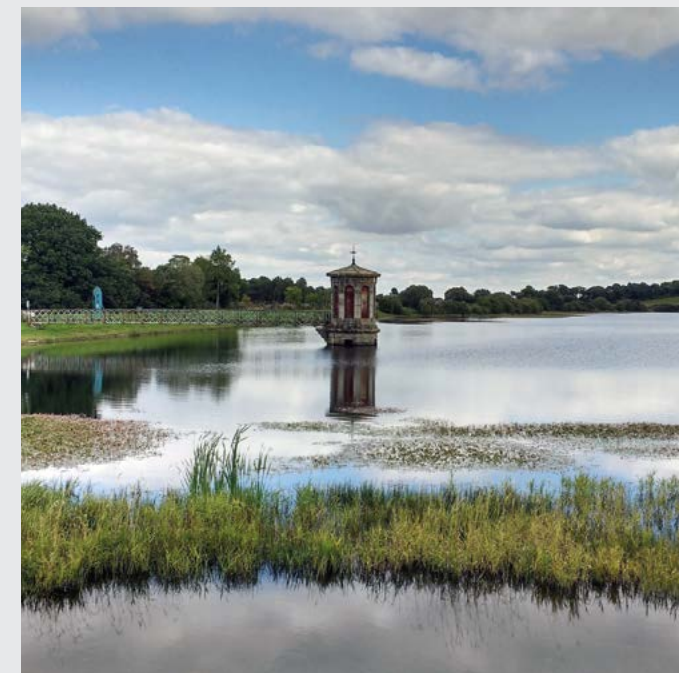
Corporate Membership also includes the following benefits:

- **Three named representatives will have all the privileges of individual members, including hard copies of the Society's Dams & Reservoirs journal, as well as access to the BDS Members' Area on the BDS website and the ICOLD Members' Section on the ICOLD website, where Technical Bulletins can be downloaded free of charge.**
- **Each Corporate Member may take a full page in the Society's Yearbook, to publicise a project, outline the company's capabilities and provide contact details.**
- **The company's logo and link to their website can be published on the BDS website.**
- **If the Corporate Member provides a PowerPoint slide to advertise the company, this will be shown before each of the BDS evening talks.**
- **The Corporate Member's named representatives will have voting rights at the society's AGM or Special Meetings and at all elections for new committee members.**

The subscription fee for a Corporate Member of the British Dam Society is £375 per year.

To apply for Corporate Membership, please download the form that can be found at britishdams.org/about/corporate-membership and return completed forms to the BDS Secretary at bds@ice.org.uk

Where a full page of a Corporate Member's activities has not been included in this Yearbook, the table on page 54 summarises the capabilities of the company and provides contact details of each.





UPPER GARNOCK FLOOD PROTECTION SCHEME

Project summary

To alleviate flooding for residents in the areas of Kilbirnie, Dalry and Glengarnock a new flood protection scheme is to be constructed. Once complete this scheme will offer protection from floods up to a 200-year return period flood event including a 20% climate change allowance.

In late 2018, AECOM were engaged by NAC to provide detailed design services for all aspects of the scheme including a new 13 m high, 290 m long rockfill dam, with a total storage of 500ML and other associated structures located downstream.

The primary focus of the AECOM dams and reservoirs team is to ensure that the completed dam is resilient, complies with all current best practice, and provides safe cost-effective flood attenuation that protects residents downstream.

Services

- Detailed design of dam and appurtenant structures
- Hydrology and hydraulic assessment (inc. physical modelling to confirm the inlet stage discharge relationship)
- Seepage and stability analysis (using Slope/W and Seep/W)
- BIM and Civils 3D
- Tender evaluation
- NEC4 Project Manager, construction support and provision of a Construction Engineer under the Reservoirs (Scotland) Act 2011.

Achievements

AECOM has now been supporting NAC for more than four years in the development of this scheme. A testament to the relationship AECOM has nurtured with NAC was being awarded the construction management stage (including site supervision) of this project which is still ongoing.

Contact:

Andrew Davie
Associate Director Dams and
Reservoirs
+447384543969



We are proud to share that the scheme was 'Highly Commended' at the 2021 ICE Wales Cymru Project Awards.

When three historic reservoirs in Snowdonia National Park were found to be failing, we developed a green infrastructure approach to restoration for owner Natural Resources Wales (NRW), to maintain the sensitive ecology of the site and preserve habitats.

Section 10 inspections had found the dams in the Gwydir Forest to be in urgent need of remedial works and NRW appointed Arup to design a solution to ensure their safety in the long term. Our approach, focusing on reusing and strengthening existing structures, not only minimised local environmental impacts, but also helped to reduce its embodied carbon.

The scheme has made the reservoirs safe for visitors and local communities while responding to their unique historical, ecological and amenity value within the national park landscape. Our work involved the safe discontinuance of one dam and remedial works at two others — the work involved buttressing and raising embankments, construction of new spillways and provision of new drawdown facilities. The solutions have been tailored to each site, ensuring NRW can safely and efficiently maintain the reservoirs in future. NRW is now using our approach as a blueprint for subsequent projects of this type.

About Arup

Arup was formed in 1946 and is a global firm of consulting engineers, planners and scientists with a specialist water consultancy providing excellence in water and environmental engineering. Arup has expertise in investigation, feasibility, design, and construction supervision of new dams, as well as the design of remedial and improvement works to existing dams. We have delivered projects for central and local government, international funding agencies, privatised water utility companies, banks, and design and build contractors. We have also worked for research organisations including CIRIA, the DETR and others producing guides on many aspects of dam and reservoir design and maintenance.

Search 'Gwydir Reservoirs' on Arup.com to find out more about the project and our team, or find us on social media:

LinkedIn: [linkedin.com/company/arup/](https://www.linkedin.com/company/arup/)

Twitter: @ArupUK

Instagram: @arupgroup

Facebook: @ArupGroup

For further details contact Anthea Peters:

Email: anthea.peters@arup.com

Tel: +44 (0)113 242 8498

Web: www.arup.com



Atkins, member of SNC-Lavalin group, delivers dams, reservoirs and hydropower projects around the globe.

Our experienced team supports a broad range of clients through all stages of project development, from early strategic water resource studies through design and supervision of construction and asset management.

Our current work includes significant projects such as Havant Thicket Reservoir for Portsmouth Water. Here we've provided integrated design and planning services for the first new large water resources reservoir to be built in the UK in 30 years and the major pipeline needed to fill and connect it to the water supply network operated by two water companies.

Atkins' design includes the 20 metre high, 3 km long zoned earthfill embankment as well as a second embankment to create a wetland habitat within the reservoir that will itself constitute a large raised reservoir. Our team has tailored the arrangement of the main embankment to address complex constraints, protecting habitat and maximising opportunities to improve public realm and amenities. This attention to detail and creation of biodiversity net gain, along with the extensive use of digital tools, allowed consultation and planning permission to be successfully completed to programme during a period of national lockdown.

Our work provides significant opportunities for career development across a wide range of skills, including development to panel engineer status. Our growing UK team is part of a 250-strong international practice with the pedigree that comes from designing, constructing, and refurbishing 300,000 MW of hydropower, with over 100 such projects completed in the last 10 years.

Contact Graham Clark
graham.clark@atkinsglobal.com
+44 7834 506904



Bachy Soletanche has a rich history of delivering dam and reservoir projects in the UK with previous schemes including the Marchlyn Bach Dam Remediation (shortlisted for Technical Excellence in GE Awards 2021) the Lower Carno Dam Stabilisation, and the Wimbleball Dam scheme. In addition to this, the organisation is part of the global Soletanche Bachy Group, which delivers projects all over the world.

Our team has the expertise knowledge to overcome the niche challenges that often arise on dam projects, from the logistical difficulties of remote locations to the technical challenges posed by the ground conditions. When working with our clients, we bring our grouting specialists, in-house design team and geotechnical engineering experts together to deliver high-performing, robust and reliable dam and reservoir infrastructure that stands the test of time.

Marchlyn Bach Dam

Working on behalf of Lewis Civil Engineering for client, Dŵr Cymru Welsh Water (DCWW), Bachy Soletanche was recently contracted to provide a long-term geotechnical solution for the Marchlyn Bach Dam, located in North Wales, which was experiencing leakage issues.

Bachy Soletanche developed an innovative solution involving the construction of mortar barrier walls to create a robust, impermeable seal. This approach prevented any environmental pollution that could be caused by injecting particulate grout into the highly fractured rock. To construct the walls, the team adopted rotary percussive duplex drilling methods with water flush to install a series of boreholes arranged in a closely spaced layout, into which they injected a repurposed mortar mix. Once complete, the adopted methods reduced leakage by up to 98% and has preserved the integrity of the dam for years to come.

For further information please contact:

enquiries@bacsol.co.uk

01276 674940

www.bacsol.co.uk



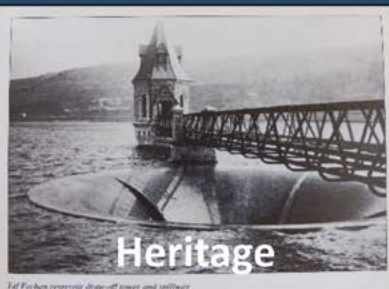


- Prior Park is a Grade II listed, 18th century 'Capability Brown' landscaped garden owned by the National Trust, containing three ornamental lakes.
- Binnies has designed sensitive improvement works to pass extreme flood events and address dam stability concerns whilst minimising impacts on the protected views from the Palladian bridge for the two lower lakes. Utilising a clever hydraulic design, we confined spillway improvements to a localised area, minimising construction in a private garden immediately downstream. We have taken the engineering design from conception through to detailed design and we are currently providing construction supervision and project management services.
- The proposals have been developed in close liaison with regional and national National Trust staff as well as external consultees including Historic England and Bath and North East Somerset council.
- We have worked closely with the Trust's appointed Landscape Architect and planning specialist Nicholas Pearson Associates, as well as other specialists such as a Conservation Architect. Measures have been put in place to ensure that public access can be maintained to the gardens throughout construction.

Matthew Coombs,
Reservoir Delivery Director, Supervising Engineer. Email: CoombsMJ@binnies.com



Website – www.binnies.com
 LinkedIn - <https://www.linkedin.com/company/binnies/>
 Instagram - <https://www.instagram.com/binniesglobal/>
 YouTube - https://www.youtube.com/channel/UCZD2BIKJN51_xyJyaztpZUw



Heritage



Innovation



intelligent Dam Monitoring System (IDMS)
IAM Winner – Digital Innovation Award

Transformation

Supporting our clients for a better world

Binnies is a UK owned engineering consultancy with over 100 years' experience in dam engineering. Originally formed in 1890, the company has played a pivotal role in the design and construction of many of the world's most iconic dams. In the 21st century, Binnies reservoir team continues to thrive, providing Panel Engineer services and technical excellence in dam engineering and reservoir safety, as well as leading the way with the UK reservoir industry's digital transformation.

Canal & River Trust, Reservoirs Team Contact: David Prisk,
 Telephone: 07876 392 985, Website: www.canalrivertrust.org.uk,
 Address: National Waterways Museum Ellesmere Port, South Pier Road,
 Ellesmere Port, Cheshire, CH65 4FW



The Canal & River Trust are a charity who look after and bring to life waterways across England and Wales, because we believe life is better by water. The Trust is responsible for 71 reservoirs built between 1796 and 1891 to supply water for navigation for over 2000 miles of waterways.

Barrowford Reservoir, Lancashire

Barrowford reservoir was built in 1885 to provide water for the Leeds Liverpool Canal. It is non-impounding, fed by excess water from the canal summit pound. The capacity is 454,000m³, with a maximum embankment height of 8.8m and an embankment circumference of nearly 1km.



The embankment slopes are steep; being 1 in 1.75 in places, comprised of mixed fill material, likely locally won, with a marginal Factor of Safety. There is a clay core, which varies in quality and condition.

There has been a history of slope instability and leakage, with the first slip being recorded in 1976 and leakage being recorded from 1981.

An early Section 10 inspection was called in 2017, following observations by the Supervising Engineer of leakage when the reservoir was at TWL. This

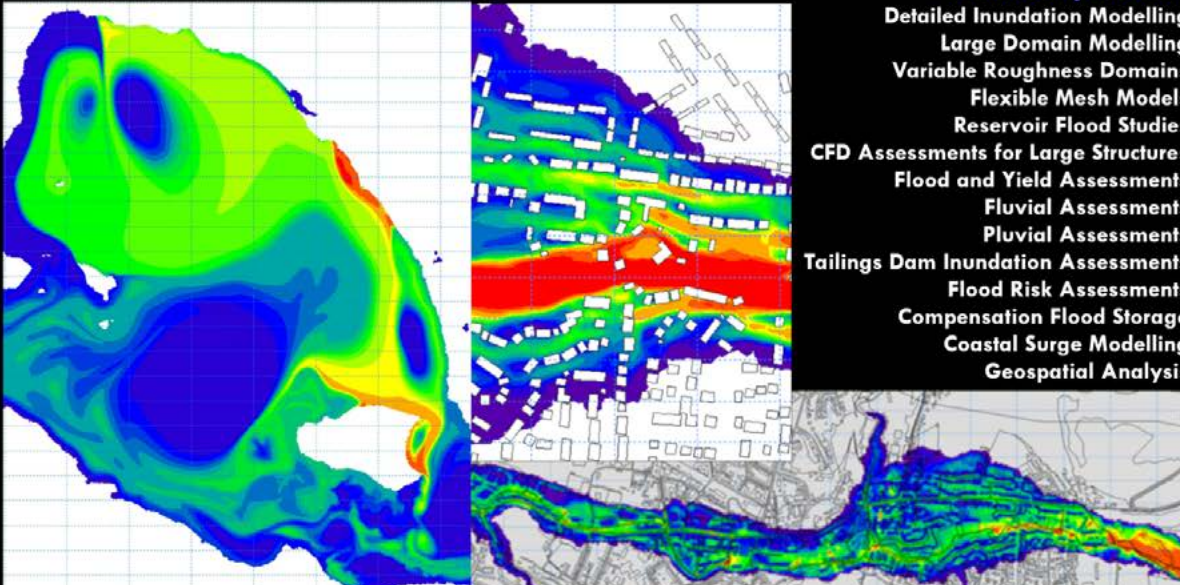
inspection resulted in extensive investigations, both intrusive and geophysical, to confirm the embankment's composition and to understand the behaviour. A Section 10 inspection was again called in 2020, in response to improved understanding of the seepage and stability issues and to allow remedial works to be planned. Resulting recommendations included:

- Control the internal erosion and seepage and provide adequate safety factors against slope instability;
- Install upstream control on the draw-off pipe.

The Canal & River Trust is currently undertaking a project to permanently lower the top water level, replacing poor quality material in the top sections of the embankment and regrading the banks to give an improved Factor of Safety against stability. The draw-off pipework will be lined and upstream control installed. Works started on site in November 2021.



CCH



Reservoir Pollution Dispersion **Reservoir Inundation Modelling**

CC Hydrodynamics

www.cc-hydro.com

- Detailed Inundation Modelling
- Large Domain Modelling
- Variable Roughness Domains
- Flexible Mesh Models
- Reservoir Flood Studies
- CFD Assessments for Large Structures
- Flood and Yield Assessments
- Fluvial Assessments
- Pluvial Assessments
- Tailings Dam Inundation Assessments
- Flood Risk Assessments
- Compensation Flood Storage
- Coastal Surge Modelling
- Geospatial Analysis

Contact Us

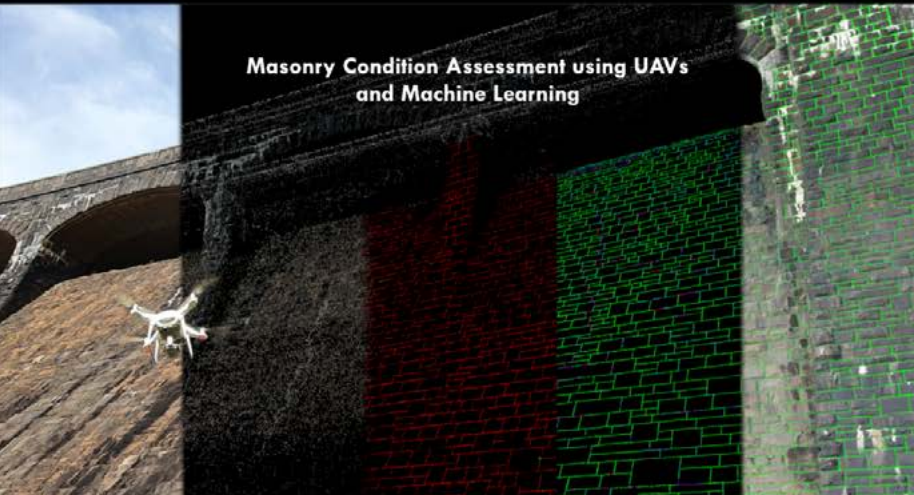
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CC Hydrodynamics is a specialist numerical modelling house focussed on wet infrastructure and flooding. We predominantly help other businesses with their numerical modelling needs by using our in-house automation and computational cluster to undertake assessments such as dam failure inundation assessments, flood risk assessments, hydraulic modelling including CFD, geospatial analysis, hydrological studies, and big data manipulation and interrogation. We work both within the UK and globally. CCH also provides Supervising Engineer services.

CC Informatics is a specialist informatics company focussing on drone surveys, remote vehicle inspections, and machine vision/artificial intelligence to aid with post processing. CCI has specialist in house tools which can be used for defect identification and defect tracking for large structures. The current focus of CCI is masonry structures (including dams, spillways, tunnels, viaducts, historical buildings, etc.) since these are difficult to produce defect surveys for without roped access or scaffolding. Since we use unmanned aerial and ground vehicles to collect data, we can reduce reliance on roped access or confined space entries - thereby removing some significant health and safety risks altogether.




Masonry Condition Assessment using UAVs and Machine Learning

Drone Surveys
3D Point Clouds
AI Feature Masking
AI Condition Assessment
Composite Imaging


CC Informatics

www.cc-info.co.uk

CCI



CREATING VALUES THROUGH GLOBAL PROJECTS



The Sendje HPP is a hydroelectric power plant under construction in the mainland region of Equatorial Guinea below the Djibloho HPP on the Wele River. When completed, the installed capacity of the hydropower plant (200 MW) will be the largest among all the country's generating capacity and will supply the continental part of the Republic of Equatorial Guinea and the neighbouring countries.

The construction of the Sendje HPP is carried out by DUGLAS ALLIANCE LTD. commissioned by the government of Equatorial Guinea.

Location and structure of buildings:

The construction site is located 30 km south of the capital of the continental region of the city of Bata and 20 km east of the town of Mbini located at the mouth of the Wele River. The layout of the hydroelectric complex is diversion type. As part of the project, the river will be blocked by a concrete gravity dam 63.0 meters high. In addition, four auxiliary earthen saddle dams, up to 20 metres high, will be needed to achieve the top water level required for powering the turbines. The energy circuit is represented by the inlet channel to the water intake, water intake, pressure metal conduits with an internal diameter of 5.0 m, the building of hydroelectric power stations and the outlet channel. Four radial-axial turbines (Francis) are to be installed in the building of the hydroelectric station. The electricity supply to the system will be carried out through 220 kV Gas Insulated Switchgear.

Main features of the project:

- Installed capacity – 200 MW,
- 4 units with a unit capacity 50 MW,
- Voltage of output – 220 kV,
- Average annual output – 1,402 million kWh,
- Nominal head – 67,5 m,

Reservoir:

- Reservoir surface area – 21.57 km²
- Normal reservoir water level – 88 m
- Reservoir net storage – 60 million m³

Connection with the power system is carried out through power transmission lines, designed for a voltage of 230 kV.

tel.: + 44 203 608 18 46
e-mail: office@duglasalliance.com
www.duglasalliance.com

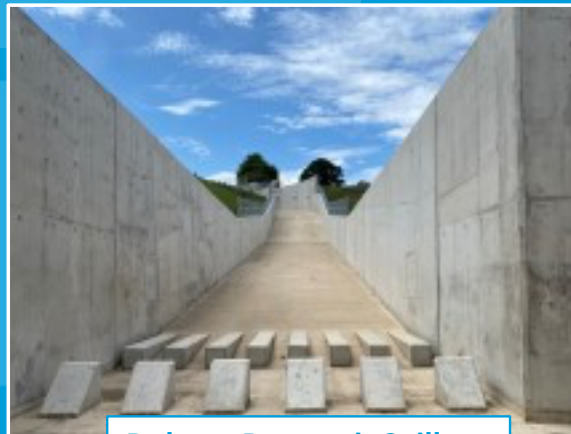
Dŵr Cymru Welsh Water is responsible for a portfolio of 134 reservoirs, which includes 85 impounding reservoirs, 7 non-impounding reservoirs and 42 service reservoirs. Of these, 86 have capacities greater than 25,000m³ (25MI) and 47 have capacities of between 10,000m³ (10MI) and 25,000m³ (25MI).



Llyn Brianne Spillway Maintenance

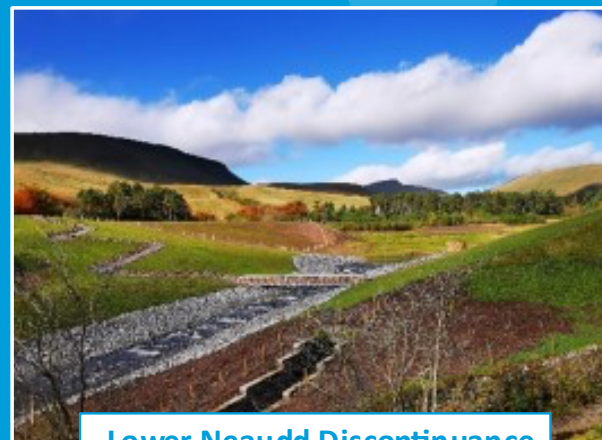
Following the Oroville spillway incident in the USA, Welsh Water identified Llyn Brianne as its only site with a similar geometry, and therefore conducted a flood study, modelling and detailed visual inspection of the structure. Although the condition was found to be generally good, the results of the investigations showed that repairing the joints would extend its life and ensure it would perform well in large storm events. Informed by the results of these studies, significant repair work was carried out across the summers of 2020 and 2021 to repair all defects - this required hydro-demolition and concrete repairs to be carried out on gradients up to 1V:1.7H. Members of Oroville research team visited the site in September 2021 to see the improvements that have been made first hand.

A flood study at Dolwen – a Category A embankment dam - concluded that the existing masonry spillway was incapable of passing a Probable Maximum Flood event without overtopping. A condition assessment also showed that the spillway was in need of repair, with clear evidence of spalling and cracking to the structure. A new reinforced concrete spillway was built at a lower level than the existing to combat leakage experienced where the clay core abuts a small dwarf wall close to the crest. Alongside construction of the new spillway, work also included the removal and preservation of a section of the clay core, before careful reinstatement. Despite challenging environmental constraints and a rigorous water level management protocol, the spillway is now fully operational and has since passed both storms Ciara and Dennis.



Dolwen Reservoir Spillway

Lower Neuadd reservoir, situated at the foot of the Brecon Beacons, has been successfully discontinued. The remaining pond and walkway provides a benefit to the public and the ecology in the area, whilst retaining a visual reminder of the industrial heritage. In 2016, Welsh Water proactively brought forward the Section 10 due to increasing concerns over the worsening condition of the 130-year-old earth embankment dam. There were numerous recommendations of works to be carried out to improve the condition of the site, but Welsh Water opted to discontinue the reservoir in line with Section 13 of the Act.



Lower Neuadd Discontinuance



Andrew Bowen
Head of Dam Safety
Andrew.Bowen@dwrwymru.com



Edwards Diving Services Ltd. (EDS) successfully completed works at Carr Mill Reservoir to develop and install bespoke isolations on two submerged 24" (600mm) diameter inlets to allow the valves and pipework to be replaced. The inlets served the draw-off and scour pipework and were located at the reservoir end of a submerged 67m long, 1.2m span brick arch draw-off tunnel, accessible only via a 2m diameter underwater tower within the reservoir.

Common design options would have included full dewatering of the reservoir (a slow process, including a large fish rescue operation) or an expensive sheet piled cofferdam structure in order to allow localised dewatering of the draw-off tunnel. These had many drawbacks both economically, socially and on the required works programme.

EDS was able to provide an innovative solution involving a bespoke hydraulic Remote Operated Vehicle (ROV) which could operate underwater to deploy a double isolation to each intake. The system had the benefit of being operated without diver intervention, therefore eliminating any intrusive diver work in the tunnel.

This innovation built on the expertise developed for a similar isolation achieved in a Welsh reservoir in 2019 with a bespoke ROV. Improvements in the design meant the new ROV was built to be smaller and more manoeuvrable whilst the isolation was further developed to comprise a blank flange, with a secondary (independent) inflatable pipe stopper, thus providing the peace of mind of a double isolation whilst the valve replacement works were carried out downstream in the dry.

As a result of EDS's innovation, the valve replacement work was completed in a short period of time, at significant cost and social impact benefits to the client and local community and enabling the safety recommendations to be achieved within the required timescales. EDS has a track record of working with reservoir owners and operators to develop and provide safety-orientated innovative solutions to revolutionise future reservoir operation and maintenance.

Nathan Walding

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Historic reservoir Loch Thom given a new lease of life thanks to expertise of Glenfield Invicta team



In 2019, two AVK UK Group companies, Invicta and Glenfield merged to form Glenfield Invicta. One of the key drivers for the merger was to take advantage of significant growth opportunities in their core markets: dams, reservoirs, hydropower, and environmental engineering.

Loch Thom is located 25 miles west of Glasgow and was constructed between 1825 and 1827. It was built originally to power water wheels that served local industries and is unusual because it is named after the engineer who designed it: Richard Thom.

A Section 10 inspection report for Loch Thom Reservoir in 2013 recommended that the discharge capacity of the tunnel outlet and the associated drawdown capacity be verified. This led to consulting engineers Mott MacDonald undertaking a drawdown feasibility study in 2016, which revealed that the existing discharge capacity was insufficient.

The proposed solution was to install a supplementary three-pipe siphon arrangement to provide the required additional drawdown capacity. Each of the three siphon pipes was specified as 1100mm tapering down to 900mm. The required flow rate through each siphon line was 5m³/s.

Glenfield Invicta worked with Mott MacDonald to optimise the valve selection for the siphon lines. The valves were to be installed on the 900mm diameter pipe section where the flow velocity was to be 7.9m/s. This velocity exceeds the maximum recommended flow velocity for standard gate valves.

After reviewing the proposed valve application Glenfield Invicta instead recommended the use of its Series 54 'reservoir-specification' metal-seated gate valves which are robustly designed, include several optional features as standard and are suitable for more arduous conditions.

In total, Glenfield Invicta supplied 6 x DN900 Series 54 gate valves, and 1 x DN500 Series 54 gate valve on the principal Loch Thom project works. The valves were supplied with spur gearboxes and electrical actuators.

In the case of the Loch Thom project, there were three key points. Firstly, specifying the correct valve is fundamental to the success of drawdown and discharge projects. Secondly, at Loch Thom high flow rates meant standard gate valves were unsuitable and Series 54 reservoir-specification gate valves provided the optimal solution. Finally, the involvement of the Glenfield Invicta team contributed to the success of the project.

Greg Morris, Glenfield Invicta's Business Development Manager Dams, Reservoirs & Hydropower, said: 'It was extremely important to discuss the exact requirements for the valves being used on this critical section of the project. Glenfield Invicta's detailed discussions with the consulting engineers allowed us to confidently identify the optimum valve specification for this application.'



Greg Morris

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HESELBERG HYDRO (UK) LTD

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Hesselberg Hydro specialises in the use of asphalt in hydraulic engineering for erosion & scour protection. The company supplies & installs reinforced geomats for river training, Open Stone Asphalt for flood protection structures, estuarine revetments & dams, and grouted rock for the most exposed coastlines. Our services also include feasibility studies, inspections, design & maintenance of asphaltic structures for dams, rivers, coastlines & ports.



In 1991 we installed the first Open Stone Asphalt (OSA) erosion protection revetment on a dam in the UK and since then we have worked with most of the UK's major water companies to provide solutions to strengthen deteriorating upstream faces. Upstream faces comprising stone pitching, rip-rap, concrete blocks, Grasscrete® and concrete slabs have all been strengthened using OSA.



In 2001 OSA was used to protect spillways for the first time in the UK. Projects have included providing spillway channels for existing dams as well as providing protection to entire downstream faces on new flood storage dams



In 2022 we will be installing erosion protection to the downstream slope of an existing flood storage dam to improve its resilience against an increased threat of overtopping. The original design used concrete blocks but when the Environment Agency challenged the designers to come up with carbon efficiencies, they looked into the use of OSA as an alternative. After proving its suitability, the OSA alternative was selected on the basis it saves time, money and carbon.



Technology driven solutions for resilient dams and reservoirs

HR Wallingford delivers smart solutions wherever water interacts with people, infrastructure and the environment.

Reservoir inspection and dam safety, dam breach, risk modelling, reservoir sedimentation and intelligent monitoring. We develop and apply innovative technology to deliver sustainable and cost-effective solutions for dams and reservoirs, no matter how complex the challenge.

With more than 70 years' experience in hydraulic engineering, our collaborative approach supports many nationally significant projects. We are independent and not for profit, but it's our people who make us who we are. Our ability to innovate and push the boundaries of conventional thinking is renowned across the globe.

When it comes to water, we're in our element.

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PROJECT SHOWCASE

Environment Agency Collaborative Delivery Framework (CDF) New Flood Storage Reservoirs

As a delivery partner to the Environment Agency, Jacobs is undertaking the design of several new flood storage reservoirs, from feasibility to detailed design and construction. Detailed design is underway for:

- Three reservoirs on the Littleborough and Rochdale Flood Risk Management Scheme (FRMS)
- River Roding (Shonks Mill) Flood Storage Reservoir, Essex
- Kendal Flood Risk Management Scheme, Cumbria

There are feasibility studies underway for other schemes, including Carlisle and the Thames Valley. This builds on Jacobs' long history of developing similar schemes under previous Environment Agency frameworks, including Salford and the Perry Barr scheme currently under construction (feature photo).

Littleborough and Rochdale FRMS Phase1

The 100,000m³ online Gale reservoir will protect 500 properties with a 1 in 100 AEP standard of protection. The reservoir will be impounded by embankments and a sheet pile wall both up to 4.5m high. The constrained site is bisected by a mainline railway such that the reservoir is split into two compartments, each with their own spillway and passive control structure, connected by a new culvert under the railway. The site is geotechnically challenging, being over a 21m-deep glacial channel infilled by very soft discontinuous surface clays, peat pockets and silts/ sand, with inflows from contaminated mine water discharge.

River Roding (Shonks Mill) Flood Storage Scheme

The 1,440,000m³ online reservoir features a double baffle control structure to optimise the head versus discharge characteristics and make most efficient use of the storage capacity. The spillway has been designed to pass the 440m³/s PMF flood while a foundation cut-off will mitigate the risk of internal erosion through terrace gravels in the foundation.

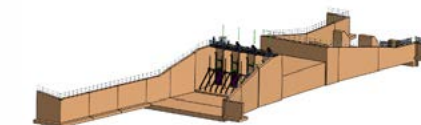
Kendal FRMS

The Kentmere and Kenrigg Flood Storage Area (FSA) provides 2.9Mm³ of storage and with 7km of linear defences contribute to protecting 1480 homes and 1150 businesses. The reservoirs are retained by 8m-high embankments while the flow control structure comprises a 180m³/s gated outlet, all built over glacial outwash deposits.



RESERVOIR ENGINEERING AT JACOBS

Jacobs provides a full range of dam and reservoir engineering services covering the full life cycle of dams from prefeasibility through to detailed design, inspections, studies and repurposing/discontinuance. Globally, Jacobs' Dams Community of Practice includes 350 staff with centres of excellence in the UK, Australia and USA, with decades of experience in delivering solutions to complex problems for a variety of clients. Within the UK, we have specialist reservoir engineers across five offices, with key hubs in Reading and Glasgow. This includes three All Reservoir Panel Engineers and ten Supervising Panel Engineers under the Reservoirs Act 1975. Our team works alongside specialists covering all relevant disciplines, including hydrology, geotechnics, hydraulics, structural analysis and environment. Our projects range from statutory inspections and remedial works to design and construction of new dams. Reservoirs range from small amenity lakes and service reservoirs to the largest reservoirs in the UK.



At Jacobs, we're challenging today to reinvent tomorrow by solving the world's most critical problems for thriving cities, resilient environments, mission-critical outcomes, operational advancement, scientific discovery and cutting-edge manufacturing, turning abstract ideas into realities that transform the world for good.

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CARR MILL RESERVOIR CANAL & RIVER TRUST

Kier is core to the maintenance of 2000 miles of the UK's canals and rivers, and over 8500 different structures, many of them listed. We support the Canal & River Trust to look after the third highest number of listed structures after the Church of England and the National Trust. There are 75 reservoirs within this portfolio.

In December 2021 we completed an upgrade to the Carr Mill Dam by providing improved access, consisting of steps, ladder and safety railings. We repaired the old spillway by grouting the inlet weir and replaced the concrete deck of the spillway bridge. We replaced two guard and service valves by using an ROV to isolate the intake pipes in the scour system.

Kier Regional Civil Engineering works nationally to deliver projects within complex environments.



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M

MOTT
MACDONALD

M

Mott MacDonald services in dam engineering

Mott MacDonald is proud to be a corporate member of the British Dam Society. We have been serving the UK water industry for over a hundred years and have a long track record in dam engineering. With offices throughout the UK and overseas, we offer exciting opportunities for staff to engage in a diverse range of reservoir-related projects including safety inspections, risk assessments, dam breach analysis and emergency planning. Our planning, design and construction supervision services cover all types of dams ranging from small flood storage reservoirs through to major dams for hydropower, irrigation and water supply. We offer formal training towards membership of the Supervising Engineer panel and mentoring for progression to the All-Reservoirs panel, together with the opportunities to effectively support panel engineer development.

Technical advisory services



Investigations



Construction supervision



Design services



Tim Hill | 01223 463697 | dams@mottmac.com | www.mottmac.com/water-and-wastewater/dams-and-reservoirs

Loch Thom Drawdown and Freeboard Improvement Project, Scottish Water



Cost	Designer	Contractor
£8M	Mott MacDonald	George Leslie Ltd

Loch Thom was designed by Robert Thom and construction was completed in 1824 to feed Greenock with a supply of water via the Greenock Cut, to power the locals mills in the area. It is formed by five earth embankment dams ranging in height from 2m to 23m. It currently provides the water supply to Greenock, Port Glasgow and Lochwinnoch via Greenock WTW.

At the statutory inspection under the Reservoirs (Scotland) Act 2011 completed by an All-Reservoir Panel Engineer in 2013, a number of safety recommendations were made which included completing a flood study to check for overtopping and a study to check the rate at which the reservoir can be drawn down.

It was determined from the CIRIA drawdown guidance published in 2017 that Loch Thom did not meet these requirements and that additional draw down facilities were required. In addition to this, the flood study identified that one of Loch Thom's smaller embankments was at risk of overtopping in a major flood event and therefore freeboard improvements were also required at the dam.

The preferred option to improve drawdown was to install 3 x 1100mm siphons through the main dam and discharge into the spillway channel (being upgraded to meet drawdown criteria). Tapers were used to reduce the sizes of the gate valves from 1100mm to 900mm, to save costs on the sizes of the valves required.

Freeboard improvements included raising the height of 2 of the 5 embankments and upgrading the spillway channel to safely pass a PMF event.

The siphons were commissioned in June 2021 with all works completed by September 2021.



Somerset Dam Improvement Project

Queensland, Australia

Stantec is delivering a design services contract to develop and detail the reference design for Seqwater's Somerset Dam Improvement Project.

Somerset Dam is a dual-purpose water supply and flood mitigation dam that is owned and operated by Seqwater. It is located on the Stanley River near Kilcoy in Queensland, Australia and water from the Dam is released into Wivenhoe Dam. The 305 metre long dam is 58 metres at its highest point and comprises 22 monoliths.

Stantec is investigating the potential for a dam upgrade to provide increased safety, consistent with the latest engineering standards and guidelines. The proposed upgrade will explore raising the Dam crest, constructing a downstream buttress, as well as modifying the gated spillway and outlet works.

When the upgrade is completed, the normal full supply level will be reinstated while allowing the dam to continue to mitigate potential floods.

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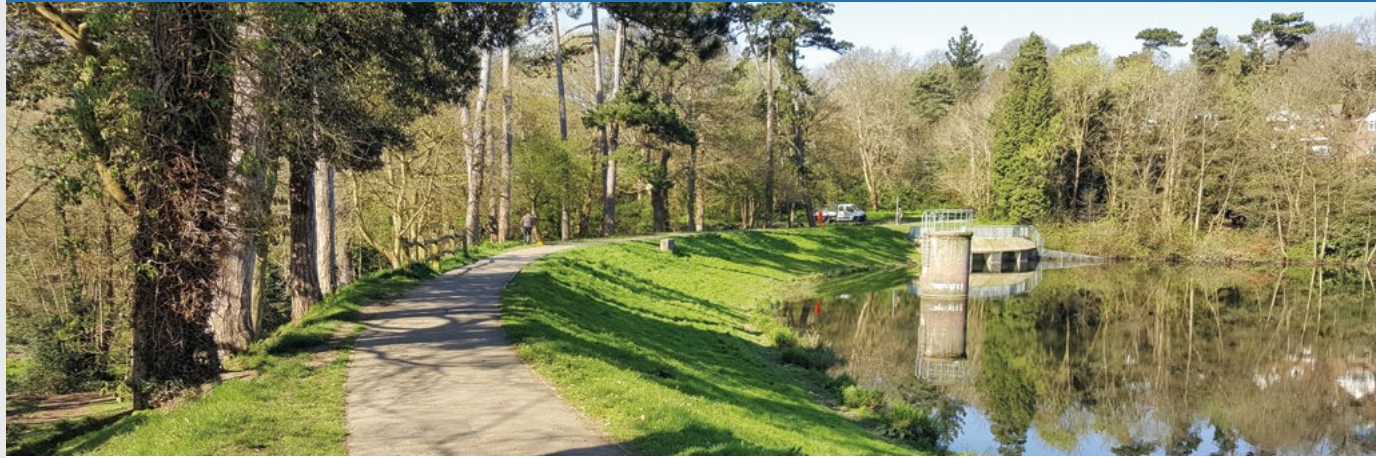
Stantec has over 160 years' of dam engineering and hydropower experience and offers full consultancy, planning and design services in the UK and across the world. Stantec has been actively involved with the design and construction of over 5,000 dams and reservoirs projects.

Stantec has delivered storage schemes for water supply, flood alleviation, river regulation and has been responsible for the design of over 50,000 MW installed capacity of hydropower (including pumped storage).

In the UK, Stantec also provides reservoir inspection and Qualified Civil Engineer services under the Reservoirs Act.

Stillwater Associates

Reservoir Safety & Water Consultancy



2021 has been another busy year for Stillwater Associates. In September we moved into a new larger design office in Reigate, Surrey which will allow us to continue to grow our technical staff and design capabilities.

As a UK owned specialist reservoir safety consultancy we are able to engage with a full range of clients from water companies to small private estates together with assisting larger consultancies meeting their reservoir safety requirements. Stillwater Associates now provides reservoir safety services to over 350 reservoirs with support from an extensive network of panel engineers across the UK. This, and our varied client base, enables us to continue to provide excellent training opportunities for our staff looking to achieve membership of a reservoir panel.

We have had an extremely varied workload in 2021 with many interesting design and construction projects in the UK and internationally.



Following on from our BDS evening meeting presentation in early 2021 on Buckshole Reservoir in Hastings, we completed the detailed design of the new spillway channel. The existing spillway channel runs immediately adjacent to the downstream toe of the embankment and any out of channel flow would have caused significant erosion and possible failure of this category A reservoir embankment. The new reinforced concrete spillway and stilling basin design will ensure extreme flood flows will be safely contained as demonstrated by the physical model that was developed during the detailed design. Construction is due to start in early 2022.

In 2021 we have been working on several new spillway designs including auxiliary spillways at Merevale Estate Reservoir (15m wide armorflex reinforced grass spillway), Eyebrook Reservoir (50m wide grass spillway) and new large capacity piped spillways at Eleven Acre Lake and Awbridge Lake.

Our other main design projects include several reservoir discontinuance projects including schemes for Welsh Water in north Wales, Llandarcy North Site Reservoir in south Wales and Kionslieu Reservoir on the Isle of Man. Each of these projects have a number of interesting ecological, reservoir safety and planning constraints which have shaped the design.

Stillwater Associates is proud to be a Corporate Member of the British Dam Society. It is one of the many ways we support the reservoir safety industry in the UK. Many of our staff also have experience of serving on the BDS committee, or ICE Reservoir Committee, demonstrating our ongoing commitment to assisting the industry in these changing times.

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Project Reviews 2021



Bateman Upgrades

Torside Grouting Project

The Longdendale chain of reservoirs was completed in 1877 by John Frederick La Trobe Bateman and at the time claimed to be the largest chain of reservoirs in the world.

Torside Reservoir located within the valley has recently undergone Tube-a-manchette (TAM) grouting to reduce the risk of potential seepage paths and increase the life of these aging assets.



Over recent years an increase in settlement and drainage flows had been observed by the SupE. Ground investigations were undertaken, including a quantitative risk analysis of internal erosion risk, and identified a number of seepage paths. Working with Soil Engineering, a grouting solution was developed and implemented resulting in over 1.3M litres of grout being injected in a targeted zone in the dam.

SupE Training

New Graduates join the team

Over the last five years United Utilities has invested time and SupE training opportunities for prospective engineers from within our Catchment and Ground Engineering and Reservoirs Teams, which has seen the Reservoirs Safety Team grow to 8 No full time and 3 No part time SupEs. The recent additions to the team are Nathan Freeman and Tom Rigby who have joined as graduates and are keen to engage in their future career in ground engineering and reservoir safety.

Blackmoss Upper

Clay Core Raising

Blackmoss Upper Reservoir is situated near Barley-in-Pendle, Lancashire. The dam was constructed between 1891 and 1894. In 1968 a new storm wall was constructed and crest raised across the full length of the dam. In 2016, seepage observed on the downstream embankment investigations led

to remedial works to raise the clay core to crest level. A recent Section 10 inspection included a direction ITIOS to investigate the clay core level in relation to TWL and PMF design flood.



A series of trial pits was excavated along the crest and indicated that the clay placed as part of the 1968 core raising was of poor quality and that the original clay core level had settled. As a result, new core raising is now underway along the full length of the dam. Due to restricted access the crest level has had to be reduced to allow plant to track safely across the crest and to provide the reach for the excavation to key into the original clay core.

New Spillway Works

Cloughbottom & Upper Rivington Reservoirs

In the next six months works will be starting on both Cloughbottom and Upper Rivington reservoirs following directions ITIOS to improve the spillway to allow the design flood, the Probable Maximum Flood (PMF), to be safely passed down the spillway.

In 2022 UU is planning to host a BDS site visit to the spillway and wave wall improvement works at Cloughbottom Reservoir. Works are expected to start early in the New Year and further information will be provided via the BDS early next year.

2022 CPD and BDS Site Visits

Where possible United Utilities is supportive in offering opportunities to prospective SupEs of external employers (for example S12 and S10 attendance) and working with the BDS mentoring scheme. Contact ian.scholefield@uuplc.co.uk for more information.



Anglian Water Services

Anglian Water is geographically the largest water company in England and Wales, providing water and sewerage across East Anglia and the East Midlands as well as supplying water to the area around Hartlepool. Operating in the driest region of Britain with around 600 mm of rain in a year, the region's water resources are split equally between surface and groundwater sources. Anglian Water has 36 reservoirs under the Reservoirs Act with the most notable being Rutland, Grafham and Alton Water.

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Aqua-Media International Ltd

Aqua-Media International Ltd, publisher of the bi-monthly journal Hydropower & Dams, aims to provide reliable data and a balanced view on the role and benefits of water storage and hydro plants, for its readership worldwide. Papers focus on technical, financial, economic and environmental issues. Special issues are produced for the annual ICOLD events, and previews and reports are published of BDS conferences. The company also brings together world experts at its own international events, working closely with ICOLD, IEA, ICID and ESHA. Biennial African conferences are organised in partnership with ICOLD.

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Bristol Water plc

Bristol Water plc, founded in 1846, supplies water to over one million people and businesses in an area of almost 2400 km² centred on Bristol. It is a subsidiary of Sociedad General de Aguas de Barcelona S.A. (Agbar). The Agbar Group has subsidiaries in 19 countries, and provides services to more than 37 million people around the world.

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CDMS

CDMS Sub-Surface Engineering Ltd has a long, robust history, which began initially with the formation of Commercial Diving and Marine Services in early 1971. Since then, the company's name has changed, but the retention of the founding spirit has remained, resulting in innovation dedication and reliability. Now after 47 years in the diving industry, the company can call on a wealth of experience gained over literally thousands of projects that have been successfully completed with a 100% safety track record. Over the years professional association with new clients and other organisations have further strengthened the company's versatility, exposure, and commitment to deliver the best services available.

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Keller

Keller is one of the UK's largest and most successful specialist geotechnical engineering contractors providing design and construct services for specialist grouting, piling, I&M, retaining structures and ground improvement packages. Using state-of-the-art plant, our highly trained professionals and innovative technologies to deliver projects within programme.

Sister company, Geo-Instruments, is also extremely experienced at providing automated systems for monitoring the safety and stability of dams, bridges and other structures enabling owners, infrastructure operators and engineers to identify and mitigate risk, optimise designs/solutions and document regulatory compliance.

We pride ourselves on our collaborative approach, working with contractors, clients and engineers across all sectors to ensure that a quality solution is delivered in a safe, sustainable and environmentally friendly manner. Our vast experience of working on reservoir and dam projects both in the UK and around the world, means that clients will always receive the best advice, highest quality service and most competitive price regardless of the scheme's complexity and location.

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KGAL Consulting Engineers Ltd

KGAL Consulting Engineers Ltd offers a complete structural, mechanical and electrical engineering service, both in the UK and overseas, through all stages of a project from conceptual design development to final commissioning on site.

With more relevant staff years' experience than any comparable company, KGAL is recognised as the leader in the field of Water Control Gate design, engineering and project management. With many of our engineers previously employed by the leading gate design and build contractors of the time such as Armfield Engineering Ltd, Biwater Hydropower, Newton Chambers Engineering (latterly Boving Newton Chambers, Kvaerner Boving and GE Hydro), we have a true working knowledge of gate design, manufacture and installation.

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Multiconsult UK Ltd

Multiconsult UK Ltd is a wholly owned subsidiary and fully-integrated part of the Multiconsult Group. The office in Ashford, Kent, UK is part of Multiconsult's Energy business area. All activities in marketing, sales and project execution are carried out seamlessly as part of the Energy team, sharing resources and expertise.

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National Resources Wales

We are proud to be leading the way to a better future for Wales by managing the environment and natural resources of Wales sustainably. NRW is the enforcement authority for the Reservoirs Act 1975 and regulates reservoir safety across nearly 400 large raised reservoir in Wales with a capacity of 10,000 cubic metres or more. We welcome comments, ideas and feedback from the BDS community on our work.

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SSE

SSE is a purpose based company involved principally in the generation, transmission and distribution of electricity; and also in the supply of energy and related services to customers. Its success depends on the skills and talent of its employees and the quality of its assets. Our purpose is to provide energy needed today while building a better world of energy for tomorrow. Our vision is to be a leading energy company in a net zero world. To create value for shareholders and society in a sustainable way by developing, building, operating and investing in the electricity infrastructure and businesses needed in the transition to net zero.

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R2M Ltd

R2M Limited was founded in 2003 and has grown over the last 17 years to become an established supplier to the UK water industry building a reputation for innovation and outstanding customer service. In 2019 R2M became a proud member of the Hawle Austria Group.

Our product range varies from pipes, valves and fittings to encapsulation collars and innovative pro-ducts. In particular our Nova Siria DR Range™ of emergency repair and encapsulation systems has been specifically designed for Dam and Reservoir Applications. Other specialist products also include remotely controllable, battery powered valve actuators that have already been adopted by three large UK companies. We offer all of our customers in the UK a 24/7 emergency service for installation and support with all of our product range.

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Storm Geomatics Ltd

Storm Geomatics Limited are measurement experts who use innovation to provide knowledge of the arrangement of structures above and below the water surface. Accurate geospatial data is captured of the reservoir bed, banks and walls with interferometric sonar and merged with above water data from static laser scanners. The complete data set enables engineers to access the whole asset from their desktop and efficiently plan maintenance work and accurately perform engineering calculations. Our large team of water trained surveyors are always available to discuss your requirements and provide competitive fee proposals for your projects.

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Severn Trent

Severn Trent is a FTSE 100 water company, serving more than 8 million customers. Our region stretches from: mid-Wales to Rutland and the Bristol Channel to the Humber. We manage a captivating collection of 82 statutory reservoirs, regulated by the EA and NRW respectively. Our estate of reservoirs can be found in our surveillance training manual: **2019_03_04_Maintaining Reservoirs Redesign.pdf (britishdams.org)**. We seek *“to be recognised as the best in the country at reservoir safety”* and our team comprises; 4 SE's, 3 Surveyors and 4 Technicians. A further 5 engineers are training to become SE's on an industry leading programme. Our capital programme includes an ambitious programme of remote monitoring. We fully support the R&D programme and are actively involved in the current CIRIA Siphons Guide. We are active members of BDS and have promoted papers and presentations; most recently on the “Clywedog 50year Review” and “Ladybower Reservoir Emergency Exercise”.

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Thames Water

Thames Water is the UK's largest water and sewerage company, serving 14 million customers across London and the Thames Valley. The area we service covers 5000 km2, from parts of Kent and Essex in the east to the fringes of Gloucestershire in the west. Thames Water owns and operates 59 statutory dams and a further 450 smaller service reservoirs and flood storage areas throughout the Thames Water region.

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Yorkshire Water

Yorkshire Water is responsible for providing clean and waste water services to over five million customers and businesses within Yorkshire, and the efficient management of the local water supply network from source to tap. We are responsible for 134 large raised reservoirs under the ambit of the Reservoirs Act 1975, ensuring their continued safety and availability for water supply and amenity within local communities.

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Closing Remarks



As we reflect on 2021, there is no doubt that we have all faced a number of personal and professional challenges in the year. Although, for some, the location and way in which we work has continued to change, there is one constant that has remained at the forefront of our minds. This is to ensure that the safety of our dams and associated infrastructure are maintained in line with industry standards, and in turn protect the public.

Over the next year and beyond, we as an industry will be faced with another period of transformation following further legislation changes, as a result of the incident at Toddbrook Reservoir. New guidance documents will be published including guides for owners and operators, spillway examination guides, guidance for Inspecting Engineers and Supervising Engineers. These guidance documents will hopefully initiate a clear and consistent direction in our industry as we move forward. We all have a part to play in these challenging and ever-changing times, but we must all ensure that we share experiences, by engaging and learning from each other. It is our duty to pass on knowledge between ourselves and to show the world what we are doing as an industry in the UK.

During 2022, we have several key events being held including in May 2022, the 27th Congress - 90th Annual meeting of ICOLD will be hosted in Marseille, France and the BDS Conference 2022 in Nottingham. As Vice Chair of the BDS committee, I cannot wait to attend these events and to be able to discuss, learn, network and engage with all attendees not only from the UK, but globally at ICOLD. I encourage all members of the BDS to consider attending these two important events in our industry's calendar, especially with ICOLD being held in such an accessible European city.

Rachel Davies
BDS Vice Chair



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