Conference Report: Historic Landscapes and the 2010 Flood and Water Management Act
Tuesday 21st June 2011 Deer Park Hall, Pershore, Worcestershire

The Reservoirs Act 1975, which ensures the safety of UK reservoirs, is in the process of being updated by the Flood and Water Management Act 2010. Haycock liaised with English Heritage and other key organisations to host a conference to share experience, providing a forum for interested groups to share experiences of implementing these changes. The setting and conference facilities were first class. Speakers from the leading organisations on this subject summarised the requirements of the Flood and Water Management Act, and shared project examples, identified sources of support and funding and discussed the strategic implications for historic houses and estates, and their owners and managers. For historic landscapes there are particular challenges in satisfying the legislation whilst maintaining a sensitive approach to the management. Costs can be significant.

Professor Andy Hughes, Director of Dams & Water Resources, Atkins; Panel Engineer, and Advisor to DEFRA, began the day with a historical perspective. (For more detailed information, see www.barrages-cfbr for his paper RESERVOIR SAFETY IN THE UK). The first reference to reservoir safety in the UK appeared in the Waterworks Clauses Act of 1863, where someone who was concerned about reservoir safety could complain to two Justices of the Peace who would then investigate the issue and organize repairs/action. Then in 1925 three failures caused loss of life. On Monday 20th April 1925, heavy rain caused the dam of the Skelmorlie reservoir to overtop, the 'burst' killing a woman and four children, and then on 2nd November 1925, a cascade failure causing the death of 16 persons in the village of Dalgarrog, North Wales, when two dams failed, after poor quality construction. This led to the Reservoirs (Safety Provisions) Act 1930 that became law 31st January 1932, applying to all reservoirs containing more than 5 million gallons above the level of the natural ground and subject to inspection by an independent engineer. There was a responsibility under common law for accumulating water and filth, but there were no powers to enforce the Act or compel the owner to carry out works required in the interests of safety. The Reservoirs Act 1975 brought in the formation of a supervising Enforcement Authority nested in more than 136 different authorities with the provision of a Supervising Engineer for each dam with a capacity of 25000m^3 (a rounding up of the 5 million gallons – 22700m^3) and to visit the dam usually twice a year to watch for change. The first formal Register was made. Since 1975 though there had been no loss of life, there have been three or four incidents of dam failure every year. A guide 'Floods and Reservoir Safety: An Engineering Guide' first published in 1978 was updated 1989 and 1996 to suggest standards and categorising dams in terms of the potential hazard to life and property downstream:

Category A dams: where a community (defined as 10 or more people) are at risk.

Category B dams: where inhabitants of isolated houses are at risk or where extensive damage would be caused (i.e. erosion of soils, severing a main road or rail communications.

Category C dams: situations where there is negligible risk to human life and so included flood threatened areas that are 'inhabited' only spasmodically e.g. footpaths etc and loss of livestock and crops.

Category D dams: usually small dams where the additional damage caused by the release of water may well be insignificant if the lake is small – where the stored water would add no more than 10% to the volume or peak of the flood.

The 2003 Water Act called for better record-keeping of 'flood-plans': inundation mapping, velocity and depth of water, on-site and off-site emergency planning; the removal of the 136 different enforcement authorities , to be replaced with a single enforcement authority – the Environment Agency; the removal of Crown immunity.

As a result the Flood and Water Management Act 2010, England and Wales, there will be more monitoring and maintenance to ensure public safety, a risk-based-approach to protect persons and property against the escape of water, and includes more small reservoirs and cascades, with a 10,000 cubic metres threshold. Statutory Inspections will have the force of law. Recommendations and reports may be challenged at the report stage with a referee procedure. Owners will be given three years to resolve problems. Many historic water features previously exempt from regulation will now have to meet statutory standards and will be subject to inspection to ensure they comply, whilst many may be deregulated as they pose a low risk to people and property downstream. The choice of pragmatic and flexible engineers will be key for owners, so as to build and maintain stable level-crested, smooth dams with working valves, appropriate spillways and ensure no trees in a wrong position, care with machinery, grass cut and no overgrown vegetation so that dams may be inspected. The advice is be safe, be legal, be sure.

Simon Rundle, Principal Counsel for Reservoirs, Environment Agency, continued the theme, pointing out that the average age of reservoirs is 110 years. Owners will be enforced to register, and in Phase 1, April 2012, every reservoir will be assessed, probably in three categories, high, medium and low risk and measures to be taken 'as soon as practicable'. Phase 2, Oct 2013/2014 will require the registration of new large reservoirs and flood maps for those from 10,000 to 25,000 cubic metres. High risk reservoirs will require a supervising engineer to make a statement of compliance on maintenance. Post incident reporting will become a legal requirement. This will enable the sharing of knowledge in this new era of challenges for owners/undertakers/lessees of ornamental lakes especially in Phase 2. In cases of dual, or even several ownership regarding upstream face, and downstream face, and road, or even different local authority areas, it will be a matter of negotiation on a case by case basis. Note that DEFRA is administrative and cannot give technical advice in engineering. Also DEFRA does not care about planning issues, listed structures or tree preservation orders, safety is paramount. Criminal charges may be brought for an offence of strict liability.

Andy Wimble, Regional Landscape Architect, English Heritage, thinks that approximately 13% of registered parks and gardens could be affected by this 2010 legislation and endorsed the need for flexibility and pragmatism. There will be issues of extreme weather and ground saturation, lakes needing to be de-silted, and warned of the cumulative effect of managing a chain of lakes or abandoned water features. There are design issues such as the use of riprap to counter rising water tables, die-back in trees, and emphasised the need to mitigate highly inappropriate, over-engineered solutions. Landscapes are

vulnerable to failure to understand the character and key components of the landscape. Heritage at Risk Funding is being extended to landscapes at risk. He gave us some significant case studies: at Bretton Country Park, EH Grade II, (home to the Yorkshire Sculpture Park) restoration of the lakes created by damming the River Dearne, and the EH Grade II* Plumpton Rocks, where it is hoped to retrieve the picturesque landscape as depicted in Turner's c.1798 paintings. He disclosed that Alnwick Castle Estates are looking at using hydro-power from the cascades on the River Aln below the castle. Andy concluded by saying there might be a case for English Heritage issuing Guidance Notes. He emphasised the importance of dialogue, case studies and data-gathering, and concluded that County Gardens Trust might be helpful in data-gathering, to help the understanding not only the history of the features but how the lakes are being used.

David Thackray, Head of Archaeology, National Trust, has been working on their policy publication "Source to Sea", and has assessed 5 % of NT land and 2,000 buildings are at risk, with 120 NT properties at Flash Flood Risk. Slope is an issue, as is erosion, episodes of high rainfall and climate change. They are looking at slowing the speed of water at which it moves downstream, using land to absorb and store water. There is flood risk with coast erosion and sea level rises, with 9 coastal historic parks and gardens in the risk zone. The restoration of the dam at Stourhead is a good example hydrological, archaeological and biodiversity aspects. Core samples of the dam were taken. They did not change the profile of the lake, and kept the historic outlet piping and used the least obtrusive materials. Dredging can create artificial islands. In Studley Royal water garden some such islands have now been removed. At Woodchester, a big working landscape in Gloucestershire, a valley with a chain of 5 lakes, the dense forestry creates a problem, casting deep shade on the lakes and viewpoints have been obscured. The NT has a 25 year plan to take out the forestry and return the land to grazing. There is a serious health and safety risk to the Stroud valley community, so, with appropriate historical research and design intentions to ensure water resource conservation in planning, there has been some serious, austere engineering including enlarging spillways.

Dominic Cole, Principal Landscape Architect, Land Use Consultants, Chair of Garden History Society, agreed that the brutal engineering at Woodchester works because the sides of the valley are planted up. He talked of problems of water features placed on tops or on sides of hills, for example the scale and visual illusion at Prior Park where the ponds are small, and this area of Bath geologically unstable. At Wardour Castle, designer Richard Woods dams had collapsed when trying to implement Capability Brown's lake proposals. Dominic showed a fascinating plan of the contours of the Stowe landscape, showing where great amounts of earth-moving had been done and excavated soil deposited, and talked about Brown's problems sourcing water and failing to create a lake at Stowe in the Grecian valley.

Nick Haycock, Director of Consulting, Haycock Associates, focused on hydrological perspectives, the challenges of catchment risks, and modifying catchment behaviour. Should we use smart hydrometrics to reduce reservoir management risk, or find softer solutions? He spoke of the eleven water bodies on the 600-acre Hampstead Heath, the impact of people, and the problems of compaction and sorptivity, with some areas like concrete. Crisp, clear water is an aspiration as at Croome which had been badly silted. He spoke about dredging the lake, the weir and original penstock systems, the quality of the catchments (although NT does not own Pirton Pool part of the original network),

the need for sympathetic solutions, particularly with a heronry on the island, and the reduction of pollution and nitrogen because of the significant wetlands, and with ground water seeping down the valley, alternating flow and run-off. He discussed warning systems. There is a rain radar now monitoring the weather on Hampstead Heath, with rain gauges and water-level recorders to trigger an alarm system now in place in Hampstead.

Steve Capel-Davies, Partner & Past-Chair, Peter Brett Associates, concluded the day's talks with a key case-study, Blenheim, where his engineering firm have been involved for 8 years. He spoke of Vanbrugh building what Thomas Whateley called 'a monstrous bridge over a vast hollow', of Capability Brown's damming of the modest river Glyme to create the Great Lake. Brett Associates needed to balance competing objectives concerning 7½ million cubic metres of impounded water in a World Heritage Site working with English Heritage, Natural England and the Environment Agency. In 2007, a tractor made a hole in Brown's underground spillway beside the dam. The cascade, with a drop of 7 to 8 metres, was also leaking. The decision was made to pollard and then cut down the trees below the dam by the spillway. They dug a 1m wide trench to remove eroded and breached sections of the dam, and replaced the 600 mm core of the dam back filling with bentonite (a form of clay) slurry (or cement made of hydrated aluminosilicate minerals, comprised chiefly of montmorillonite). They had wanted to build a level spillway over ground, instead of underground, but others wanted a more naturalistic serpentine spillway as a path. Vegetation will take root in this armour-lock spillway. 12, 000 cubic metres of top-soil were imported and wildflower and grass sewn, and evergreen shrubbery planted. There is now a viewing area for visitors overlooking the cascade. The central area of the Grand Cascade was grouted, and limestone rocks (taking care to source the right kind of stone) placed either side to stop leakage. They now have to address an area below the Swiss Bridge that was once wetlands according to a 1920's photograph, and the river–lake that is embanked and densely wooded all the way to Brown's brick Lince Bridge and another cascade with 4-metre drop.

Conclusion. A worthwhile day explaining the implementation of the 2010 Flood and Water Management Act, giving an opportunity to discuss issues and good practice, and adding much to a gathering wisdom re hydro-projects in historic landscapes, which will need to be individually addressed, carefully, case by case, and hopefully, sensitively sympathetic to the site's setting. Haycock Associates' posters on the walls for the conference room: "Putting water first creates habitat for lives" and "Thinking big to solve problems at source" would seem to suggest a positive way forward for landowners of historic landscapes.

Steffie Shields, June 2011