Low-Carbon Concrete Delivers Resilient Spillway Upgrade at Camps Reservoir

SPECIAL REPORT | Reservoir engineering • Low-carbon concrete • Remote-site construction

HOW GEORGE LESLIE USED COLLABORATIVE MIX DESIGN, ON-SITE BATCHING AND GGBS CONCRETE TO IMPROVE RESERVOIR RESILIENCE WHILE REDUCING ENVIRONMENTAL IMPACT.

140m reinforced concrete spillway channel	**Almost 800m^3 structural concrete placed**
130+ rock anchors installed and grouted	**On-site batching** reduced delivery risk and improved control

At Camps Reservoir, George Leslie delivered major spillway improvement works for Scottish Water as part of a wider programme to strengthen reservoir resilience and support long-term water network performance. The project combined heavy civil engineering with practical sustainability measures, proving that lower-carbon materials can be adopted on demanding infrastructure schemes without compromising constructability or quality.

THE CHALLENGE

The works required construction of a new U-shaped spillway channel within the existing spillway to improve flow control, prevent erosion and enhance resilience. The site brought together several constraints familiar to reservoir engineering teams: remote access, a weight-restricted bridge, long supply routes and a steep spillway geometry that increased the risk of concrete movement before curing.

Conventional concrete supply would have required repeated long-distance deliveries from a plant more than 30 miles away, increasing vehicle movements, quality risk in transit and pressure on private access roads. The project therefore needed a concrete strategy that could maintain output, protect quality and reduce avoidable environmental impact.

At a glance
A remote reservoir setting demanded a practical construction model balancing logistics, concrete performance, carbon reduction and programme certainty.

THE APPROACH

George Leslie worked collaboratively with Grange Quarry to develop a low-carbon C40/50 concrete mix incorporating Ground Granulated Blast Furnace Slag. The mix had to meet structural performance requirements while remaining workable on a spillway formed on a longitudinal gradient of approximately 13 degrees.

To validate the method, the team carried out laboratory testing and full-scale trial pours using mock-ups that replicated the spillway geometry. This allowed the project

team to refine workability, stability and placement techniques before the main pours began.

An on-site batching plant was established to produce concrete on demand. This improved responsiveness during pours, reduced reliance on external delivery windows and gave the site team greater control over consistency, waste and sequencing.

Engineer's note
The construction strategy treated mix design, logistics and placement methodology as one integrated temporary works problem, rather than separate site issues.

ENVIRONMENTAL BENEFITS

The use of GGBS reduced the cement content of the concrete, lowering embodied carbon while retaining the durability and strength required for a critical water infrastructure asset.

Producing concrete on site reduced the need for long-distance part-load deliveries, supported better quality control and minimised waste. It also reduced pressure on constrained access routes and gave the project greater flexibility in responding to weather, programme and placement conditions.

Additional sustainability benefits came from reinforcement steel manufactured with high levels of recycled content, retention of imported aggregate for future operational use, energy-efficient welfare provision and wider measures to reduce fuel consumption within the site compound.

THE RESULT

The Camps Reservoir spillway upgrade demonstrates how low-carbon concrete can be embedded into complex civil engineering delivery when design, supply chain and site teams collaborate early. The project maintained the quality and durability required for reservoir infrastructure while improving control over logistics, waste and carbon impact.

"The project shows that sustainable construction is not a separate workstream. It is an engineering decision-making process, shaped by site constraints, material performance and constructability."

WHAT'S NEXT

The approach provides a practical reference point for future reservoir, water network and remote-site infrastructure projects where carbon reduction must be balanced with programme certainty, technical assurance and operational resilience.

GEORGE LESLIE