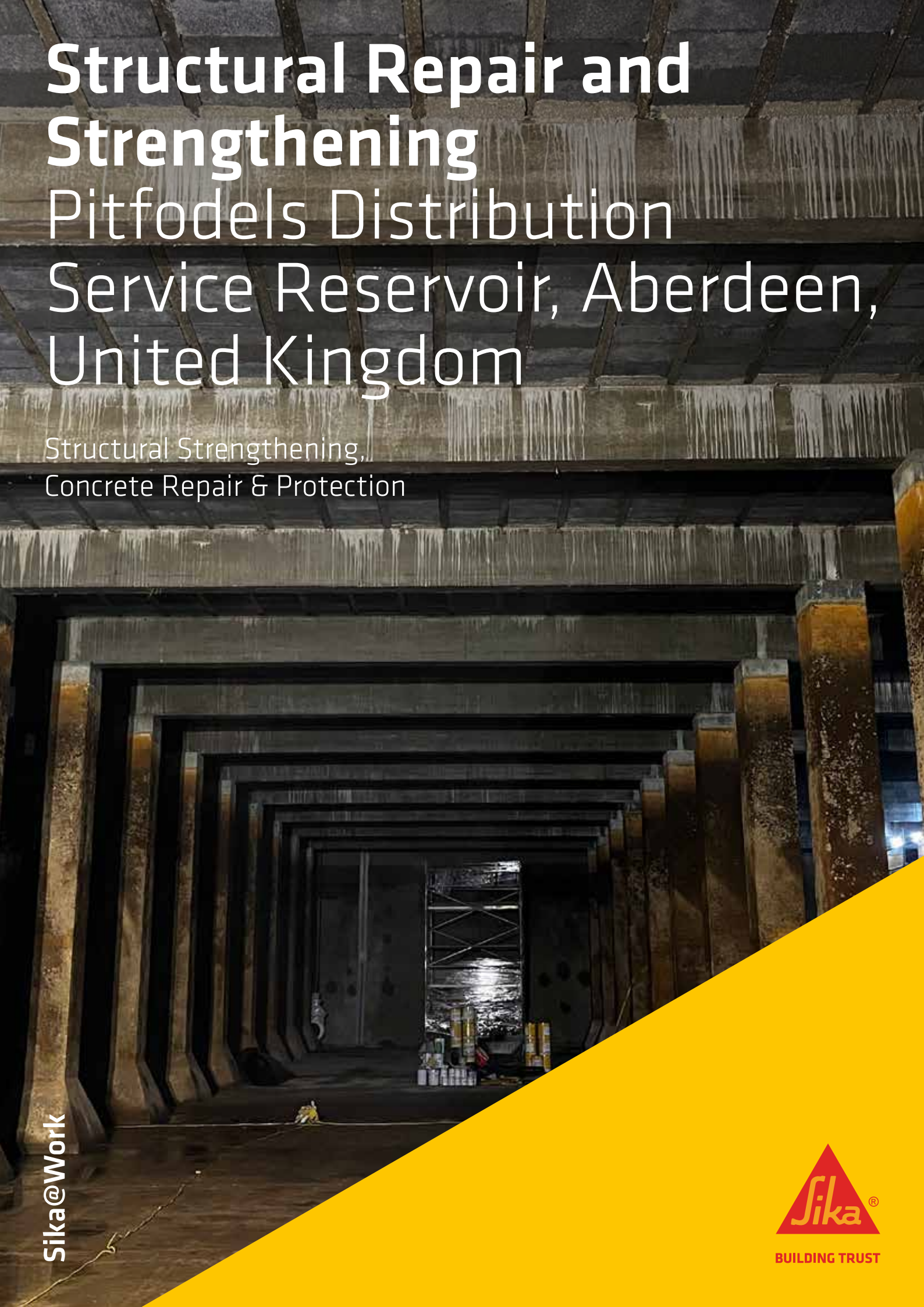
Structural Repair and Strengthening

Pitfodels Distribution Service Reservoir, Aberdeen, United Kingdom

Structural Strengthening,
Concrete Repair & Protection



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BUILDING TRUST

The cost-effective repair and refurbishment of a mothballed reservoir to bring it back into service proves a sustainable, economic alternative to a costly new build replacement.

Project description

Pitfodels Distribution Service Reservoir (DSR), located in Aberdeen, is an important part of Scottish Water's drinking water distribution network. Originally constructed in the 1930s, the reinforced concrete reservoir was taken out of service after inspections identified water ingress and significant deterioration of the roof structure. Rather than replacing the ageing asset, Scottish Water chose to refurbish and strengthen the existing reservoir, providing a more sustainable and cost-effective solution.

Covering approximately 3,000 m^2 with a depth of 8 metres, the reservoir is comparable in size to two football pitches. Following refurbishment, the structure was upgraded to meet the stringent requirements for potable water storage, extending its service life while restoring an essential part of the region's drinking water infrastructure.

Project requirements

The refurbishment presented significant structural and operational challenges. Initial inspections identified water ingress through the roof structure. Once the reservoir had been drained, detailed investigations revealed substantially greater deterioration than originally anticipated, requiring extensive structural repairs and strengthening beyond the initial scope.

The project was further complicated by the absence of as-built documentation, requiring engineering decisions to be made following detailed on-site investigations. Working inside an 8-metre-deep confined space also imposed strict health and safety requirements, including specialist confined-space procedures and emergency rescue planning.

A further challenge was the continuously damp environment. Since several strengthening systems require dry substrates to achieve optimum performance, the reservoir had to be carefully dehumidified before repair and strengthening works could begin.

Finally, all repair materials had to comply with the stringent hygiene requirements applicable to structures used for drinking water storage, ensuring long-term durability without compromising water quality.

Sika solutions
Following detailed condition assessments, Sika worked closely with Morrison Construction, Fraser Bruce Group and the project engineers to develop an optimized refurbishment strategy that provided both structural strengthening and longterm concrete protection.

Structural Repair and Strengthening
Concrete defects were repaired using Sika MonoTop® repair mortars before strengthening works commenced.

Because the soffit surface was uneven and remained damp, the originally proposed CFRP fabric system was replaced by the Sika® CarboDur® Grid C system, which uses a cementitious mortar to bond and encapsulate an expanded CFRP grid. This solution allowed efficient strengthening of the extensive roof soffit despite the challenging substrate conditions.

The secondary beams were further strengthened using Sika® CarboDur® S626 carbon fibre plates bonded with Sikadur®-30, providing additional structural capacity where required.

After completion of the strengthening works, the concrete surfaces were protected with SikaTop®-588 Seal, a Drinking Water Inspectorate (DWI) approved protective coating suitable for potable water applications.

Technical service and on-site support
Sika played an active role throughout the project, supporting the contractor from the early design stage through to final installation.

Working together with Morrison Construction, Fraser Bruce Group and Allen Gordon LLP, Sika participated in developing the refurbishment strategy after the true extent of the deterioration became evident. Technical specialists assisted in selecting the most appropriate strengthening solution, adapting the specification when site conditions made the original approach impractical.

To ensure successful installation of the new strengthening system, Sika provided hands-on installation training, with a specialist travelling from Switzerland to train the contractor on the application techniques, spray equipment and product systems. Sika personnel also completed Confined Space Training, enabling them to safely access the reservoir and provide on-site technical assistance whenever required.

This close collaboration between client, contractor, engineers and Sika ensured the selected solution could be installed efficiently while maintaining the highest standards of quality and safety.

Project outcome
The refurbishment successfully returned the reservoir to service as a drinking water storage facility while avoiding the need for complete replacement. By refurbishing the existing structure, Scottish Water achieved a solution costing approximately one quarter of a new replacement, representing savings of around £3 million.

The upgraded structure benefits from a 30-year design life, providing a sustainable solution that significantly reduced material consumption, construction waste and embodied carbon compared with building a new reservoir.

Project participants	
Project owner	Scottish Water
Main contractor	Morrison Construction
Specialized contractor	Fraser Bruce Group Ltd
Structural engineer	Allen Gordon LLP
Sika Organization	Sika Limited (United Kingdom)

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