

King George V Reservoir Works

Client: eight₂O (SMB JV)

Location: Enfield, London

Value: £2.5m

Duration: 1 Year

In Brief...

King George V Reservoir was constructed between 1908 and 1912. It opened in 1913 and is the largest reservoir within the London area, measuring 170 ha (420 acres) in size and holding 2,740,000,000 gallons of water.

To enable the reservoir to continue to operate safely, Barhale were engaged by eight₂O (SMB JV) to carry out two essential elements of work:

- Strengthening of the existing kneeler beam
- Installation of a hardcore access road round the crest of the reservoir

Technical Features...

Strengthening of the Kneeler Beam

Kneeler beams are built into the upstream shoulders of the reservoir embankment. They provide support to the concrete slabbing, which protects the embankment from wave erosion around the top of the water level. When reservoir levels were very low, there was the risk of erosion undermining these kneeler beams, which could cause the concrete slabs to fall away.

To solve this issue, Barhale proposed the placement of a 2m wide, 300mm thick gabion stone mattress, immediately below the kneeler beam, providing a reinforced footing to the base of the reservoir perimeter.



A 2m wide, 300mm thick gabion mattress was installed around the perimeter of the reservoir



Conveyor belts were used to transport stone from the top of the reservoir to the kneeler beam

Strengthening works were carried out using the following method:

- Linked conveyor belts were set up at four locations around the reservoir
- 8t tracked excavators were used around the reservoir at the kneeler beam level to create a level access track on which the tracked dumpers could operate
- Gabion stone was delivered to the top of each conveyor belt by 6t tracked swivel dumpers. It was then loaded by excavator into the conveyor hoppers at the top and then loaded again into tracked dumpers at the bottom (kneeler beam level) by tracked excavator. The use of tracked dumpers was imperative as standard wheeled dumpers would not have been able to safely traverse the steep incline of the reservoir's embankment
- The stone was then transported to the required location and placed into the final position by an 8t tracked excavator

Construction of the Crest Road

To enable safe and unhindered access to all areas of the embankment crest, a 3m wide, hardcore road was constructed around the entire perimeter of the reservoir. The new road is 6.5km long and was constructed using Type 1 aggregate at thicknesses varying between 150mm and 300mm.

The road was constructed by four separate work gangs (each working on different sections of the reservoir) using the following method:

- An 8t tracked excavator removed the existing surface on the crest of the reservoir to reach the required formation level
- A layer of geotextile separator was then laid
- Imported Type 1 stone was transported to the crest by 6t tracked swivel dumpers
- Excavated soil was removed by the dumpers from the crest to the designated site storage area
- The stone was then spread by the excavator and compacted to the correct finish level using whacker plates. A nominal cross fall of 1:40 was incorporated in the design to promote drainage
- This sequence was repeated in 5m sections around the perimeter of the reservoir



Customer Benefits/Feedback...

To avoid working in the winter time, which would have run the risk of extending the overall duration of the works, Barhale agreed with eight₂O to have a 6 month pause. Although this moved the completion date, it did enable the team to keep the actual duration of the works (including “snagging”) within programme. Barhale developed an excellent relationship with eight₂O’s project management team. They provided specialist knowledge to eight₂O in both design and delivery to ensure the solution worked correctly and safely. Through collaborative planning, the team ensured eight₂O’s requirements were met throughout the works.

Barhale also saved eight₂O costs during the project by:

- Proposing the use of an alternative type of geotextile material, which provided the same level of protection as the recommended product but cost considerably less
- Re-using excavated spoil on site to enhance the quality of the access roads at the bottom of the reservoir