DAMS & RESERVOIRS

Reference: CS-38

Dams and Reservoirs have formed essential structures for thousands of years, utilised for water supply, flood protection, navigation, irrigation and more recently for power generation. The combined effect of population growth and climatic variability is leading to increased pressure and demand for such infrastructure.

GWP Consultants LLP has over 30 years' experience providing water resources and geotechnical services within the UK and overseas.

GWP have expertise over a range of disciplines relevant for the design of water management infrastructure, covering all aspects of hydrology, geomorphology, flood risk management, hydraulic design and geotechnical design. Our experience incorporates hydraulic and geotechnical dam design, including stability assessment and construction monitoring and supervision. In addition, our expertise spans to watershed characterisation and management, incorporating the assessment and mitigation of sedimentation, rockfall and landslide hazards.

Work is undertaken by our team of hydrologists, hydrogeologists and geotechnical engineers backed up by experienced surveyors and GIS specialists. The integrated nature of these disciplines enables GWP to oversee a project from inception to completion.

We are able to consult partners who can provide innovative solutions to dam inspection, repair and maintenance, such as 'Limpet Dam' technology.

Related expertise:

- Geotechnical design and assessment of embankments, dams and abutments
- Construction specification and supervision
- Detailed surveying; topographic and hydrographic
- Geographic information systems (GIS)
- Hydrological catchment modelling and flood routing
- Hydrogeological investigation
- Hydraulic modelling and flood water elevation prediction
- Hydraulic design of weirs and spillways
- Design of flood water storage facilities
- Geomorphological assessment
- Rainfall probability analysis
- Rainfall runoff modelling

Selected Projects

Case Study: Geotechnical assessment of dam abutment

Stability assessment of the right abutment to the main Hatta Dam above the centre line of the asphalt core (then under construction). A detailed structural geological survey was undertaken of the right abutment, highlighting the possibility of mass slope movements from un-restricted excavation. Design controls to ensure undercutting of critical joint and fault surfaces were put in place. Detailed slope designs ensured the hazards were successfully removed in a controlled manner ahead of raising the dam.

Case Study: Construction Quality Assurance (CQA) monitoring of lined dam and reservoir

Site investigation, design and Construction Quality Assurance (CQA) of a 9m high earth dam to form a 22,000m^3 water feature and irrigation supply for a golf club. The design had to mitigate the running sands and sand lenses found during the site investigation, providing adequate drainage layers through the dam structure. The design included stability analysis and overflow design, whilst site monitoring ensured that the embankment dam was constructed to the correct specification.

Case Study: Geotechnical Investigation and CQA

Geotechnical site investigation and CQA of a lake excavation and 7m high embankment dam construction for a proposed sporting lake in Wiltshire. Specification of HDPE liner, overflow pipes and spillway and geotechnical assessment of the proposed source material for embankment construction. Construction supervision was provided by a GWP engineer, throughout the construction operation comprising topsoil stripping, lake excavation and embankment dam construction.

Case Study: Flood mitigation and dewatering feasibility assessment

Detailed design of flood alleviation and mitigation measures for 2 No. limestone quarries, as part of a multimillion dollar development in Nigeria. Rigorous hydrological analysis of rainfall events was undertaken to inform the design of 3 No. dams and 2 No. reservoirs. Specification of dam spillways and the required geotechnical investigations were undertaken, including stability analysis and design of appropriate drainage and overflow infrastructure.

Case Study: Stability assessment and mitigation strategy

Assessment of slope failure and rockfall hazard along the Khasab to United Arab Emirates border coastal road corridor was undertaken in response to a heavy rainfall event triggering numerous large scale rockfall incidents along a 34km section of road. The area was structurally mapped to allow the relevant rock slope failure mechanisms to be determined to aid in design of appropriate mitigation strategies. Mitigation measures included consideration of installation of netting and rockfill traps, re-profiling the slope, tunnelling and causeway development.

Case Study: Water resources management

A five year national water resources management and governance programme in Samoa, including the improvement of water resources protection and conservation, as well as the assessment and monitoring of surface water and groundwater resources. Watershed characterisation was undertaken to determine sediment mobilisation potential and assess cyclone risks posed to water management infrastructure, such as weirs, dams, spillways and reservoirs.

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