



**BHR** Group

EXPERTS IN FLUID ENGINEERING



**ENVIRONMENTAL  
CAPABILITY STATEMENT**

[www.bhrgroup.com](http://www.bhrgroup.com)

The background of the page is a photograph of an industrial water treatment facility. It features numerous large, horizontal pipes. On the left side, there are several white pipes stacked vertically. On the right side, there are several large yellow pipes, some of which are connected to a circular component. The lighting is bright, highlighting the metallic and plastic surfaces of the pipes.

## PURITY, AVAILABILITY, SUSTAINABILITY

Water is a scarce and vital resource requiring complex and costly processing. From desalination and treatment for potable supply, to separation and management of produced or process water, the challenges of efficient water management require specialist engineering talent. Developments in smart networks, membrane separation, osmotic filtration, flocculants and process handling techniques further increase complexity and intensify the challenges against a backdrop of capital constraints.

With a strong but volatile outlook for the global mining and minerals industry, focus on future growth through expanded production in new and rehabilitated assets is paramount. Strategic decisions must be made without losing sight of operational efficiency and cost optimisation. At the same time, responsible operations are welcoming the increased scrutiny of the social and environmental impact of their operations.

Whether designing municipal water treatment works, creating whitewater slalom courses, mitigating industrial discharges or modelling the environmental impact of tailings ponds, the challenges facing the sector today call for specialist design, development and validation services in all aspects of fluid engineering – provided by the world's leading engineering experts.

When the British Hydrodynamics Research Association was established by the UK Government over 65 years ago, we were set the goal of being those experts, providing innovative technologies, design and support across all industries. Today, BHR Group is an independent engineering consultancy but our aim remains the same: to be the people you trust to provide innovative and reliable solutions to problems in the water and extractive industries.



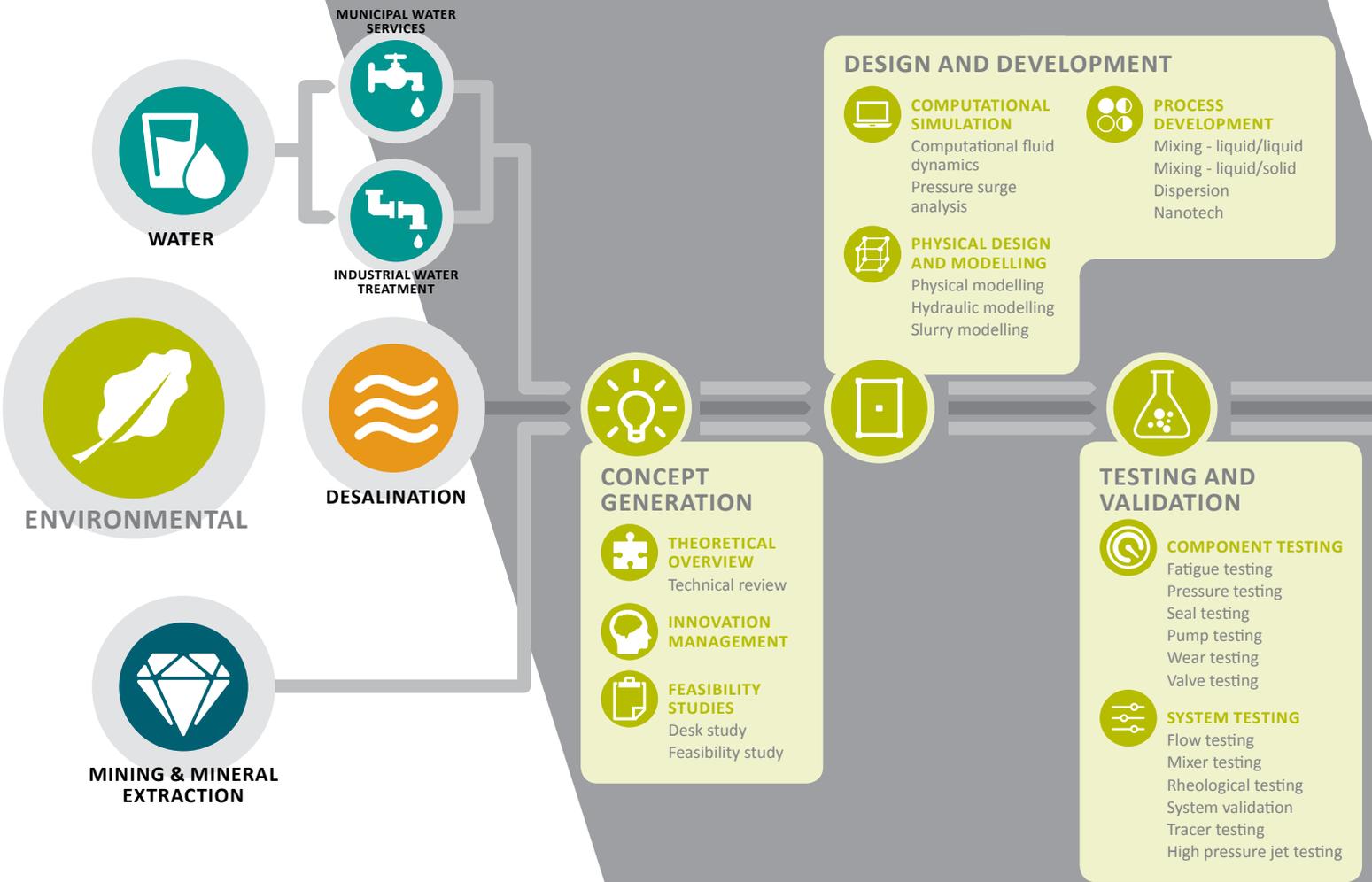
## CUSTOMER NEEDS

**As problems in design, validation and optimisation continue to impact on the industry – resulting in lengthy project times and costly delays – the importance of engineers experienced in fluid engineering, hydrodynamics and computational simulation on the profitability and safety of extraction and fluid transport systems cannot be overstated.**

Experienced engineers who understand the problems associated with process monitoring, dosing, rheology and modelling (both physical and computational) are in short supply – and finding the right skill fit is a constant challenge for both small start-up companies and seasoned multinationals alike.

Similarly, the lack of specialist equipment can result in a time-consuming search for qualified, dependable partners with extensive test facilities. Bringing this expertise in-house may not be the most cost-effective option, as solutions to some of the more intractable problems may require a fresh insight. But, by working as an extension to your team, the knowledge and a wealth of experience of our world-renowned industrial experts can provide practical and effective solutions to your problems.

By working in collaboration, BHR Group provide the leading edge knowledge and technology you require. By delivering and implementing sustainable solutions, you save both time and money – the key drivers in any business.



**WATER**



**ENVIRONMENTAL**



**MINING & MINERAL EXTRACTION**

**MUNICIPAL WATER SERVICES**



**INDUSTRIAL WATER TREATMENT**



**DESALINATION**



**CONCEPT GENERATION**



**THEORETICAL OVERVIEW**  
Technical review



**INNOVATION MANAGEMENT**



**FEASIBILITY STUDIES**  
Desk study  
Feasibility study

**DESIGN AND DEVELOPMENT**



**COMPUTATIONAL SIMULATION**  
Computational fluid dynamics  
Pressure surge analysis



**PROCESS DEVELOPMENT**  
Mixing - liquid/liquid  
Mixing - liquid/solid  
Dispersion  
Nanotech



**PHYSICAL DESIGN AND MODELLING**  
Physical modelling  
Hydraulic modelling  
Slurry modelling



**TESTING AND VALIDATION**



**COMPONENT TESTING**  
Fatigue testing  
Pressure testing  
Seal testing  
Pump testing  
Wear testing  
Valve testing



**SYSTEM TESTING**  
Flow testing  
Mixer testing  
Rheological testing  
System validation  
Tracer testing  
High pressure jet testing

## OPTIMISATION



DESIGN  
OPTIMISATION



PROCESS  
OPTIMISATION



## CAPABILITIES

**BHR Group's multi-disciplinary teams provide an integrated engineering approach to fluid system design and build, testing and verification, optimisation and scenario-planning. Our computational modelling and simulation expertise is complemented by our scaled physical modelling. Whilst our experimental work, on-site testing and evaluation allows us to validate and calibrate our results.**

BHR Group's Environmental team provides core expertise in hydraulic modelling and network analysis underpinning asset management, hydraulic efficiency, improved safety and reliability and lower construction and operational costs.

BHR offers its dedicated and bespoke test rigs for impartial qualification testing and the wealth of our technical expertise for novel product and process development. We have a range of test facilities that can physically replicate a wide range of industrial processes. We use these in the modelling and understanding of hydrodynamic conditions in a controlled laboratory environment.

All this is augmented with computer aided design tools that simulate the behaviour of fluids in open and closed channels, pipelines, treatment works, processing and extraction equipment.

**UTILISING A MULTI-DISCIPLINARY TEAM OF EXPERIENCED CHARTERED ENGINEERS AND DEDICATED PROJECT MANAGERS WE PROVIDE SOLUTIONS ACROSS THE WATER AND WASTEWATER VALUE CHAIN:**

- Energy utilisation and optimisation
- Design optimisation & feasibility studies
- Rheology testing & pumping system design
- Advanced anaerobic digestion technology
- Process monitoring, tracer testing & analysis
- Design & implementation of improved mixing & dosing
- Scaled physical modelling, computational fluid dynamics & pilot plant studies
- Steady state & transient pipeline analysis
- Odour and noise modelling
- Product & process development
- Independent equipment testing



## EXPERIENCE

**BHR Group is an independent technology organisation providing engineering consultancy, industrial research and product development services based on its core expertise in fluid engineering. We apply over 60 years of know-how to design, develop, validate and optimise processes for the benefit of the Environmental sector.**

Our heritage provides you with the exceptional advantage of access to a diverse range of engineering services and our combination of engineering skills and investment in key technologies gives us a unique capability to help you to solve your fluid engineering problems.

Our approach is to work in close co-operation with you or your clients to understand the specific and individual needs and drivers, so that we can provide solutions that are both technologically sound and commercially viable.

Alongside access to some of the industry's leading practitioners, availability, reliability and procedural integrity are factors that are paramount to your choice of partner – and these are fundamental to the service we provide. BHR Group also believes that a deadline is a commitment – not just on time, but on budget too, with no compromise in quality.

Within the sphere of fluid engineering our experiences are truly diverse with projects ranging from the modelling of civil engineering structures, process design, waste treatment pump performance testing, understanding the non-Newtonian rheology of slurries and mathematical modelling.

### SOME OF OUR CLIENTS:

- A. A. Engineering Services
- AECOM
- Aker Solutions
- Anglian Water Services
- Ashgal Qatar
- Balfour Beatty
- Bechtel
- Costain
- Doosan Enpure
- Entec
- Environment Agency
- Grontmij
- Hyder
- Jacobs Engineering
- Mott Connell Ltd
- Mott MacDonald
- MWH
- Parsons
- Thames Water
- Torishima
- United Utilities

## TEAM WORLD-CLASS ENGINEERING EXPERIENCE

BHR Group's Environmental team provides core expertise in both physical and CFD hydraulic modelling, network analysis and rheology that underpins management, resource planning, cost reduction and legislative compliance.



**SARAH FAIRHURST**  
Senior Consultant

Sarah Fairhurst (née Spence) joined BHR Group in 1986 working on high pressure water jetting systems before focussing on the design and hydraulic modelling of hydraulic structures, in particular pumping stations, dams and spillways and sewage treatment works, skilfully managing BHR Group's dual physical and computational approach to the modelling of complex flows and related technical consultancy.

She has also managed a number of large consortia research projects for the water industry on subjects such as sewage sludge conditioning prior to dewatering and the hydraulic requirements for disinfection of potable water. Her work has encompassed physical model studies, equipment development and testing, site audits and desk studies for a range of industries.

Sarah is a Chartered Mechanical Engineer and Member of CIWEM, and is the BHR Group representative for the Pump Centre.



**SAJID RAFIQUE**  
Senior Consultant

Sajid has over 15 years of experience in civil engineering, hydraulics and mixing in water and wastewater process plants. His principal area of work is in modelling, utilising both physical scaled models and also numerical techniques (computational fluid dynamics and pressure surge analysis) in pumped/gravity pipeline systems).

He has overseen and investigated a multitude of projects that require hydraulic performance evaluation and design optimisation, across a broad range of application areas; including the water/wastewater, environment, marine and power industries. He also has particular experience in the hydraulic optimisation of civil engineering schemes that involve pump sumps and intakes.



**MICK DAWSON**  
Engineering Director

Mick is a Chemical Engineer with more than 20 years directorial, managerial, technical and commercial experience in fluid engineering research and consultancy. His technical expertise is in mixing with a particular emphasis on the growing field of inline mixing technology. He also specialises in the transfer and application of process mixing know-how and equipment to the Environmental sector.

Mick is a regular presenter of lectures, seminars and training courses worldwide covering BHR's Fluid Engineering expertise. He is the author of over 50 journal and conference papers, technical reports and design guides.



**NIGEL HEYWOOD**  
Senior Consultant

Nigel and his section work on designing and troubleshooting ore pulp, minerals and tailings pipelines in the mining and minerals processing industry through consultancy and research, supporting the industry's attempts to reduce the land and water usage in the disposal of tailings.

The design of sewage sludge transport systems are approached with over 35 years of consulting experience and based around the measured or predicted sludge rheological properties. Innovative test techniques are augmented by BHR Group's extensive on-line sludge rheology database (SRDB) and sophisticated in-house software for pipeline design (SLoT), which can model the pressure losses across suction and discharge pipework.

**Our knowledge and technology base is continually enhanced through research, development and industry funded PhD projects consolidated by practical site experience. BHR Group also lead and participate in major industrial consortia.**

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## TAKE THE NEXT STEP

Every situation is different. BHR Group would like to help solve your fluid engineering problems. Call us for a pre-consultancy discussion with one of our experienced industry specialists. We can support you in defining what we can achieve when working together in partnership.