



Clarity from complexity



## Water and Environment UK Capability Statement



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BMT is a leading international multi-disciplinary engineering, science and technology consultancy offering a broad range of services, particularly in the energy, environment, shipping, ports and logistics and defence sectors. Clients are served by professionals located in a network of international subsidiary companies in over 30 offices and across 5 continents.

BMT has a third party accredited Integrated Management System, which includes Quality Assurance (AS/NZS ISO 9001), Environment Management (AS/NZS ISO 14001) and Safety (AS/NZS ISO 14001) and Safety (AS/NZS 4801; OHSAS 18001).



# The Company

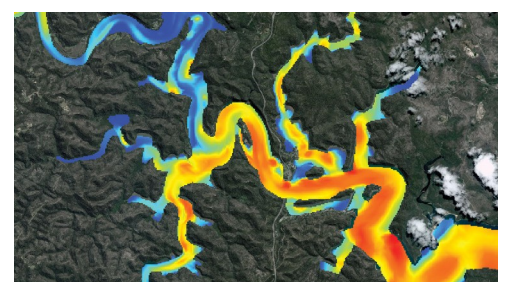
BMT has the in-house skills to provide an integrated engineering, ecological and scientific service to our clients. The diversity and strength of our staff enables us to provide innovative and practical solutions, supported by comprehensive field data capability and sophisticated numerical modelling.



BMT is a large and experienced specialist environmental consultancy. Our work demands skill, commitment and excellence from everyone involved. Our ongoing success is found in our people's dedication to scientific, technological and engineering excellence, value for money and a determined customer focus.

BMT specialises in:

- Hydrology and flood hydraulics
- Flood intelligence
- Coastal processes and management
- Water quality and sedimentation
- Environmental impact assessments
- Development approvals and environmental management
- Environmental planning
- Marine, freshwater and terrestrial ecology
- GIS, web and data development
- Software solutions
- Integrated total water cycle management
- Expert services





# Hydrology and Flood Hydraulics



A fundamental and rigorous understanding of how water behaves is central to managing catchments, floodplains, drainage networks, rivers and estuaries.

We have an extensive team of specialist engineers and scientists who work full-time on hydrologic and hydraulic studies, ranging from small urban catchments to major floodplains conveying flows in excess of tens of thousands of cubic metres per second. We are also very experienced with estuaries, where flooding results from a combination of coastal and catchment processes.

We offer the following specialist hydrologic and flood hydraulic management skills:

- Flood frequency analysis for peak and low flows
- Rainfall-runoff modelling, including calibration, for design flood estimation
- 1D and 2D floodplain modelling using both proprietary and in-house software (TUFLOW)
- Surface water modelling and mapping
- Extreme flood estimation, including Probable Maximum Floods
- Dambreak analysis
- Real time flood forecasting and warning
- Open channel hydraulics including unsteady flow and 2D modelling and bridge hydraulics
- Urban stormwater pipe network and retardation basin design and analysis

## Floodplain Management

The management of floodwaters is crucial. A major flood can be devastating for communities and industry, while a minor flood can be beneficial to the natural environment and agricultural industries.

Decisions that have to be made when managing floodplains are complex. They must consider the needs of the community and the environment. Such decisions may have major implications.

We offer the following specialist floodplain management skills:

- Practical floodplain management plan formulation
- Hydrologic (catchment rainfall/runoff) modelling
- 1D and 2D hydraulic flood modelling, including calibration, validation and design application/impact analysis
- Community consultation and surveys
- Floodplain mapping
- Flood forecasting and warning systems
- Flood risk assessment
- Flood damage cost benefit analysis for management options
- Post-flood damage reconnaissance and assessment
- Flood mark identification and GIS-based database development



# Flood Intelligence

BMT has developed a suite of flood management tools to ensure that the information developed in flood studies has meaningful, real-world applications. We offer a wide range of services to help councils and emergency services relate real-time information to on the ground actions, such as issuing warnings to the community, closing roads or initiating evacuations.



## Flood Information

BMT recognised that whilst flood studies are valuable for long-term planning, they don't always provide information in a format which can be readily used during flood events. In response, we have developed a number of new TUFLOW outputs. It is now possible to map the time and duration of flood inundation, and model linkages between stream height gauges and critical infrastructure and building floor levels.

We specialise in providing information in formats which are most useful to the end user, including printed and digital maps, information databases, animations and interactive websites.

## Evacuation Planning

Some of the more difficult tasks faced by emergency managers are predicting the ability of a community to evacuate safely and knowing how to optimise the evacuation process. We have developed a specialised TUFLOW output which identifies when and where roads first become flooded. This information can be integrated with an evacuation planning model or used to inform traditional evacuation timeline assessments.

## Flood Warning

We are experienced in reviewing, improving and developing flood warning systems which integrate flood information and provide timely warnings to the community. Our flood warning services include review of existing gauge networks, development of relationships between gauge triggers and on the ground outcomes, and installation of integrated flood warning systems.



## Real Time Assistance

During flood events, emergency managers and councils are required to synthesise a wide range of predicted and real-time rainfall and stream height data and use this information to inform flood emergency decisions. We are able to provide support at incident control centres by interpreting flood intelligence, advising of likely flood impacts and preparing flood warning communications.



# Coastal Processes and Management

Natural forces of winds, waves and currents as well as human intervention constantly shape our coastline and influence how it is used. The challenge is to meet the increasing pressure to develop the coastal zone with environmentally sound practices, ensuring coastal processes, amenity, natural character and environmental values are protected.

BMT's highly respected team of engineers and scientists specialise in developing programs which can satisfy the competing demands placed on the coastal zone through investigation and an understanding of the physical and ecological coastal system.

BMT is a leader in delivering:

- Numerical modelling assessments of tides, currents, waves and coastal sediment transport
- Coastal inundation hazard and risk assessments (storm tide and tsunami)
- Coastal erosion hazard and risk assessments
- Coastal climate change and adaptation plans
- Shoreline erosion management plans
- The design and implementation of coastal management solutions including engineering structures, beach nourishment and sand bypassing campaigns
- Management of the development application and permitting for coastal management strategies





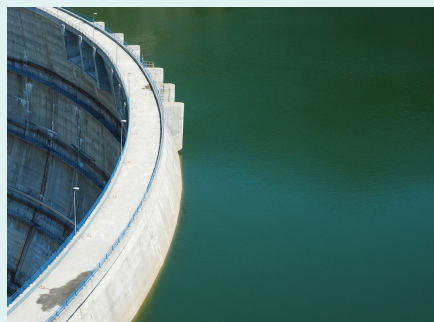
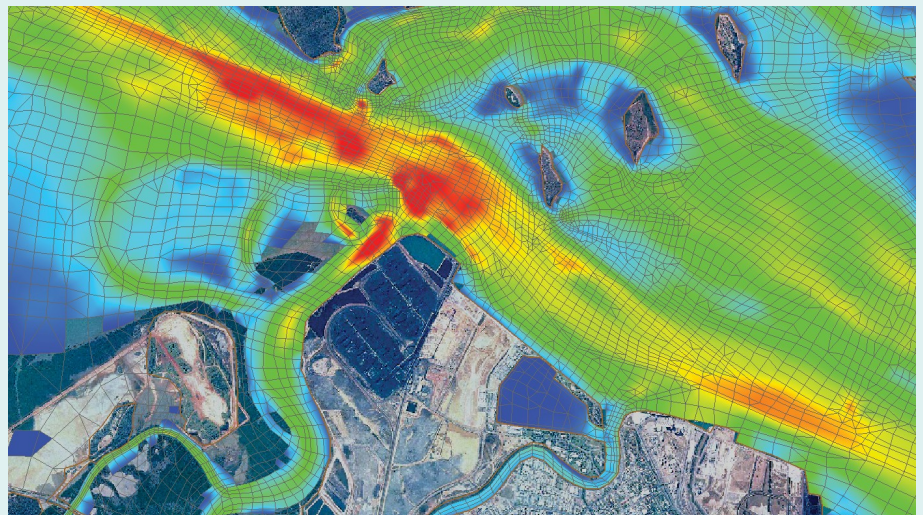
# Water Quality and Sedimentation

Environmental water quality is affected by a wide range of influences, the impacts of which can be considerable. Increases in pollutant and sediment loads combined with changes in natural flow regimes can lead to the degradation of environmental health and the community's enjoyment of our natural resources.

Understanding the complexities of water quality and sediment dynamics and developing effective and pragmatic management strategies is our core business.

We specialise in:

- Water quality assessments within waterways relating to flood and wastewater discharges, urban runoff, flushing of harbours and marinas, turbidity associated with dredging and the spillage of contaminants at sea
- Assessing the relationship between water movement and exchange processes, pollutant loadings and resultant water quality
- Computer modelling of catchment water quality runoff loads and concentrations, and 1, 2 and 3D computer modelling of water quality within receiving waters
- Developing and assessing management techniques to protect water quality levels
- Assessment of compliance with discharge requirements
- Real time water quality monitoring and management systems
- Customised GIS-based database development
- Morphological modelling and sedimentation processes (sand and mud)
- Bank erosion assessment and management plans





# Environmental Impact Assessments



BMT has an international reputation for preparing high-quality Environmental Impact Assessments (EIA), Environmental Statement (ES), Environmental Management Plans (EMP) and associated studies.



Preparation of such documents requires a comprehensive knowledge of all relevant national, regional and local authority regulations, standards and practices that apply and the reporting requirements to satisfy the various approval processes.

We work in unison with our clients in developing project concepts and designs that will meet environmental standards whilst maintaining project viability.

The multidisciplinary nature of our company means that most investigations can be addressed in-house. We also partner with specialist sub-consultancies to provide a 'best for project' study team.



We are experienced in carrying out environmental investigations for the private, government and industry sectors. We are able to address all aspects of the EIA process, including:

- Project scoping
- Review of legislation and policy
- Stakeholder and public consultation
- Project and environmental description
- Site investigations, including baseline surveys
- Impact analysis including cumulative impacts
- Development of appropriate mitigation measures, and
- Investigations for major infrastructure, land developments and mining/resource development projects



# Development Approvals and Environmental Management



Based on our expertise and experience in interpreting environmental laws and policies, BMT offer integrated services to our clients to manage assessment and approval processes for both large and small-scale development projects.

We develop solutions to address environmental impacts through the application of best practice environmental management measures, formulation of robust monitoring programs and we work with our clients to develop innovative environmental mitigation and offset packages.



# Environmental Planning in Catchment, Coastal and Marine Areas

Effective long-term planning in catchment and coastal areas is fundamental to maintaining the ecological health of our aquatic ecosystems, and ensuring social values such as fishing, tourism and recreational activities are protected for future generations.

Our teams of engineers, scientists and ecologists is supported by a specialist environmental planning team with expertise and experience in managing and carrying out multi disciplinary planning and resource assessment projects.

We specialise in:

- Coastal and wetland resource planning at the local, regional and National scale, including UKCS (UK Continental shelf) in accordance with relevant policies and best practice principles
- Strategic policy formulation, analysis and advice
- Environmental risk assessment facilitation and planning in accordance with ISO 31000 Risk Management Standards
- Environmental auditing and due diligence studies





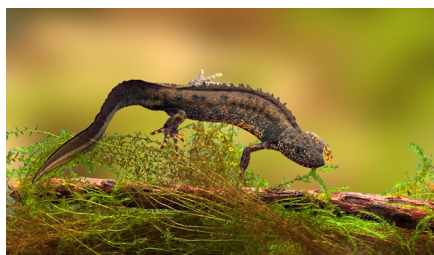
# Marine, Freshwater and Terrestrial Ecology



Our team of dedicated aquatic and terrestrial scientists is committed to developing strategies which ensure sustainable use of our finite environmental resources.

For decades, native vegetation has been cleared and wetlands drained. With the loss of these habitats, many wildlife species have become extinct and the resultant land degradation is costing communities millions of dollars. From these actions, not only are the economy and the climate threatened, but also our future quality of life.

The way forward is to focus on sustainable land, water, vegetation and biodiversity management. This can be achieved only with long-term strategic and integrated thinking.



We are experienced in carrying out marine, freshwater and terrestrial ecological investigations.

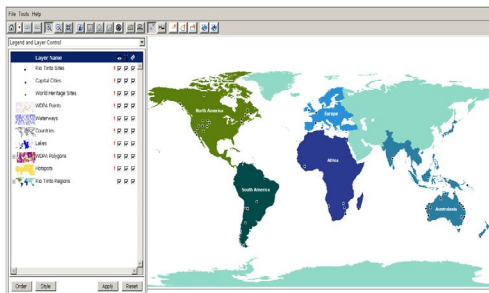
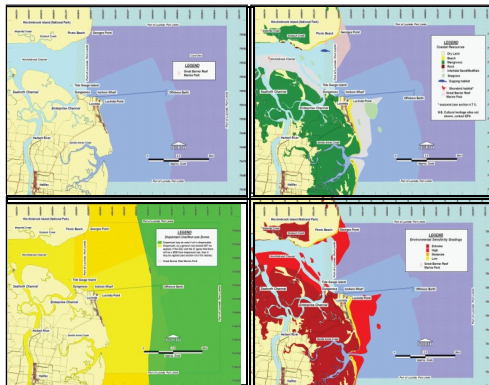
Studies undertaken include:

- Environmental risk assessments to the aquatic ecosystem from waste discharges
- Flora and fauna species and community surveys
- Water and habitat quality assessments using biological indicators
- Design and implementation of ecological monitoring programs and associated statistical analyses
- Regional biodiversity inventories
- Coastal wetland mapping and inventories



# GIS, Web and Data Management

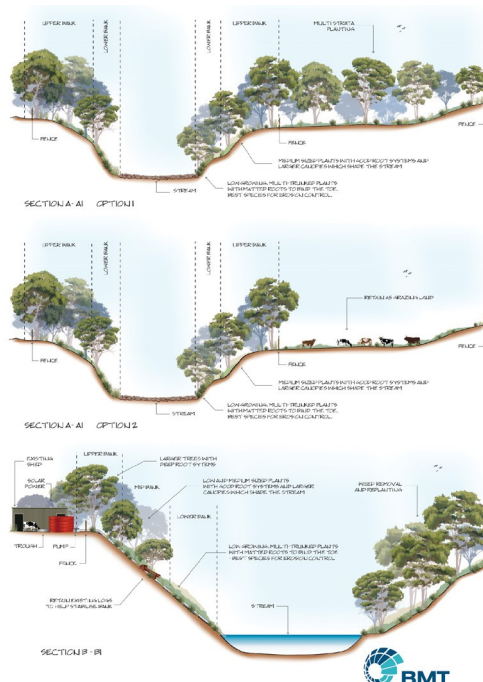
GIS is widely applied to the recording, manipulation, analysis and presentation of spatial and temporal environmental data. BMT have a proven track record in the development of integrated applications within commercial environments. Our abilities in this area have led to clients requesting services beyond our core business areas.



BMT specialise in routine and advanced GIS analyses, and regularly utilise these skills to support our high-quality and technically advanced numerical software applications.

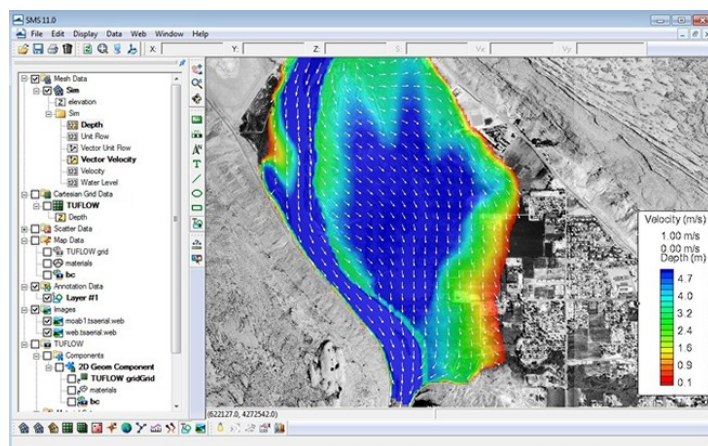
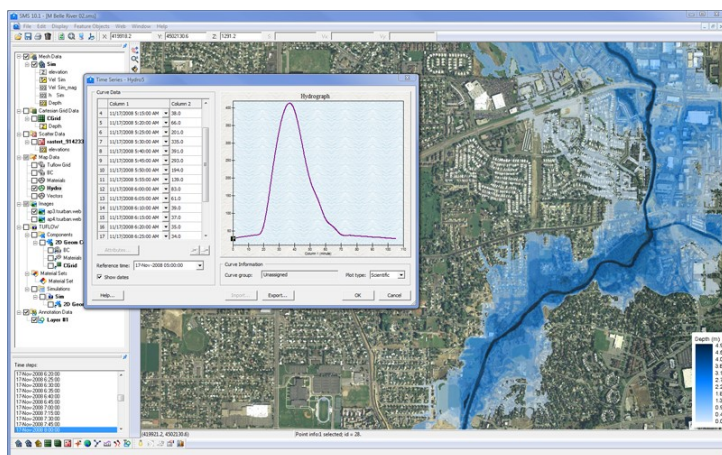
We are experienced in carrying out GIS and data management studies for the private, government and industry sectors, with typical assistance being in the following areas:

- High quality GIS mapping
- Interactive web based mapping
- GIS training
- GIS/CAD data capture
- Data conversion
- Digital terrain models
- Spatial referencing and image rectification
- Spatial database design
- Database management
- Graphics and design services
- Web delivery

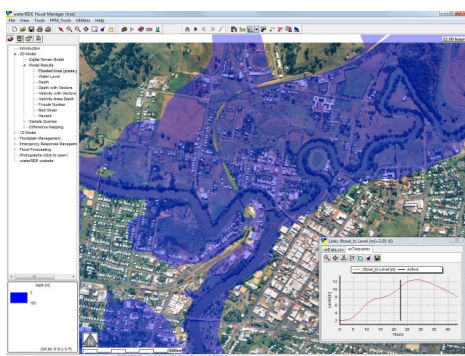
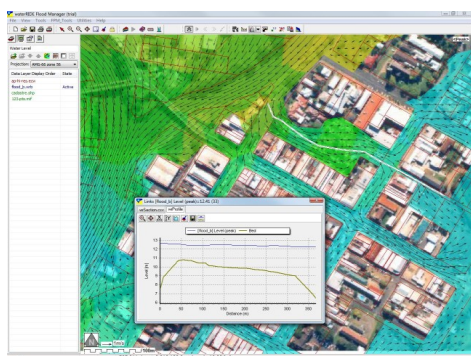




# Software Solutions



BMT employs software development and design skills in many services, which means as well as producing world class software products we are able to develop bespoke software and online applications for our clients.



At the core of our software products is the TUFLOW Products suite of advanced numerical engines and supporting tools for simulating free-surface water flow for urban waterways, rivers, floodplains, estuaries and coastlines.

The TUFLOW engines are technically superior and are industry leaders in solving all the necessary physical processes using 1D, 2D and 3D solutions.

Our approach to developing the TUFLOW engines is grounded on two philosophies:

1. We develop numerical engines through collaborative efforts with universities and research organisations to ensure they are scientifically of a high standard and are thoroughly benchmarked.
2. We design software for the rigorous demands of consulting and to interface with third party products. This makes TUFLOW Products useful, efficient, flexible and highly suited to the workplace.

TUFLOW was made commercially available in 2001. Its popularity spread by word-of-mouth largely by recommendations by users. Larger organisations, even those that are long-term users of other similar products, have quickly increased their number of TUFLOW licences once they realise the efficiencies and performance gains of using TUFLOW.

BMT are the sole UK agents for waterRIDE™ FLOOD Manager, a dedicated floodplain management tool developed by modellers and managers. It allows for seamless integration of TUFLOW model results and is a tool built to streamline processes and overcome the limitations imposed by conventional GIS on analysing and using dynamic flood model results.

BMT were integral in the development of the waterRIDE™ software to incorporate the latest EA surface water property count methodology and economic damages tool.

BMT are the distributor of FLIKE, an extreme value analysis package particularly suited to flood frequency analysis. It has many features that will enhance flood frequency estimates and make the best use of the diverse set of flood data available. These features include; the use of a Bayesian framework to fit distributions; the ability to incorporate historic flood data; the safe censoring of potentially influential low floods; and the ability to use regional flood information.



# Integrated Total Water Cycle Management

To meet the needs of the environment and community, it is essential that catchments are managed as a total system.

The key is integrating the practices of flood management, water sensitive urban design, stormwater quality control, wastewater management, community needs and preservation of the natural environment.

Such integration requires the holistic assessment of water quantity and water quality issues in a whole of catchment context. Consideration and detailed understanding is required of how water behaves in such a context, including all paths whereby water passes through a catchment, encompassing surface runoff, groundwater, potable water storage treatment and delivery and wastewater collection/treatment/disposal.

**We offer an integrated approach, which is crucial if total solutions to urban, peri urban and catchment systems are to be designed.**

We specialise in:

- Catchment rainfall/runoff analysis
- Hydrologic assessments of changes to catchment land use
- Hydraulic flood model calibration, verification and design application
- Hydraulic impact analysis of flood management options and floodplain developments
- Urbanisation water quality impact assessments
- Design of water quality and hydraulic control structures
- Stormwater assessments
- Water Sensitive Urban Design
- Integrated Urban Water Management planning
- Wastewater planning and management
- Decentralised and on-site sewage systems
- Water efficiency studies
- Sustainable Drainage Systems (SuDS)





# Expert Services

BMT offers a range of Expert Services to assist land and environment courts with assessments of development proposals for environmental impact.

We assist the courts in determining appropriate highest and best use of land in resumption compensation cases. In addition, we provide expert peer review and due diligence assessments for major projects on behalf of government and private sector clients.

We currently provide expert legal services in the following disciplines:

- Flooding, including emergency flood and storm tide management
- Stormwater management
- Coastal processes and engineering
- Water quality
- Environment and ecology





**BMT has a proven record in addressing today's engineering and environmental issues.**

**We aim to continue to enhance our services, capabilities and areas of application to meet the community's future development and environmental protection needs.**



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