EXCELLENCE IN STORMWATER, FLOOD AND WATER QUALITY MANAGEMENT
Flooding and water quality management are key risks for urban development projects. Failing to adequately address these issues can cause major costs and delays, as well as adversely affecting the quality of the product delivered to the market.

Our expertise, obtained from many years specialising in water engineering, allows us to deliver practical and cost-effective solutions for all types of development.
We know how to manage water to maximise both developable land and environmental outcomes.

Our experience covers everything from small residential sub-divisions to masterplanned communities and entire river basins.

We work collaboratively with our clients to develop urban infrastructure solutions that limit ongoing costs while reducing potential problems.

Our knowledge of local government processes and priorities allows us to deliver robust technical solutions that minimise delays in the approval process.

We have demonstrated high-level expertise in:

- water sensitive urban design
- infrastructure design including detention and bioretention basins
- environmental compliance and reporting
- flood risk mitigation and management
- stream diversion design
- ongoing site water management
- on-site water treatment
- preparation of industry-leading reports
- appearing as expert witnesses.
THE PIONEER RIVER FLOOD STUDY INVOLVED ESTIMATING DESIGN FLOOD DISCHARGES AND FLOOD LEVELS ALONG THE RIVER AND ITS TRIBUTARIES
EXPERTISE AND FLEXIBILITY

By thoroughly understanding the development assessment process we are able to address key issues of concern to councils. For our clients, this means less time spent on compliance and avoiding the flow-on delays that often follow, so their developments can keep to their timelines.

We complement this with an innovative and flexible approach, enabling us to come up with site-specific, optimal solutions for each situation.

Some of the ways in which our specialised expertise has been vital to the success of our clients’ operations include:

**Flood and stormwater management and hydraulic infrastructure design**

Such as we did over an eight-year period for the Springfield development, one of Australia’s largest urban developments with a total area of 2,850 ha. The steep topography of the Woogaroo Creek catchment presented challenges in managing stormwater runoff and potential downstream flooding and environmental impacts.

Our master drainage strategy provided maximum developable area while ensuring no adverse downstream impacts through the use of major detention basins and urban lakes.

**Innovative design of integrated water quality and drainage infrastructure**

Bakers One/Ooralea Development Area is a 556 ha development located in a flood-prone region. The site needed a regional water quality strategy and drainage solutions that were cost-effective, functional and aesthetically pleasing.

WRM’s suite of solutions included ways to capture and treat run-off from adjacent cane farms, giving maximum water quality benefit for the lowest cost, as well as a system of recreational open spaces and trunk drains, fully costed to facilitate future development planning for the area.
Hydraulic model analysis and flood hazard mapping

We prepared a flood and stormwater management plan for the proposed Redbank Motorway Estate industrial development, adjacent to the Brisbane River.

The proposed development incorporated major earthworks within the river’s flood fringe areas. Mike 11 models were developed to assess the impact of the earthworks on peak flood levels and detailed hydraulic modelling of the stormwater drainage system was also undertaken.

The results were used to design drainage infrastructure and stormwater easements.

Design event modelling, rating curve reviews, tidal impact modelling and dam routing

Our expertise in basin-wide hydrology led to Mackay Regional Council asking us to develop design flood discharges and flood levels along the Pioneer River.

We reviewed and updated the gauge rating curves of each of the catchment’s 15 gauges, estimated design discharges and modelled design flood levels along the river. We then assessed the impact of sediment transport rates and different tailwater levels, such as tidal impact, on design levels at Mackay.

These studies gave Council a comprehensive set of flood level, depth and extent maps for landuse planning.
KNOWLEDGE

We understand development as well as water

In a complex regulatory environment, understanding the challenges our clients face is as important as understanding the hydrology. We have a familiarity with the processes of local governments that means we understand how to negotiate the approval process in minimum time.

Our experience working on developments of all scales across diverse climates and geologies means we can deliver tailored solutions at minimum cost.

SPECIALISATION

Skills to handle the most complex of problems

We’ve spent many years studying and working in all aspects of water engineering, and have developed a set of skills and experience that set us apart from other engineering firms. In fact, we’re often hired by other consulting companies to peer review their work.

We are able to overcome difficult and unusual problems with competing priorities, that are simply beyond the scope of more generalist companies.
INNOVATION

Clever thinking, underpinned by thorough research

We know when – and how – to modify existing methods and designs to come up with original ways to meet each project’s unique challenges.

We do thorough research and take nothing for granted, resulting in tailor-made solutions that stand the test of time.

RELIABILITY

Robust advice that stands up to scrutiny

We’re proud of our reputation for thorough preparation and review of our technically robust reports, advice and recommendations.

To our clients, it adds up to confidence. We provide solutions that don’t have to be revisited, with all the costly delays that entails, and which stand up in court. We also have extensive experience as expert witnesses to back up our work.
THE FITZGIBBON URBAN DEVELOPMENT AREA IS ADJACENT TO THE FLOODPLAIN OF CABBAGE TREE CREEK
CASE STUDY

FITZGIBBON URBAN DEVELOPMENT AREA

Award-winning water sensitive urban design.

THE CHALLENGE

The Fitzgibbon Urban Development Area, identified for a new residential community, was significantly constrained by existing flooding and drainage issues. WRM was engaged to deliver an integrated flood and stormwater management solution that maximised developable land without impacting on upstream or downstream properties.

We developed a TUFLOW two-dimensional hydraulic model to investigate and manage flood impacts along Cabbage Tree Creek and its tributaries.

Based on this model, we investigated a range of potential structural mitigation works including channel widening, bank modifications, flood relief bypass channels, levees and an off-stream detention basin.

We also developed stormwater models to achieve compliance with best practice objectives for management of stormwater quality and quantity.

THE RESULT

Our comprehensive flood management strategy for the site allowed the client to achieve their proposed development plan. The strategy included several major infrastructure components such as culverts and detention basins that were based on our concept designs.

A detailed water sensitive urban design strategy for the site was also developed to minimise potable water use and ensure best practice management of stormwater quality.

These were delivered within the tight time restrictions imposed by the ambitious development plan for this major development.

The development was awarded the Healthy Waterways Water Sensitive Urban Design Award for 2012.
WRM’s team of 14 engineers and support staff are led by our four principals. Between them, these four are involved in every project that WRM takes on, ensuring that our clients can rely on high levels of expertise and effective decision making.

**Dr Sharmil Markar**  
BSc(Eng) (Hons) PhD FIEAust CPEng RPEQ  
MANAGING DIRECTOR / PRINCIPAL ENGINEER

With over 35 years in water resource management, Sharmil has worked on projects across all market sectors in all Australian states and territories, as well as several countries overseas. This includes a number of years in China undertaking major flood management, flood forecasting and water resource allocation and management projects.

He has been commissioned to peer review hydrologic and hydraulic modelling of several major water infrastructure projects in Queensland.

**KEY AREAS OF EXPERTISE:**  
- numerical modelling of hydrologic and hydraulic processes  
- water resource management and planning  
- flood and floodplain management  
- flood forecasting  
- flood damage assessment  
- mine site water management.

**Greg Roads**  
BE(Civil)(Hons) MIEAust RPEQ  
DIRECTOR / PRINCIPAL ENGINEER

Greg’s extensive knowledge of two-dimensional hydraulic modelling and extreme flood hydrology, together with his background in hydraulics and fluvial geomorphology, give him enormous expertise in floodplain management, designing stream diversions and riverine erosion control techniques.

Greg has played an important role in the flood and environmental flow impact assessment of many of Queensland’s major water infrastructure projects.

He also has vast experience helping local communities to develop flood management strategies.

**KEY AREAS OF EXPERTISE:**  
- two-dimensional hydraulic modelling  
- extreme flood hydrology  
- river engineering  
- water resource planning  
- large and small stream diversions  
- riverine erosion control techniques.
Dr David Newton

BE(Hons) MEngSt PhD MIEAust CPEng RPEQ
DIRECTOR / PRINCIPAL ENGINEER

David is a highly experienced numerical modeller with specialist expertise in flooding and drainage, stormwater management and water sensitive urban design. He has 20 years’ experience providing specialist advice on water quality and quantity management and infrastructure design.

He is skilled in finding collaborative, strategic solutions to complex water and environmental problems.

KEY AREAS OF EXPERTISE:
- urban hydrology
- hydraulic design
- synthesis and presentation of complex systems and water-related data sets
- flood hydrology
- water sensitive urban design
- high-quality technical writing
- corporate water management strategies.

Michael Batchelor

BE (Hons) MEngSt MIEAust RPEQ
DIRECTOR / PRINCIPAL ENGINEER

Michael’s primary areas of practice include flood protection, stormwater management, mine site water management and water supply planning. His experience in water resources management and environmental impact assessment for major infrastructure projects spans more than 20 years.

He has worked with clients across a diverse range of industries and hydrological conditions to deliver efficient project solutions which fulfil environmental protection requirements.

KEY AREAS OF EXPERTISE:
- hydrologic modelling for yield analysis and environmental flow impact assessment
- hydrologic and hydraulic modelling for flood assessment and mitigation
- hydraulic design (water distribution systems, stormwater management infrastructure)
- mine site water management
- industrial water supply planning.
A TRUSTED ADVISOR TO THE DEVELOPMENT INDUSTRY

Our outstanding track record in water sensitive urban design, including concept design of flood and stormwater management systems, is the result of many years’ experience working with large and small developers.

Thanks to our industry knowledge and reputation for professional integrity, we are also relied upon to advise local and state government clients on development issues. We have appeared as expert witnesses in the Land Court, the Planning and Environment Court and the Supreme Court.

A COLLABORATIVE APPROACH

COMMUNICATION

Direct, hands-on involvement of our principals

Our directors are all highly experienced engineers who take direct responsibility for each project, meaning clients have direct access to someone capable of making quick and informed decisions.

We’re flexible and can deal with rapidly changing circumstances and quick turnaround times, and we make a point of always using plain English.

INTEGRITY

Professional integrity is a core value

Our advice is always provided in the best interests of our client, the community and the environment. We’re honest and trustworthy in all we do.

We present all of the relevant facts so that our clients, regulators and the community understand the project risks.

We succeed when our clients succeed.