



Grantley Smith

WRL Director – Industry Research

Grantley Smith is Director, Industry Research at the Water Research Laboratory (WRL) of the University of New South Wales. WRL is a leading international research and consulting laboratory utilising numerical modelling, physical modelling and field data collection to provide expert solutions to water related problems. As Director, Industry Research Grantley is responsible for all applied research projects, financial operations, ongoing professional development of staff and the

maintenance and development of WRL's facilities and techniques.

Grantley is an Australian expert in the fields of physical and numerical modelling of water. In his 30 years as a professional engineer, Grantley has developed his skills on a broad range of projects providing assessment and solutions for water engineering and water resources investigations. He is a team leader with a proven track record for leading multi-disciplinary teams delivering practical solutions to environmental investigations. He has particular expertise in the selection and application of appropriate physical or numerical models to support design solutions, planning and management across the water spectrum.

Grantley has specialist expertise in water resources management through a hands-on career investigating catchment processes. He is acknowledged by his peers as an expert in modelling catchments and floodplains and was instrumental in the pioneering use of 2D hydrodynamic models for floodplain flow prediction and inundation mapping. His experience gained through direct participation in the evolution of floodplain modelling has provided him with an outstanding knowledge of the application and interpretation of appropriate models to support environmental planning, management and forecasting for floodplains. Grantley is a lead author and key contributor to reports supporting the revision of Australian Rainfall and Runoff, most recently contributing to guidelines for appropriate use of numerical models and flood safety. He is also the lead author of the recently released guideline on flood hazard assessment supporting the national best practice manual Managing the floodplain - a guide to best practice in flood risk management in Australia (AEMI Handbook 7). His skills include the simplification of technical data and modelling outputs in to forms readily communicated to non-technical stakeholders.

Qualifications and affiliations

BE Hons (Civil Engineering), UQ

MEngSc (Water Engineering), UNSW

CPEng, FIEA (Chartered Professional Engineer, Fellow Engineers Australia)

NPER, RPEQ (National Professional Engineers Register, Registered Professional Engineer Queensland)

Past Chair: Engineers Australia Sydney Water Panel

Professional history

2020-Current: Director – Industry Research, UNSW WRL

2012-2020: Principal Engineer & Manager, UNSW WRL

2009-2011: Senior Project Engineer, UNSW WRL

2004-2009: NSW State Manager, DHI Water and Environment, Australia

2000-2004: Principal Engineer, DHI Water and Environment, Australia

1999-2000: Computational Hydraulics Engineer, Danish Hydraulics Institute, Denmark

1990-1999: Engineer/Senior Engineer, Lawson and Treloar, NSW

Expertise

- Project management
- Hydrological processes
- Water resources management
- Surface water/groundwater interactions
- Flow forecasting
- Hydrodynamic and water quality modelling

Summary of relevant experience

Wetlands rivers and flooding

Hydraulic and cost benefit assessment of the impact of climate change on the Hunter Valley Flood Mitigation Scheme, NSW

Newcastle city-wide floodplain risk management plan, NSW

Lower Hunter River floodplain, NSW

Ironbark Creek floodplain, NSW

Middle Creek flood and sediments, NSW

Woy Woy flooding, NSW

Darling River, Bourke - Louth, NSW

Dark Creek flooding, NSW

River Murray environmental flow easements, NSW

Haslam Creek hydraulic investigation, NSW

Frenchs Creek FPMS, NSW

Warrah Creek flooding, NSW

Blackman's Swamp Creek FS, NSW

Mawson Lakes channel, SA

Flood damage assessment, Czech Republic

Bohle River flood study, QLD

Onion Creek, Texas, USA

Tenterfield flood study, NSW

Brickfield Creek flood study, NSW

Flood hazard

Flood fatalities estimation

National Flood Hazard Guideline – AEM Handbook 7

Flood hazard – analysis methods

Hydrology and forecasting

Wollondilly/Wingecarribee, NSW

Shoalhaven (Tallowa Dam), NSW

SCA real-time forecasting system framework, NSW

Vistula River, Poland

Dams and structures

Somerset Dam, QLD

Lake Macdonald, QLD

Hume Dam gate operations, NSW

Copeton Dam fuse plug EIA, NSW

Tumut 3 turbine upgrade, NSW

Chaffey Dam break, NSW

Bethungra Dam break, NSW

Potts Hill reservoir, NSW

Cordeaux Dam break, NSW

Avon Dam break, NSW

Nepean Dam break, NSW

- Wetland hydrology
- Environmental flow delivery
- Ocean outfalls
- Estuarine processes
- Hydraulic structures

Water and wastewater

Sydney Water sewer sediment blockage analysis, NSW

Maldon odour control, VIC

Sydney Water two-phase, dynamic H₂S model scoping, NSW

Industrial waste impacts, SWOOS, NSW

Balickera pump station upgrade, NSW

Sydney Water SCAMPS, NSW

Northside storage tunnel, NSW

Shelly Beach H₂S assessment, NSW

Wetlands

Tomago Wetlands, NSW

Yarrahappini Wetlands, NSW

Chowilla floodplain baseline, SA

Chowilla floodplain options, SA

Koondrook Forest, NSW

Gunbower Forest, VIC

Macquarie Marshes, NSW

Coasts, estuaries and outfalls

Hunter River water quality model, NSW

Sydney desalination plant outfall, NSW

Newcastle Harbour extreme ocean water levels, NSW

Port Jackson model, NSW

SWC SOLP receiving waters, NSW

Illawarra outfall design and commissioning, NSW

Danish Olympic Sailing Team – Sydney Olympics, NSW

Cooks River dispersion study, NSW

Lake Illawarra entrance, NSW

Kikori River pipeline stability, PNG

Panels and review

VIC DELWP flood program - peer review

QLD CSG surface water review

Ord River irrigation scheme expansion

Lower Lakes acid sulphate review

NSW Rivers environmental restoration program, hydraulic modelling

NSW Department of Planning – flood review

Project Summary

2018/19: Hydraulic and cost benefit assessment of the impact of climate change on the Hunter Valley Flood Mitigation Scheme (Project Director and Chief Technical Specialist)

Development of a comprehensive, GIS based CBA analysis tool to assess options for the strategic management of the Hunter Valley Flood Mitigation Scheme in a climate change affected future.

2019: Reintroduction of tidal flows to Woodberry Swamp (Project Director and Chief Technical Specialist)

Assessment of the environmental and water quality impacts of reintroducing tidal flows into Woodberry Swamp near Newcastle.

2018: Metropolitan coal project: Surface water expert review (Expert Peer Review)

NSW DPE Approval #08_0149 Independent expert review of impacts of recent mining activities on the hydrology of the Eastern Tributary in the Illawarra area of Sydney's drinking water supply catchment.

2018: Throsby Creek sediment assessment (Project Director)

Assessment of the impacts of sedimentation of Throsby Creek in Newcastle on water quality, flooding and navigation.

2018: Hunter River catchment management scoping study (Project Director)

Assessment of alternatives to reduce flood and non-point source water quality impacts from the Hunter River catchment.

2016: Green Square trunk drain physical modelling (Project Director)

Model testing of hydraulic performance of key transition structures in the upgrade of stormwater systems servicing the Green Square development in Sydney.

2016: Vehicle stability in floods (Chief Investigator)

Leading world first, full scale testing of the vulnerability of vehicles when exposed to floodwaters.

<http://www.wrl.unsw.edu.au/news/floodwaters-can-turn-cars-into-death-traps>

2015: Grantham Floods Commission of Inquiry (Expert Witness)

Assisted the Commissioner with expert advice on the vulnerability of people and infrastructure on the Lockyer Creek floodplain at Grantham and surrounds during extreme flood conditions.

2015: Newcastle voluntary purchase assessment (Project Manager and Technical Expert)

Analysis of design flood conditions on an urban overland flowpath in Newcastle NSW. Assessment of the vulnerability of buildings on the flowpath to failure during flood. Design and assessment of voluntary purchase scenarios to limit potential loss of life and residential damages during flood.

2015: Toowoomba overland flood study (Expert Reviewer)

Expert advice and review of the proposed methodology for the Toowoomba overland flood study.

2015: Flood fatalities literature review (Lead Author)

Literature review for the Australian Government National Flood Risk Action Group (NFRAG) on methods to estimate fatalities during flood conditions.

2014: Flood hazard technical guideline (Author, Flood Hazard Guideline)

Preparation of technical guideline to support recently released national best practice manual for floodplain management.

2014: Flood hazard – background report (Project Manager and Technical Expert)

Preparation of a literature review and fundamental research into hazard on floodplains. Investigation of quantification of flood hazard and recommendation of hazard vulnerability guidelines for people, vehicles, buildings and infrastructure on floodplains.

2014: Temperate peat swamps on sandstone (Expert Reviewer)

Literature review to investigate the impacts of long wall mining on temperate peat swamps on sandstone in Blue Mountains and Illawarra. Critical analysis of temperate highland peat swamps on sandstone literature collation and evaluation of mitigation and remediation techniques.

2013: Coincidence of catchment & ocean flooding stage 2 - recommendations & guidance (Author & Principal Investigator)

Collation, analysis and development of guidance for the NSW Government on the joint occurrence of coastally driven and catchment driven flooding for design purposes.

2013: Safety design criteria for people and vehicles (Author and Principal Investigator)

Report for Australian Rainfall and Runoff on floodplain safety criteria for people and vehicles in floods.

2013-ongoing: VIC DELWP flood program

Expert review services for the Victorian Flood Program flood studies and flood mapping.

2012: Big Swamp rehabilitation project hydrological study (Expert Reviewer)

Development of a strategy for the rehabilitation of Big Swamp on the Manning River floodplain. Design of earthworks and hydraulic controls for controlled inundation of acid-sulfate affected floodplain.

2012: Joint probability assessment of NSW extreme waves and water levels (Expert Reviewer)

Collation of offshore oceanographic data and statistical analysis of the joint probability of extreme waves and elevated ocean levels during extreme offshore storm events.

2012: Throsby Creek dredging: Flood assessment (Principal Investigator)

Assessment of impacts of proposed dredging on flood levels in Throsby Creek, Newcastle. Numerical modelling, interpretation and reporting.

2011: Yarrahappini wetland restoration (Expert Reviewer, modelling)

Review of hydrodynamic and advection dispersion models of Yarrahappini Wetland on the Macleay River, NSW. Testing of gate opening options for tidal inundation to restore salt marsh and negate acid sulphate conditions.

2011: Sewer sediment blockage assessment (Project Manager)

Development of a controlled experiment to assess the flow velocity conditions required to self-cleanse consolidated cohesive sediments in sanitary sewers.

2011: QLD coal seam gas, surface water review (Expert Reviewer)

Review of surface water aspects of development proposals for three coal seam gas development applications for the Federal Department of Sustainability, Environment, Water, Population and Communities. Assessment of impacts to matters of National Environmental Significance with respect to the EPBC Act.

2010: ARR Project 15, floodplain flow blockages in urban areas (Lead Researcher and Project Manager)

Development of detailed physical and numerical models of the Merewether floodplain in Newcastle NSW. Assessment of various 2D numerical modelling techniques to determine suitability and accuracy as applied for representation of urban floodplain flow behaviour.

2010: Hunter River water quality model (Project Manager and Modelling Expert)

Development of a hydrodynamic and advection dispersion model of the Hunter River tidal pool. Assessment of the influence and impact of adjusted wastewater treatment plant outflows to the river as part of the assessment of a catchment wide water re-use scheme for the Lower Hunter River valley.

2010: Ord River irrigation scheme (Expert Reviewer)

Review of surface water aspects of a development proposal to expand the Ord River irrigation scheme for the Federal Department of Sustainability, Environment, Water, Population and Communities. Assessment of impacts to matters of National Environmental Significance with respect to the EPBC Act.

2009-2010: Newcastle city-wide floodplain management plan (Team Leader, Modelling)

Review of floodplain models as the basis of flood planning levels. Coordination of models as tools for the assessment of flood mitigation structures. Advice to the committee regarding floodplain hydraulic performance.

2009: Gunbower Forest review (Expert Reviewer)

Provided due diligence review of numerical modelling inputs used as the basis for design of channels for environmental flow delivery in the Gunbower Forest.

2009: Chowilla floodplain review (Expert Reviewer)

Provided expert review of the 2D numerical model assessment of the effectiveness of the proposed Chowilla Weir to control environmental flow inundation extents on the Chowilla Floodplain.

2009: Design review of odour control device (Expert Reviewer)

Review of proposed adjustments to sanitary sewer designs in order to minimise odour generation at a site in Maldon, Victoria for Coliban Water.

2009: Sydney desalination plant outfall (Project Manager)

Physical model testing of the Sydney Desalination Plant outfall diffuser. Design advice to the Bluewater consortium to refine outfall design performance for both dilution and headloss.

2008: Analysis of extreme ocean levels at the Hunter River entrance (Project Director)

Investigation to provide an assessment of the various extreme ocean phenomena which may induce an elevated ocean level and to quantify estimates of the component ocean water level anomalies that might combine to develop into an elevated ocean level or "storm surge" event in the extreme range in the Hunter River at Newcastle.

2008: Wallsend Plattsburg (Ironbark Creek) flood study (Project Director/Senior Technical Reviewer)

Developing a coupled MIKE-FLOOD model to determine the flooding characteristics of the Wallsend-Plattsburg floodplain provision of GIS information to form part of council flood planning guidelines.

2008: Middle Creek flood study and sediment transport study (Project Director)

Development of a linked 1D/2D floodplain model to assess the impact of sand extraction on flow behaviour in a semi urban creek system.

2008: Woy Woy flood study (Project Director)

Development of an integrated 2D surface water/3D groundwater model for the flood assessment of a sandy coastal floodplain on the NSW central coast.

2007: Expert assistance - Hunter River flood emergency (Flood Forecasting Expert)

Expert advice supplied to NSW State Emergency Service for Hunter River Flood Emergency. Analysis of real-time flood records "on the fly". Forecasting of flows and impact areas to determine potential requirement for evacuation. Go/no go advice for evacuation procedures.

2007-2008: Koondrook Perricoota hydraulic modelling (Project Director/Senior Technical Adviser)

Analysing hydraulic behaviour of the Koondrook forest using a MIKE-FLOOD model spanning 100km. The investigation focuses on maximising the advantages of hydraulic structures with environmental flows to inundate the forest for given criterion.

2007-2008: Darling River flood study - Bogan River junction to Louth (Project Manager)

Development and calibration of a 2D model of the Darling River floodplain near Bourke. Estimation of design flows by flood frequency analysis. Design floodplain behaviour estimation using a representative flow hydrograph derived from historical flood information.

2007: Balickera pump station, 3D flow model analysis (Project Director)

Development of a full 3D model description using DHI's computational fluid dynamics package NS3. Assessment of flow conditions in pump intake bay for upgrade of water supply offtake.

2007: Wollondilly/Wingecarribee catchment hydrological assessment (Project Manager)

Development and calibration of hydrological model for the upper portion of the Sydney Water supply catchment. Model development to be included in the SCA Floodwatch system as part of the upgrade of the system for use as a Spill Emergency DSS.

2007: Port Jackson receiving water model - UTS challenge grant (Project Coordinator)

Development and calibration of a 2D/3D receiving water model for Sydney Harbour to be used as a basis of University of Technology Sydney research of water quality including contaminated sediments.

2007: Wyong employment zone flood assessment

Development of hydrologic and flood models of the proposed Wyong Employment Zone in the headwaters of the Porter's Creek Wetland sub-catchment. Analysis of impact of likely development on flow regime.

2007: AMCOR paper mill - upgrade assessment (Project Manager)

Assessment of impact of revised flow regime for paper mill outfall into SWOOS sewer main in Southern Sydney.

2007: Hume Dam spillway operations analysis (Project Manager)

Development of a MIKE-11 model to simulate operation of the gated spillway of Hume Dam. Logic tree development for spillway operation procedures. Calibration of model to storage level and flow release for a range of historical floods. Analysis of operations for extreme floods up to PMF.

2007: Sydney Water sewer overflow licensing project (Project Manager)

Re-calibration and extension of receiving water quality model for Port Jackson, Botany Bay/Georges River and Cooks River in Sydney NSW.

2007: SCA flow forecasting (Project Manager)

Development of a real-time flow forecasting system for the Sydney Water Supply catchments. System is in daily use by operators with information published to SCA intranet.

2007: Koondrook Forest modelling assistance (Project Director)

Providing training and assistance to Department of Natural Resources in building a 1D/2D hydraulic model for the investigation of regulatory structures.

2007: Dark Creek flood study (Project Director/Senior Technical Reviewer)

Developing a coupled MIKE-FLOOD model to determine the flooding characteristics of Dark Creek and providing GIS information to form part of council guidelines.

2007: Black Creek flood study (Project Director/Senior Technical Reviewer)

Undertaking community survey for historical information and collating existing material on flooding in Cessnock. Development of a hydrologic and a 1D/2D hydraulic model to investigate flooding characteristics in Cessnock.

2006: River Murray hydraulic modelling (Project Manager)

Developing a 1D MIKE-11 model covering the River Murray from Hume Dam to Lake Mulwala. Development of inundation maps as basis for flow easement acquisition for environmental flow releases as part of Living Murray program.

2006: Copeton Dam auxiliary spillway analysis (Project Manager)

Coordinator of multi-disciplinary team for assessment of environmental impact for proposed auxiliary spillways for Copeton Dam upgrade. Team included terrestrial ecologists, geomorphologist, geologist and archaeologist.

2006: Haslam Creek hydraulic investigation (Project Engineer)

Development of a 2D model for analysis of design event floods for the building application of a new Tooheys Brewery site.

2006: Chowilla floodplain regulator options assessment (Project Manager and Technical Specialist)

Project involved testing a range of regulator options in the Chowilla Floodplain hydraulic model aimed at improving wetland vegetation health, as part of the Living Murray program.

2006: Illawarra outfall commissioning (Project Manager)

Design and execution of a range of experiments to confirm satisfactory operation of the Illawarra Wastewater System marine outfall. Coordination of onshore and offshore teams including plume measurement using rhodamine tracer and visual inspections by dive team.

2005: Upgrading of the Lower Hunter River model at Hexham (Project Manager)

Review of the 1D model developed for the Lower Hunter River flood study. Development of a nested 1D/2D model in the Hexham area to enable Newcastle City Council to make informed decisions in respect to flooding for development planning and control in the Hexham area.

2005: Thurgoona flood study (Project Director)

Flood study for the Thurgoona catchment in Albury.

2005: Lavington catchment flood study (Project Director)

Flood study for the Thurgoona catchment in Albury.

2004-2005: French's Creek floodplain management study and plan (Project Manager)

Development of a dynamically linked 2D overland flow/pipe network model for analysis of storm water flooding of an urban residential catchment in the Warringah Council Local Government Area. Community Consultation program to gain historical "local knowledge" perspective of flooding and also to engage community interest in the management of the floodplain. Model calibration and verification. Design flood predictions. Integration of study outcomes into Council's GIS planning system. Development and work shopping of flood mitigation options. Integration of mitigation options into a Floodplain Management Plan for the catchment.

2004-2005: Stockton Beach coastal processes study (Project Director)

Evaluation of sediment transport conditions at Stockton Beach, Newcastle NSW. Wave and sediment transport modelling to evaluate the coastal erosion issues occurring in the area. The study also includes the analysis of protection alternatives to minimise the impact of erosion on coastal property.

2004: Lake Hume inundation mapping (Project Manager)

Mapping of flood extents in Lake Hume for a range of Lake levels. Maps prepared so that potential inundation around the township of Tallangatta could be assessed.

2004-2005: Chowilla Wetland hydraulic modelling (Project Manager)

Setup and validated a 2D hydraulic model of the Chowilla Wetland ana-branch system using MIKE-FLOOD. Review of ALS sourced DEM. Several site inspections and preparation of advice for additional ground survey brief and flow gauging requirements. Calibration of model to historical flood events. Assessment of a range of options aimed at exaggerating the floodplain inundation of allocated environmental flows to enhance environmental outcomes.

2004: Poulton Park flood study (Project Manager)

Development of a dynamically linked 2D overland flow/pipe network model for analysis of storm water flooding of a highly urbanised catchment in the Kogarah Council Local Government Area. Model calibration and verification. Design flood predictions. Integration of study outcomes into Council's GIS planning system.

2004: Warrah Creek flood study (Project Manager)

The Warrah Creek catchment is characterised by a steep upper catchment that drains to a low gently sloping floodplain. The lower catchment is an alluvial floodplain that has a series of interconnected ana-branches.

2004: Bethungra Dam break study (Project Manager)

Development of a 1D model to assess flood impact due to hypothetical dam failure of the Bethungra Dam. Mapping of flood impacts for the downstream floodplain.

2004: Tumut 3 turbine upgrade - headrace and tailrace channel surge modelling (Project Manager)

Tumut 3 power station, part of the Snowy Hydro Scheme is to have its 6 turbines up-rated. The up-rating of the turbines has the potential to change the operational regime of the power station in terms of maximum and minimum operational water levels in the head race and tail race channels. DHI were engaged to undertake detailed 3D numerical model analysis of the headrace and tailrace channels using the software package NS3, a full Navier Stokes solution for free surface flow.

The NS3 model was successfully calibrated to measurements taken specifically for the study. The calibrated model was then used to predict surge levels in the headrace and tailrace channels for a range of station stoppage and start-up scenarios.

2004: Chaffey Dam break modelling (Project Manager)

Development of a hydraulic model for hypothetical dam failure of Chaffey Dam in NSW. Preparation of flood impact mapping.

2003-2004: Illawarra wastewater strategy - ocean outfall design (Project Manager)

Design of Ocean outfall to meet stringent licensing criteria for near field and far field dilution over a wide range of flows for the consolidated Illawarra WWTW. Numerical and Physical modelling of outfall pipeline stability, outfall saltwater purging and dilution analysis.

2003-2004: Elanora Heights overland flood study - Pittwater Council (Project Manager)

Development of a dynamically linked 2D overland flow/pipe network model for analysis of storm water flooding of a highly urbanised catchment on Sydney's Northern Beaches. Model calibration and verification. Design flood predictions. Integration of study outcomes into Council's GIS planning system.

2003: Hydrological modelling Hume catchment - NSW Dept of Sustainable Natural Resources/Murray Darling Basin Commission (Project Manager)

Development of innovative approach to design flood prediction using a continuous hydrological model (NAM). Analysis of soil moisture time series for selection of design initial conditions. Comparison of model outputs with more traditional design flood modelling approaches.

2003: Hydrological modelling Hume catchment - NSW Dept of Sustainable Natural Resources/Murray Darling Basin Commission (Project Manager)

Development and calibration of NAM hydrologic model for three catchments in the Upper Murray River catchment. The model calibration was part of a larger study aimed at selecting the most appropriate hydrologic model for use in design flood estimation for the Hume Dam storage.

2003: Hydrological model statistics software - NSW Dept of Sustainable Natural Resources/Murray Darling Basin Commission (Project Manager)

Design and drafting of a functional specification for a software tool to assist in the statistical comparison of hydrological model outputs with observed data. Supervision of programming team. Software alpha testing. Transfer of software and client training.

2003: Tenterfield flood study - Tenterfield Shire Council, NSW (Modelling Specialist)

Responsible for technical supervision of the study team. Data acquisition, mapping and hydrological and hydraulic modelling of the Tenterfield City catchment.

2003: Hume Dam hydrology - drafting of hydrological method statements - NSW Dept of Sustainable Natural Resources/Murray Darling Basin Commission (Hydraulic Modelling Expert)

An integral part of the Hydrologic Risk Assessment of the Hume Dam is the signed acceptance of the Murray Darling Basin Commission's Technical Review Committee of suitable methodologies to address each stage of the study. DHI staff were contracted to draft various prescriptive method statements designed to meet the objectives of the stated study outcomes.

2003: Hume Dam hydraulic model scoping study - NSW Dept of Sustainable Natural Resources/Murray Darling Basin Commission (Project Manager)

Assistance to the NSW Department of Sustainable Natural Resources to scope the survey data requirements for a MIKE-11 hydraulic model of the Hume Dam Catchment. Definition of model domain. Analysis of existing survey data. Development of a survey brief for remote sensing (Airborne Laser Survey) of the Upper Murray River and tributaries floodplain.

2002: Brickfield Creek flood study - Upper Parramatta River Catchment Trust (Project Manager)

Detailed hydraulic modelling of the Brickfield Creek floodplain the Upper Parramatta River catchment. Compilation of survey and development of hydraulic models. Prediction of design flood levels and associated flood hazard levels. Flood

mapping. Integration of model results into Upper Parramatta River Catchment Trust's greater catchment model and GIS decision support system.

2002: Potts Hill No1 Reservoir Dam break - Sydney Catchment Authority (Project Manager)

Development and simulation of a 2D model to assess hypothetical failure of the Potts Hill No 1 Reservoir at Yagoona in Sydney's south western suburbs. Assessment of dam flood inundation area, flow depth and velocity, and travel time. Estimation of likely loss of life. Recommendation of preliminary dam hazard rating.

2002: Mawsons Lakes channel design - Maunsell Australia Pty Ltd, Adelaide, Australia (Project Manager)

The Mawson Lakes development in the northern suburbs of Adelaide, South Australia. The development area is presently serviced by a network of leveed, man-made channels that cope adequately with smaller floods but contribute to a complex pattern of interacting flow paths when floodwaters pass over bank onto the wider floodplain. A number of channel deviations, hydraulic structures and roadway embankments also contribute to the complexity of the flood flow behaviour. DHI was engaged to provide advice to improve the hydraulic efficiency of the system. MIKE-FLOOD 2D floodplain model with detailed MIKE-11 hydraulic structures nested at sub-grid scale.

2002: Blackman's Swamp Creek flood study - Orange City Council (Project Manager)

Detailed flood modelling of the Blackman's Swamp Creek catchments flowing through the Orange CBD. Compilation of hydrological and hydraulic models. Prediction of design flood levels and associated flood hazard levels. Flood mapping. Integration of model results into Council's GIS decision support system.

2002-2003: Illawarra wastewater strategy - outfall design & construction, Walter-Vivendi Joint Venture (Project Manager)

Manager of DHI's project team responsible for the timely technical input to the design and construction of the Illawarra STP shallow water ocean outfall. DHI's contributions included definition design of ocean wave and current climate, pipeline stability, pipeline scour, outfall pipeline hydraulics including purging and intrusion, near and far field plume dilution and physical modelling of outfall dynamics.

2001: Brownhill/Keswick 2D flood study, Hydro Tasmania, Adelaide, Australia (Hydraulics Expert)

Responsible for specialist input for the design and operation of a complex 2D urban floodplain model. The model included an innovative approach to the representation hydraulic structures by embedding 1D flow elements in the 2D model domain.

2001: NSW shelf bathymetry - NSW EPA, Sydney

Compilation and quality checking of available data in order to develop a detailed terrain model of the sea bed for the area offshore NSW between Port Stephens and Jervis Bay for use in numerical models.

2001: Mona Vale - Bayview flood study - Pittwater Council, Sydney

Detailed flood modelling of the Mona Vale and Bayview catchments on Sydney's Northern Beaches. Compilation of hydrological and hydraulic models. Prediction of design flood levels and associated flood hazard levels. Integration of model results into Council's GIS decision support system.

2000-2001: Wonga Beach drainage study - Douglas Shire Council, Mossman, QLD

Compilation and construction of hydrological and hydraulic (1D) models of the Wonga Beach area. Concept design, testing, and ranking of a range of structural and non-structural options designed to reduce the impact of flooding on the community. Development of a Drainage Management Strategy for implementation by Council.

2000: Bohle River 2D modelling study - Townsville, QLD

Development of a MIKE-21 2D model to predict the flood levels, flow patterns and velocity fields on the lower Bohle River floodplain. Verification of the model against historical flood data.

2000: Flood damage assessment - Morava catchment, Czech Republic

Application of GIS based software designed to assess the economic impact of flooding on a flood-affected community. Assessment of direct, indirect and intangible damages. Assessment of the impact on flood damages of several flood mitigation scenarios as part of a benefit cost analysis of the options.

2000: Bohle River MIKE-11 GIS flood mapping - Townsville, QLD

Application of Arcview GIS based floodplain mapping software to the Bohle River floodplain to determine the extent of flood inundation for a range of flood risk levels determined using MIKE-11 1D flood models.

2000: Danish Olympic Sailing Team current predictions, Sydney

Prediction of fine scale, spatially resolved current predictions for Olympic Sailing Courses on Sydney Harbour and offshore during the Sydney Olympics.

2000: Northside Storage Tunnel design - Shelly Beach offtake - Sydney Water

Adjustment and simulation of the Northern Suburbs Ocean Outfall System MOUSE model to include the Northside Storage Tunnel. Assessment of the impact on tunnel operation of additional flow volume from the Shelly Beach area.

1999: Flood management model - R&D project, Denmark

Research, planning and design of a GIS based floodplain management tool aimed at improving the quantification and management of the impact of flood behaviour on flood affected communities.

1999: WAMM project, Tagliamento River, Italy

Calibration of a MIKE-11 1D model to historical flood levels. Additional calibration and comparison of M11 GIS flood extents with SAR satellite imagery of November 1996.

1999: Onion Creek, Texas, USA

Development of a 2D (MIKE-21) model of the Onion Creek floodplain in the City of Texas, USA. Calibration of model to overbank flood conditions. Assessments of possible impacts to existing flood behaviour by the raising of the William Cannon Drive Road Bridge and its approaches which cross the floodplain.

1999: Vistula River, Poland

Implementation of Floodwatch GIS flood monitoring system, including MIKE-11 fully dynamic FF module for realtime flood forecasting on the Vistula River, Poland.

1998-1999: Mona Vale Golf Course water quality management study

Review of water quality in golf course ponds, design of water quality management strategies, design of monitoring programme to define loads into the golf course. Modelling of long-term loads and evaluation of existing pond sizes to meet long-term course requirements. Setting of criteria and levels of compliance. Design of monitoring programs.

1998-1999: Careel Creek flood study

Detailed flood modelling of the Careel Creek catchment at Avalon on Sydney's Northern Beaches. Analysis of the reticulated stormwater drainage system using the fully dynamic MOUSE modelling system. Identification of stormwater overflows. Full integration of the MOUSE stormwater drainage model with a MIKE-11 model of surface drainage and open channel flows to determine flood depths. Integration of model results into Council's GIS decision support system.

1998-1999: Wallsend/Plattsburg high definition flood study

Development and calibration of hydrologic and hydraulic models to include all flood affected areas in the Wallsend/Plattsburg catchment in western Newcastle. Definition of flood level, velocity and hazard on a property by property basis. Integration of flood model results with Council's GIS and databasing systems. Full documentation and transferral of models and GIS interface system to Council.

1998: Mona Vale Golf Course water quality monitoring

Collection and analysis of stormwater flow parameters, CTD data and water quality samples. Range of wet weather storm events, average and dry weather conditions.

1998: Channel stabilisation, Illawarra

Concept design of channel stabilisation and rehabilitation works for a reach of channel on the Illawarra Escarpment.

1998: Lidsdale hydraulic study - RTA, NSW

Development of hydraulic and hydrologic models of a small catchment at Lidsdale to describe existing flooding of the highway. Development of structural options designed to reduce the flood risk to highway traffic under flood conditions.

1997-1998: Clarence River water supply augmentation scheme project

Development of hydraulic models using IQQM model inflows. Calibration of salinity in estuarine portion. Provision of hydraulic information based on offtake scenarios to ecology groups for environmental impact.

1996-1998: Allans Creek floodplain management study

Extension and recalibration of hydraulic and hydrologic models to PMF levels. Simulation and reporting of design flood events. Flood hazard definition, flood damage calculations. Full interfacing of model results with Council's GIS system. Development of floodplain management options, model testing of structural options. Examination of social, cultural, heritage and environmental issues. Implementation of community participation program. Preparation of Floodplain Management Plan.

1997-1998: Warriewood integrated water management study

Development of integrated water quality and quantity management strategy for 110Ha urban release area on the Northern Beaches of Sydney. Long-term water quality analysis, setting of criteria and compliance reporting, riparian corridor design and vegetation requirements.

1997-1998: Narara Creek floodplain management study

Development of flood mitigation options for an area of Gosford, flood damage assessment and evaluation of works associated with implementation of the plan.

1997: Dam break study of Woronora Dam

1D modelling of hypothetical failure of the Woronora Dam and the Woronora and Georges River floodplains. Prediction of inundation areas and floodwave travel times. Identification of infrastructure at risk. Estimation of population at risk and loss of life. Recommendation for dam hazard rating.

1997: Ingleside/Warriewood

Development of hydrologic and hydraulic models to establish the effects of urbanisation on flooding for several catchments on Sydney's Northern Beaches. Testing of several flood mitigation options.

1995-1997: Water supply reservoir dambreaks

1D and 2D dambreak analysis on ten reservoirs in Sydney. Prediction of inundation areas and flood wave travel times. Calculation of likely damages, and estimation of loss of life.

1996: Dam break study of Avon Dam

1D modelling of hypothetical failure of the Avon Dam and the Hawkesbury/Nepean floodplain. Prediction of inundation areas and floodwave travel times. Identification of infrastructure at risk. Estimation of population at risk and loss of life. Recommendation for dam hazard rating.

1996: Dam break study of Cordeaux Dam

1D modelling of hypothetical failure of the Cordeaux Dam and the Hawkesbury/Nepean catchment floodplain. Prediction of inundation areas and floodwave travel times. Identification of infrastructure at risk. Estimation of population at risk and loss of life. Recommendation for dam hazard rating.

1996: Newcastle CBD and Honeysuckle flood strategy

Definition of flooding behaviour in the Newcastle CBD area to develop long-term sustainable strategies for urban development. Flood damage assessment and GIS implementation of strategies.

1996: Hydrodynamic and transport dispersion models - Shoalhaven River

Compilation and calibration of MIKE-11 hydrodynamic and transport dispersion models to be used in study of breaching of Shoalhaven Heads during flood events and flushing of the same area under low flow conditions.

1993-1996: Tilligerry Creek flood study

Extension of the Lower Hunter River hydrologic and hydraulic models to include the Tilligerry Creek areas in Port Stephens Shire. Model calibration and Verification. Prediction of range of design flood profiles.

1995: Ironbark Creek flood management strategy

Conversion of various flood models to common standard, development of flood damage estimates and evaluation of detention and channel improvement strategies for a heavily urbanised catchment in Newcastle. Development of flood management strategies in consultation with the Community and Council.

1995: Cooks River - data collection

Collection and analysis of CTD data profiles as part of a study of stratified flow in the Cooks River by the Sydney Water Board.

1995: Straits of Johor - water quality investigations

To determine the impact of altering the condition of the causeway between Singapore and Malaysia. Incorporated catchment non-point pollutant export estimation, treatment plant and landfill leakage sources. Calibration of water quality models and prediction of impacts due to changes in the causeway openings.

1994: Millers Forest drainage investigation

Investigation of drainage problems in low lying farmlands on the Lower Hunter River floodplain. Identification of drainage "hotspots" using GIS technology to interrogate digital elevation model of terrain. Simulation of drainage times using 1D and 2D hydraulic models.

1994: Lake Illawarra entrance study

Hydrologic, hydrodynamic, transport-dispersion and sediment transport models - calibration of MIKE-11 model under both tidal and flood conditions. Investigation into likely effects of proposed lake entrance stabilisation.

1994: Hunter River coliform modelling

Two studies on the Lower Hunter River simulating the impacts of coliforms.

1994: Raymond Terrace and Medowie WWTW catchment investigations coliform modelling

Simulation of bacterial fate for proposed treatment plant at Raymond Terrace under wet and dry weather flow conditions.

1993: Lower Hunter River floodplain management study

Conceptualisation of flood mitigation options. Implementation of mitigation options in 1D model of Lower Hunter River floodplain. Interpretation of model results.

1990-1993: Lower Hunter River - Green Rocks to Newcastle

Calibration, verification of hydrologic and hydraulic models to the Hunter River, NSW for the Public Works Department. Several studies undertaken including tidal and flood calibration, local drainage management, floodplain management and geomorphology.

1993: Adamstown overbridge hydraulic investigation

Design of bridge openings and flooding impacts for proposed road bridge over floodplain in Newcastle. Integration of 1D model results with GIS. Spatial representation and interrogation of model results in GIS environment.

1993: Hexham light industrial area

Investigation of likely impacts to flood levels and velocities by proposed filling of areas in the Hunter River floodplain.

1993: Tomago aluminium outfall

Investigation of wastewater plume dispersion for outfall in Hunter River, NSW.

1993: Hexham Swamp inundation study

1D and 2D modelling of Hexham Swamp as part of TCM project on Ironbark Creek to determine possible improvements to floodgate operation.

1993: Logan River

Calibration and verification of hydraulic and transport dispersion models of the Logan/Albert River system and southern Moreton Bay. Calibration of water quality models and prediction of impacts due to planned additional sewage treatment plants.

1992-1993: Hydrodynamic and transport dispersion models - Ironbark Creek

Investigation of impact of floodgates on tidal penetration and salinity levels for a tributary creek of the Hunter River, NSW.

1992: Navigation channel siltation study

Motion of ocean bed sediment under combined wave and current action was analysed to estimate the rate of infill of a navigation channel for a range of current directions and wave heights.

1992: Ironbark Creek - data collection

Collection and analysis of stage, discharge and salinity data as part of the study into impact of floodgates on Ironbark Creek.

1992: Emu Plains flood study

Application of 2D model to an urban floodplain. Definition of existing flood behaviour under a range of design events.

1992: Leneghans Drive

Investigation of likely afflux caused by proposed upgrade of the F4 freeway at Leneghans Flat on the Hunter River floodplain.

1991: Turbidity plume study

Investigation of the effect dredging for marine aggregates might have on turbidity levels in the ocean near the dredging unit.

1991: Cooks River dispersion study

Calibration of MIKE-11 hydrodynamic and transport dispersion models to recorded data on Cooks River, NSW.

1991: Dunbogan canal estate

Construction of a MIKE-11 model to aid in the investigation of tidally induced flushing and circulation of water through the design canal estate network.

1991: Kikori River, Papua New Guinea

Conversion of SYSTEM-11 flood model to MIKE-11 format. Calibration and verification of MIKE-11 model for low level discharges. Extraction of flow velocities for pipeline stability analysis.

1990: Lower Hunter River Oakhampton to Green Rocks

Conversion of SYSTEM-11 flood model to MIKE-11 UNIX format. Development of less detailed DOS flood routing model from more complex system to provide a simple model for the routing of floods through the area for flood frequency analysis without running the complex system.

1988: Water Resources Commission, QLD, Groundwater Division

Analysis of groundwater quality and storage levels on the Condamine River between Talgai Weir and Dalby, leading to a recommendation as to how much future irrigation by bore water should be allowed in the area.

Training courses and lecturing

2008: Associate, University of Technology, Sydney (Visiting Lecturer/Researcher)

Provision of lectures, short courses, research collaboration, and Masters and PhD supervision.

1994-2008: DHI Software Training Courses

Tailored workshops from 2 days to several weeks on numerical modelling with practical problems and continuing education on use of modelling software. Assistance to various agencies and consultants in specialised applications of MOUSE, MIKE-11, MIKE-21, MIKE-FLOOD, MIKE-3, Temporal Analyst, MIKE-11 GIS and MIKE Flood Watch.

Committees/panels

2012: Chair, 34th Hydrology and Water Resources Symposium

2002: Ongoing: Engineers Australia, Sydney Water Panel

2003: 28th Hydrology and Water Resources Symposium

2008: NSW Government Rivers Environmental Restoration Program (RERP) Hydrodynamic Modelling Working Group

Languages

	English	German	Danish	
Speaking:	5	2	1	
Reading:	5	2	2	
Writing:	5	1	1	(Excellent = 5; Average = 3-4; Poor = 1-2)

Selected publications

- Rahman, P, Sharma, A and **Smith, G** 2011 'Estimating design floods for gauged urban catchments under climate change conditions case study: Cooks River, Sydney', *Proceedings 34th IAHR World Congress*, 2011, Brisbane, Australia.
- Shand, T D, **Smith, G P**, Cox, R J and Blacka, M J 2010 'Development of appropriate criteria for the safety and stability of persons and vehicles in floods', *Proceedings 34th IAHR World Congress*, 26 June-1 July 2011, Brisbane, Australia.
- Shand, T D, Cox, R J, **Smith, G P** and Blacka, M J 2010 'Appropriate criteria for the safety and stability of people in stormwater design', *Proceedings Stormwater 2010*, Stormwater Industry Association, 8-12 November 2010, Sydney, Australia.
- Van Kalken, T, Madsen, H, Skotner, C, Pedersen, C B and **Smith, G** 2007 'A functional decision support system for the optimisation of dam operations, NZSOLD 2007', *Dams - Securing water for our future*, 17-21 November 2007, Queenstown, NZ.
- Sakal, A, **Smith, G P** and Klinting, A 2006 'Managing catchment inflows using real-time flow forecasting', *30th Hydrology and Water Resources Symposium*, Launceston, Tasmania.
- Carr, R S and **Smith, G P** 2006 'Linking of 2D and pipe hydraulic models at fine spatial scales', online, *2006 7th International Conference on Urban Drainage Modelling and the 4th International Conference on Water Sensitive Urban Design*, Book of Proceedings, pages: 888 – 895.
- Smith, G P** and Carr, R S 2005 'Linked 2D overland and 1D pipe system modelling for urban flooding', *Proceedings - NZWWA 4th South Pacific Conference on Stormwater and Aquatic Resource Protection*, Auckland.
- Green, J, **Smith, G P** and Varley, I 2005 'A guide to rainfall-runoff-routing model selection', *Proceedings - 29th International Hydrology and Water Resources Symposium*, Canberra.
- Smith, G P** and Green, J 2005 'Design flood loss estimation using a continuous modelling approach', *Proceedings - 29th International Hydrology and Water Resources Symposium*, Canberra.
- Smith, G P**, Perrens, S and Carr, R S 2003 'Calibration of overlapping hydrologic and hydraulic flood models to limited historical data', *Australian Journal of Water Resources*, IEAust, 6(2):151 – 158.
- Smith, G P**, Wilson, G E and Jorgensen, G 2001 'MIKE flood watch - A physically-based, real-time flood monitoring and flood forecasting system', *2nd Victorian Flood Management Conference*.
- Carr, R S, **Smith, G P**, Lincoln Smith, M and Jack, C 1999 'Linking of hydraulic models with ecologic assessments', *8th International Conference on Urban Storm Drainage*.
- Carr, R S, **Smith, G P** and Bacon, P 1999 'A time series modelling approach for assessment of environmental conditions', *8th International Conference on Urban Storm Drainage*.
- Smith, G P**, Lincoln Smith, M, Jack, C and Carr, R S 1997 'The way water moves - linking hydrology and river hydraulics with ecology', *24th Hydrology and Water Resources Symposium*.
- Smith, G** 1994 'A comparison of one and two-dimensional models as applied to a floodplain - the Hexham Swamp Inundation Study', online, *1994 International Conference on Hydraulics in Civil Engineering: 'Hydraulics Working with the Environment'*, Preprints of Papers, p 25 – 30.
- Smith, G P** 1993 'A practical application of an unsteady, two layered model to stratified flow in an estuary', *University of New South Wales, Australia, School of Civil Engineering, Civil Project Report*.
- Treloar, P D, Roper, A M and **Smith, G P** 1993 'Lake Illawarra - numerical modelling of entrance processes', *11th Australasian Conference on Coastal Engineering*.