



Toby Tucker

Principal Engineer, CPEng, NER

Toby is a Principal Engineer at UNSW's Water Research Laboratory. Toby has extensive experience working in various water engineering fields including groundwater, hydraulic modelling, flood mitigation, floodplain management, estuarine water quality and processes, coastal engineering, and wetland restoration. Toby has extensive experience organising and conducting field data collection campaigns. Toby is an expert numerical modeller, and is adept at using remote sensing and GIS techniques to solve complex challenges in the field of water engineering. Toby's

experience has been recognised by Engineers Australia where he is a Chartered Professional Engineer (CPEng) in Environmental Engineering and is registered on the National Engineering Register (NER). Toby is currently working on the restoration of estuarine systems and using his skills in hydrodynamics to develop strategies to improve entire estuaries across the New South Wales coastline and beyond. Toby is passionate about using his experience as a water engineer to provide positive changes to the world and its environment.

Qualifications

BE Hons 1 (Civil Engineering), UNSW, 2015
Chartered Professional Engineer (CPEng) (Environmental) and National Engineering Register (NER) with Engineers Australia
Remote Pilot License (RePL) (Multi-rotor $\leq 25\text{kg}$, fixed wing $\leq 7\text{kg}$)

Expertise

- Estuary and wetland processes
- Water quality
- Climate change adaption / blue carbon restoration
- Flood mitigation and floodplain management

Summary of relevant experience

Wetlands

2016: Woodberry Swamp field investigations
2017-23: Everlasting Swamp field investigations, numerical modelling & blue carbon assessment
2017: Big Swamp field investigations
2018-24: Yeramba Wetland restoration & monitoring
2018: Tuckean Swamp field investigations
2018-24: Clybucca Wetlands restoration options & monitoring
2020-23: Woodberry Swamp hydrological investigations
2020-22: Kooragang Island (Area E) wetland restoration
2021: East Kinchela (Swan Pool) remediation feasibility study
2022-24: Tomago Wetland hydrological monitoring
2023: Clarence River floodplain blue carbon investigations
2023: Campvale Wetland review of deoxygenation processes
2023: Panboola Wetland hydrological investigation

Estuaries / ICOLLS

2017: Hunter River water quality field investigations & modelling
2018: Hunter River tidal pool salinity assessment
2019: Pampoolah riverbank stability & floodplain assessment
2020: NSW coastal floodplain prioritisation (Tweed, Richmond, Clarence, Macleay, Hastings, Manning & Shoalhaven)
2023: Muddy Lake tidal flushing processes
2021-24: Estuary improvement projects for Manly Lagoon
2021-24: Crookhaven River hydrological monitoring
2021-24: Lake Illawarra entrance field investigations & modelling
2022-23: Pelican Bay blue carbon feasibility assessment
2022-23: Werri Lagoon remediation options investigation

Professional history

2023-Current Principal Engineer, UNSW WRL
2022-2023: Senior Engineer, UNSW WRL
2016-2022: Project Engineer, UNSW WRL
2014-2016: Undergraduate Engineer, Lend Lease

- ICOLL processes and entrance management
- Numerical modelling (wetlands, estuaries, and floodplains)
- Coastal processes and geomorphology
- Quality management and control

Flood mitigation / floodplain management

2017: Fullerton Cove & Tilligerry Creek modified floodgate modelling & design
2017: Vehicle stability testing in floodwaters
2018: Narrabeen Lagoon monitoring & dredge design
2019-21: Keith Hall drainage options study

Coastal engineering

2016-22: Collaroy-Narrabeen beach investigations
2018: Palm Beach offshore protection, physical modelling & testing
2021: Clarkes Beach, Byron Bay emergency protection
2021: Wamberal seawall impacts on beach amenity

Groundwater

2016, 2018: John Fisher Park groundwater monitoring
2017: Mine & tunnel EIS review
2018: Warren WWTP augmentation
2018-23: Manly Lagoon groundwater monitoring & analysis

Hydraulics

2015: Pumping station and sewerage network design
2016: Stormwater grate inlet capacity testing
2016: Educational flood model development
2017: Dam spillway design & testing

Computing skills

Programming: Excel, MATLAB, Python
Numerical modelling: MIKE, RMA
Design: AutoCAD, Civil 3D
GIS: ArcMap, QGIS

Publications

- Tucker, TA** (2015) *Application of 2D models to examine sand bar recovery at Narrabeen-Collaroy*, Honours Thesis, UNSW.
- Modra, BD, Blacka, MJ, Deiber, M, Drummond, CD, Harrison, AJ, **Tucker, TA** and Miller, BM (2016) *Amrun fishway and spillway physical modelling*, WRL TR2016/17, UNSW Water Research Laboratory.
- Miller, BM, Drummond, CD, **Tucker, TA** and Harrison, AJ (2016) *Grate testing for ACO*, WRL TR2016/07, UNSW Water Research Laboratory.
- Tucker, TA**, Rayner, DS and Anderson, DJ (2016) *John Fisher Park groundwater monitoring 2016*, WRL TR2016/08, UNSW Water Research Laboratory.
- Modra, BD, Drummond, CD, Deiber, M and **Tucker, TA** (2017) *Additional testing of Amrun combined spillway model*, WRL TR2017/10, UNSW Water Research Laboratory.
- Glamore, WC, Ruprecht, JE, Harrison, AJ, **Tucker, TA**, Rayner, DS and Smith, AN (2017) *Everlasting Swamp hydrodynamic modelling study*, WRL TR2017/02, UNSW Water Research Laboratory.
- Glamore, WC and **Tucker, TA** (2017) *Fullerton Cove and Tilligerry Creek modified floodgate design*, WRL TR2017/18, UNSW Water Research Laboratory.
- Anderson, DJ, **Tucker, TA** and Rahman, PF (2017) *Heretaunga Plains Aquifer, New Zealand – groundwater study*, WRL TR2017/15, UNSW Water Research Laboratory.
- Glamore, WC, Rayner, DS and **Tucker, TA** (2017) *Hunter River Estuary water quality model – data assessment*, WRL TR2017/03, UNSW Water Research Laboratory.
- Drummond, CD, Blacka, MJ and **Tucker, TA** (2017) *Palm Beach shoreline protection, large basin modelling*, WRL TR2017/18, UNSW Water Research Laboratory.
- Smith, GP, Modra, BD, **Tucker, TA**, Cox, RJ and Felder, S (2017) *Vehicle stability testing for flood flows*, WRL TR2017/07, UNSW Water Research Laboratory.
- Rayner, DS, **Tucker, TA** and Glamore, WC (2018) *Clybucca Wetlands management options study*, WRL TR2018/32, UNSW Water Research Laboratory.
- Glamore, WC, Deiber, M, Howe, D, Ruprecht, JE, **Tucker, TA** and Dafforn, KA (2018) *Hunter River Estuary tidal dynamic assessment – additional scenarios*, WRL TR2018/05, UNSW Water Research Laboratory.
- Tucker, TA**, Rayner, DS and Simpson, JH (2018) *John Fisher Park groundwater monitoring 2018*, WRL TR2018/14, UNSW Water Research Laboratory.
- Tucker, TA**, Coghlan, IR, Carley, JT and Miller, BM (2018) *Narrabeen Lagoon entrance clearance operation design*, WRL TR2018/16, UNSW Water Research Laboratory.
- Glamore, WC, Rayner, DS, Harrison, AJ and **Tucker, TA** (2018) *Teal Lagoon hydrological study, Everlasting Swamp*, WRL TR2018/06, UNSW Water Research Laboratory.
- Anderson, DJ and **Tucker, TA** (2018) *Warren WWTP augmentation – groundwater monitoring network installation and baseline sampling*, WRL TR2018/05, UNSW Water Research Laboratory.
- Anderson, DJ and **Tucker, TA** (2018) *Warren WWTP augmentation groundwater management and monitoring plan*, WRL TR2018/43, UNSW Water Research Laboratory.
- Rayner, DS, **Tucker, TA** and Glamore, WC (2018) *Yeramba Lagoon restoration action plan*, WRL TR2018/10, UNSW Water Research Laboratory.
- Tucker, TA**, Smith, GP and Rayner, DS (2019) *Approach to re-introducing tidal flows and land management options for Woodberry Swamp*, WRL TR2019/12, UNSW Water Research Laboratory.
- Tucker, TA**, Leaman, CK and Carley, JT (2019) *Review of impacts on beach amenity of coastal protection works at Collaroy-Narrabeen Beach*, WRL TR2019/09, UNSW Water Research Laboratory.
- Ruprecht, JE, **Tucker, TA**, Coghlan, IR and Glamore, WC (2019) *Pampoolah Floodplain remediation investigation and riverbank erosion assessment*, WRL TR2019/18, UNSW Water Research Laboratory.
- Tucker, TA**, Smith, GP and Rayner, DS (2020) *Approach to introducing tidal flushing to Woodberry Swamp SLR assessment*, WRL TR2020/33, UNSW Water Research Laboratory.
- Tucker, TA** and Smith, GP (2020) *Woodberry Swamp community consultation workshop outcomes*, WRL TR2020/15, UNSW Water Research Laboratory.
- Rayner, DS, Harrison, AJ, **Tucker, TA**, Lumiatti, G, Rahman, PF, Juma, D, Waddington, K and Glamore, WC (2020) *Coastal Floodplain Prioritisation Study - Background and Methodology*, WRL TR2020/32, UNSW Water Research Laboratory.
- Tucker, TA**, Rayner, DS and Lumiatti G (2021) *Keith Hall Drainage Options Study*, WRL TR2021/06, UNSW Water Research Laboratory.
- Tucker, TA** and Rayner, DS (2021) *East Kinchela (Swan Pool) Remediation Feasibility Study*, WRL TR2021/21, UNSW Water Research Laboratory.
- Tucker, TA** and Chan, JW (2022) *Woodberry Swamp drainage review*, WRL TR2022/08, UNSW Water Research Laboratory.
- Tucker, TA** and Rayner, DS (2023) *Pacific Highway Upgrade Biodiversity Offset Program: Hydrological assessment - Clybucca offset properties*, WRL TR2021/22, UNSW Water Research Laboratory.
- Tucker, TA**, Rayner, DS and Harrison, AJ (2023) *Manly Lagoon: Review of environmental processes*, WRL TR2021/23, UNSW Water Research Laboratory.
- Tucker, TA** (2023) *Review of Campvale Wetland Deoxygenation Processes*, WRL TR2022/17, UNSW Water Research Laboratory.
- Tucker, TA** and Henderson, B (2023) *Blue Carbon Feasibility Assessment: Pelican Bay Road*, WRL TR2022/18, UNSW Water Research Laboratory.
- Coghlan, IR, **Tucker, TA**, Rayner, DS (2023) *Lake Illawarra entrance: preliminary management options assessment*, WRL TR2022/23, UNSW Water Research Laboratory.
- Tucker, TA**, Coghlan, IR, Harrison, AJ (2023) *Lake Illawarra entrance channel: data compilation*, WRL TR2022/25, UNSW Water Research Laboratory.
- Montano, L, Chaaya, F, **Tucker, TA** (2023) *Hydrological Assessment and Remediation Options of Werri Lagoon*, WRL TR2023/01, UNSW Water Research Laboratory.
- Montano, L, Chaaya, F, **Tucker, TA** (2023) *Hydrological assessment and management options for Panboola*, WRL TR2023/06, UNSW Water Research Laboratory.
- Tucker, TA**, Coghlan, Carley, JT (2023) *Assessment of geomorphic changes, hydraulics and potential foreshore stabilisation options at Windang, Lake Illawarra*, WRL TR2023/08, UNSW Water Research Laboratory.
- Tucker TA**, Gilber, DM (2023) *Muddy Lake conceptual understanding and tidal flushing assessment*, WRL TR2023/10, UNSW Water Research Laboratory.
- Tucker TA** (2023) *Woodberry Swamp access track upgrade hydrological assessment*, WRL TR2023/13, UNSW Water Research Laboratory.
- Tucker TA**, Gilber, DM (2023) *Everlasting Swamp hydrodynamic sea level rise assessment*, WRL TR2023/17, UNSW Water Research Laboratory.
- Waddington, K., Harrison, A., Rayner, D., **Tucker, T.**, & Glamore, W. (2023). Estuarine hypoxia—Identifying high risk catchments now and under future climate scenarios. *Water Resources Research*, 59, e2023WR035026. <https://doi.org/10.1029/2023WR035026>
- Waddington, K., Harrison, A., Rayner, D., **Tucker, T.**, & Glamore, W. (2023). Upscaling the remediation of acidic landscapes – the coastal floodplain prioritisation method. *Journal of Environmental Management*, 348, p. 119260. <https://doi.org/10.1016/j.jenvman.2023.119260>.