Tonkin+Taylor

Groundwater

Groundwater is an extremely valuable resource and is essential to our security of supply in a future that will be influenced by climate change and increased demand.

Tonkin + Taylor's team of hydrogeologists and engineers lead the way in groundwater resource management to ensure the sustainable use of groundwater.

Our services

We provide a range of specialist hydrogeological services for the assessment and management of groundwater resources. Our team of geologists, hydrogeologists, geochemists and engineers combine to offer a broad range of technical expertise that can deal with the most challenging projects.

Our team has significant experience in applying analytical and numerical groundwater modelling approaches to support projects including tunnelling and sustainable pumping for groundwater drinking water sources. Our services also extend to assessing groundwater and surface water interactions, contaminant fate and transport modelling, drinking water source risk assessment and management, shallow groundwater hazard mapping and assessing effects on groundwater dependent ecosystems.

In the **Water sector** we are experts in designing and overseeing the installation of new municipal supply groundwater production bores and developing 3D numerical groundwater models for groundwater resource management. In the **Land + Buildings** sector our expertise is predominantly applied to groundwater control for basement excavations and tunnelling projects. **Waste + Resource Recovery** sector projects draw on our expertise in developing conceptual hydrogeological models and assessing potential effects relating to new and existing landfill sites. We often provide technical expertise in preparing evidence for hearings and cross examination.

Water

- Drinking water source risk assessment and drinking water safety planning
- Municipal supply groundwater production bore and headworks design
- Numerical modelling to manage groundwater resources over the long term and predictive scenario analysis for climate change and saline intrusion impacts
- Designing and implementing aquifer testing using large scale pumping tests to understand aquifer characteristics and sustainable yields
- Groundwater assessments for existing and planned wetlands as well as rehabilitation
- Assessing effects of saline intrusion
- Catchment risk assessment
- Source water risk management planning
- Drinking water safety planning
- Risk assessment workshop facilitation
- Emerging contaminants (nitrate, PFAS, microplastics)
- Emergency response including drinking water contamination

Land + Buildings

- Groundwater assessments using quantitative hydrogeological modelling (analytical and numerical) for construction dewatering of trenches, basements and tunnels
- Challenger roles during tender evaluations
- Groundwater assessments to support design and construction
- Assessment of drawdown related environmental effects and settlement
- Modelling groundwater rates of groundwater level rise during quarry backfill for future building platform

Waste + Resource Recovery

- Hydrogeological assessments and development of hydrogeological models to support consenting and design of landfills and quarry expansions
- Assessment of groundwater and surface water interactions and water balances
- Contaminant fate and transport modelling
- Preparation of expert evidence, attendance at
- hearings and cross-examination

Financial + Insurance

- Development of regional and local scale shallow groundwater maps to support liquefaction assessments

Digital

- Predictive 3D modelling using MODFLOW6 and other proprietary software
- Model calibration using PEST++
- Scripting for automation of process using Python™ and R
- Geospatial analysis

Track record

Catchment Risk Assessments and Source Water Risk Management Plans, New Zealand

Our team works across regional locations to deliver complex small and large-scale catchment risk assessments and source water risk management plans for groundwater, spring water, surface water and conjunctive sources. Given the scale of the source catchment projects, T+T utilises geospatial mapping to visualise data such as land use and discharge consents and develop source water risk management areas utilising 3D numerical modelling techniques. Regional scale and point-source risks are reviewed to complete robust source-based qualitative risk assessments that fit with the scale of the supply. Risks assessments consider physical, chemical and microbiological risks (including protozoa and cyanotoxins from cyanobacteria).

Virus modelling and risk assessment, New Zealand

Building upon existing modelling for bacterial pathogens in groundwater a risk assessment was completed for viral pathogen leakage from septic tanks impacting on a drinking water source. Starting from review of the key viral pathogens and selection of relevant transport factors the team were able to characterise the risk of infection and illness to the served population from dose modelling and provide recommendations for further investigation and management.

Production bore and sanitary borehead design, NZ

Drinking water suppliers throughout New Zealand are actively improving the security and durability of their groundwater sources by replacing aging production bores and optimising borefield layouts. Our wider team of specialists has been instrumental in the design of production bores and headworks for Clients that meet stringent sanitary standards set by Taumata Arowai. Our expertise extends further to include the commissioning of water treatment facilities, where we provide essential technical inputs to support commissioning contractors.

Frimley/Eastbourne borefield replacement, Hastings

T+T was responsible for the design and delivery of the new municipal supply borefields established in Frimley and Eastbourne, Hastings. The work progressed through initial borefield optimisation based on the location of pumping centres to minimise effects and maintain the positive vertical groundwater pressure. Pilot bores were used to confirm the underlying hydrogeological conditions for the basis of design of the new production bores. T+T was also responsible for the design of three production bores at Frimley and one production bore at Eastbourne, the associated headworks design for the new production bores plus the design of headworks upgrades for existing Eastbourne bores, and new pump designs. T+T also provided design upgrades during construction and fulfilled out role as a trusted advisor to Hastings District Council by providing the technical support to help secure approval of the global groundwater take resource consent.

Havelock North Bacteriological Assessment, Hawke's Bay

The Havelock North Campylobacter outbreak was a pivotal moment in Aotearoa as to how the activities across drinking water source catchments are managed. T+T supported our client through our technical understanding of the groundwater flow process and contaminant fate and transport that most likely led to the Campylobacter transgression. We further employed techniques such as dye tracer testing and flood modelling to support expert witness services at the Government Inquiry into the outbreak.

Wellington Water Ltd: Hutt Aquifer Model, Wellington

T+T was the lead modeller on the fifth revision of the Hutt Aquifer Model (HAM5). This technically complex project uses MODFLOW6 and PEST(++) tools as well as predictive scenario analysis for climate change and saline intrusion impacts.

Chemical Spill Assessment, Auckland

We undertook a fate and transport assessment following a chemical spill at an industrial site in Penrose. The assessment was undertaken to evaluate the potential travel times to the Onehunga Wellfield operated by Watercare and to propose monitoring.

Snowy Monaro Regional Council: Bredbo Water Supply Hydrogeological Assessment, NSW

Hydrogeological assessment of the Bredbo water supply prompted by turbidity and water quality issues due to the hydraulic connection with the nearby ephemeral meander of the Murrumbidgee River. The turbidity was causing shutdown of the water supply wells because of the impact on treatment, resulting water being carted from other sources in the short-term. Our assessment included a geophysical survey and installation of a monitoring well to improve our understanding of the conceptual hydrology and hydrogeology. Our assessment provided options for managing current issues with the existing bores and establishment of a new groundwater source (i.e., a deeper source or a better positioned shallow bore).

Hydrogeological Assessment, Naitaubu Island, Fiji

T+T assessed relocating low-lying coastal facilities to build resilience against forecasted future climate change effects for on the island. The key deliverable was a technical report that presented our hydrogeological conceptual model of the island, the estimation of potential sustainable well yields based on inferred aquifer parameters and pumping rates, an assessment for saline intrusion due to groundwater abstraction using numerical methods and simplified island geometries and a qualitative assessment of the groundwater source catchment identifying potential microbial and chemical risks to the security of the groundwater source.

Contact us

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