

Energy

The energy industry is dominated by a rapidly changing regulatory environment and an increasing emphasis on renewable energy sources to meet future demand and protect our planet for generations to come.

Tonkin + Taylor's Energy team specialise in the design and construction of renewable energy projects. We focus on the exploration of methods that are more sustainable at generating large amounts of clean energy, without depleting the earth's resources.

 Tonkin + Taylor

 CHADWICK
GEOTECHNICS



About us

Tonkin + Taylor's energy experts combine their technical capabilities in geotechnical, environmental, geological, and hydrogeological engineering with deep insight into local markets and complex regulations to provide customised design and construction solutions.

Whether it's ancillary infrastructure, such as haul roads, or key structural design options, such as wind turbine footings, we offer creative answers to address any constraints.

As trusted advisors and collaborators within the energy sector, we have developed leading expertise in harnessing energy from a range of major infrastructure projects, including hydropower schemes, thermal and geothermal energy, wind and solar farms, and bioenergy.

We provide preliminary geotechnical advice to identify risks, opportunities, and technical challenges, from site investigations and testing to assess geological and hydrogeological conditions; through detailed design, sourcing materials, construction supervision, and ongoing facility support that ensures resource, environmental, infrastructural, and commercial objects are met. We support clients throughout all phases of renewable energy development.

Our Services

- Preliminary desktop and risk advice
- Site investigations, including NAT laboratory testing services
- Hydrological assessments
- Corrosion study
- Facility design
- Foundation design services
- Solar farm foundation optimisation and assessments
- Numerical software analysis
- Pavement design advice, including external pavement rehabilitation
- Construction specifications
- Geotechnical construction support
- Geotechnical and hydrogeological investigations
- Geotechnical and laboratory and testing services
- Geotechnical instrumentation
- Marginal land development
- Decommissioning projects
- Human health risk assessments
- Contaminated land remediation
- Soil science
- Thermal conductivity and electrical resistivity testing

Tonkin + Taylor acknowledges the First Nations peoples of Australia as Traditional Custodians of the land and waterways on which we work and live, and recognise their continuing connection to land, water, and culture.

We pay our respects to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples.

Track record

Gunsynd Solar Farm, Goondiwindi QLD

The proposed Gunsynd Solar Farm includes the construction of a 94 MW inverter output capacity solar farm, utilising Nextracker Single Array Trackers (both 3-String and 4-String Trackers) and Trina 570 and 575 Modules. The works also included the relevant infrastructure to ensure the operation of the solar farm.

These include the substation, internal access tracks, O&M offices, parking areas, fencing, laydown areas and trenches for the required cabling.

Technical response

- Drilling of twenty-four (24) boreholes to a depth of 5 m below ground level (bgl), or prior effective refusal, in the photovoltaic (PV) array area
- Drilling of fourteen (14) boreholes to a depth of 4 m below ground level (bgl), or prior effective refusal, at the substation area
- Drilling of two (2) boreholes to a depth of 15m below ground level (bgl), utilising solid auger and wash boring techniques, in the substation area. No coring was required
- Installation of three (3) groundwater monitoring wells at selected borehole locations
- Excavation of twelve (12) test pits to a depth of 3m bgl or prior excavator refusal
- Conducted twenty-six (26) in-situ dynamic cone penetrometer (DCP) tests at specified locations adjoined to boreholes and test pits
- Undertook in-situ and laboratory Thermal Resistivity (TR) Testing
- Undertook Electrical Resistivity (ER) Testing
- Undertook Pile Load Testing and interpretation of test results
- Completed a topographical survey across the site on a 10x10m grid as well as site benchmarks

Clements Gap Battery Storage System, SA

The development involves the construction of a 60MW/120MWh Battery Energy Storage System (BESS). The BESS plant typically comprises of the BESS storage area, Main Control Room, 33kV switchgear room, Harmonic Filter area, and a substation. Additionally, the development of the BESS facility will include the construction of permanent access roads, including car parking areas.

Tonkin + Taylor provided a full civil site study to enable the design of the BESS site, including:

- A detailed Geotechnical investigation
- Thermal resistivity
- Asset location mapping using Before You Dig information
- Corrosion assessment
- Topographical survey
- Boundary Survey
- Hydrological and Hydraulic Study

Technical response

- Geotechnical advice for shallow and deep foundations for small and tall structures
- Pavement design advice for car parks, hardstands and access tracks
- Site contamination study and advice on disposal of soil including acid sulfate soil assessment
- Assessment of thermal conductivity onsite soils
- Delineate catchment areas contributing runoff to major watercourses and define hydrological characteristics
- Develop a hydrologic model to determine the peak discharge for 0.5% Annual Exceedance Probability (AEP) flood event, 1% AEP, 2% AEP, 5% AEP, 10% AEP and 20% AEP to allow for assessment of the proposed design conditions for existing and relevant climate change scenarios
- Develop a hydraulic model using 2D

- software TUFLOW to simulate the 0.5% through to 20% flood event (as above) in the existing scenario model to predict flow widths, depths, velocities, and hazards
- Chemical assessment of soil for corrosion potential
 - Site survey and digital outputs

Gnarwarre Battery Energy Storage Systems / Fotowatio Renewable Ventures (FRV) Australia Pty Ltd

A proposed lithium-ion battery energy storage system (BESS) with a capacity of 250 megawatts / 550 megawatt hours, in Gnarwarre, Victoria, 20 kms west of Geelong.

Provided geotechnical civil site studies including geotechnical and site contamination assessments, hydrological and hydraulic studies and a site survey.

Technical response

- Geotechnical advice for shallow and deep foundations
- Pavement design advice
- Site contamination study and advice on disposal of soil
- Assessment of thermal conductivity and electrical resistivity of onsite soils
- Developed a hydrologic model to determine peak discharge for 1% Annual Exceedance Probability (AEP) and flood event along with 20% AEP
- Developed a hydraulic model using 2D software TUFLOW to simulate 1% and 20% flood event in the existing scenario model to predict flood depths, velocities and hazards
- Chemical assessment of soil for corrosion potential
- Site survey and digital outputs

Track record

Stockyard Hill / Goldwind Australia Pty Ltd

149 turbines constructed with three different types of footing designs (full gravity, anchored and composite) to suit four different geological conditions. This necessitated a reduced size gravity solution where ground conditions suited this option. Pavement construction included over 110km of internal road network with silt and clay subgrades and the variable weather conditions typical of Victoria's west. Perched water conditions in winter, and silty subgrades created challenging engineering conditions.

Chadwick Geotechnics undertook all drilling and test pitting for the initial geotechnical investigation for footings and pavements. A full-time NATA registered site testing crew undertook all the quality control testing on subgrades and pavements; proof rolling inspections; plate load testing when required; and foundation inspections for each footing throughout the construction period.

Technical response

- Geotechnical and hydrogeological investigations
- Design of Full gravity, anchored and Hybrid footings
- Geotechnical advice for construction of 4 x substations
- Plaxis 3D modelling of foundations
- Innovative and sustainable pavement designs
- Subgrade improvements, winter construction advice
- Earthworks specifications and technical advice
- Laboratory services
- Heavy component delivery pavement analysis
- Crane lift studies

Hawkesdale Wind Farm / BMD Constructions Pty Ltd

Covers 2,280 hectares on which 23 wind turbines are to be installed and 19.6 lineal km of access roads to be constructed. The area is covered by the geological unit of Quaternary age newer volcanic basalt which makes the project geotechnical challenging due to variability of rock depth and rock weathering.

A geotechnical investigation with Chadwick Geotechnics delivering all ground investigation works comprising drilling of boreholes at each turbine location, installation of temporary piezometers, excavation of test pits at turbine locations as well as along alignments of internal access roads, external pavements, and provision of pavement design services.

Technical response

- Geotechnical investigations
- Hydrogeological assessments
- Internal pavement and hardstand design advice
- External pavement design and rehabilitation works
- Geotechnical laboratory testing services
- Pavement design for roads and hardstands

Ryan Corner Wind Farm / Decmil Pty Ltd

Construction of 52 new wind turbine generators (WTG), underground cables linking all WTG locations, 38.2 lineal km of associated access roads and upgrading surrounding public roads.

A geotechnical investigation with Chadwick Geotechnics, delivering all ground investigation works comprising drilling of boreholes at each turbine location, installation of temporary piezometers, excavation of test pits at turbine locations and along alignments of internal access roads and external pavements. Geophysical survey and pavement design services also provided.

A large portion of the site is covered by the geological unit of Quaternary age newer volcanic basalt with Bridgewater Formation consisting of limestone and Quaternary age swamp and lake deposits.

Technical response

- Geotechnical and hydrogeological assessments
- Geotechnical laboratory services
- External pavements
- Geophysical survey
- Pavement design for roads and hardstands
- Advice on subgrade preparation and treatment

Golden Plains Wind Farm (Tender design) / WestWind Energy

Contains 217 wind turbine generators (WTG's). Over 200km of construction/access tracks are required for the project. The project is split into two stages: Stage 1 with 122 WTG's and Stage 2 with 93 WTG's, with upgrade of network of external roads and bridges.

GPWF is located in Regional Victoria, 150 kms west of Melbourne and 60km west of Geelong within the local government area (LGA) of Golden Plains Shire Council incorporating approximately 16,739 ha of land.

Technical response

- Geotechnical risk advice
- Geotechnical and hydrogeological desktop study
- Full gravity, Anchored, Gap gravity footings
- Innovative and sustainable pavement designs
- External pavement rehabilitations advice for council and Vic Roads roads

How can we help you?



Prasanna Punchihewa

Sector Lead - Energy
Principal Geotechnical + Pavement Engineer

- Pavement design + rehabilitation works
- Hardstands + lift assessments
- Heavy component transport analysis
- Foundation design

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Roger Olds

Senior Principal Geotechnical Engineer

- Geotechnical risk, opportunities + challenge
- Technical review
- Interfacing design + construction of geotechnical elements to optimise outcomes

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