



QHS Certification Services



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GROUND-MOUNT
SOLAR FARMS

CAPABILITIES STATEMENT



DEVELOPER
EPC
PROJECT DELIVERY
O&M

earthconnect
renewable energy specialists

GROUP OF COMPANIES
PTY LTD | EPC | DEVELOPMENTS

Turn-Key Solar Energy Solutions

Supporting sustainability efforts one project at a time.

earthconnect is one of the leading Engineering, Procurement and Construction (EPC) providers of solar and energy solutions to the commercial, industrial and large-scale sectors of the renewable energy market.

We deliver programs on a local, national and international scale.

Since 2009, we've established a reputation as a company committed to safety, performance and quality in providing best in class turn-key solar energy solutions.

earthconnect are accredited by the Clean Energy Council as solar system designers and installers as well as being EcoSmart accredited engineers. We are also members of the Smart Energy Council.

All services by earthconnect include operation and maintenance programs complete with back-office monitoring, to give you peace of mind knowing that our designs are consistently performing beyond expectations.

Our expertise

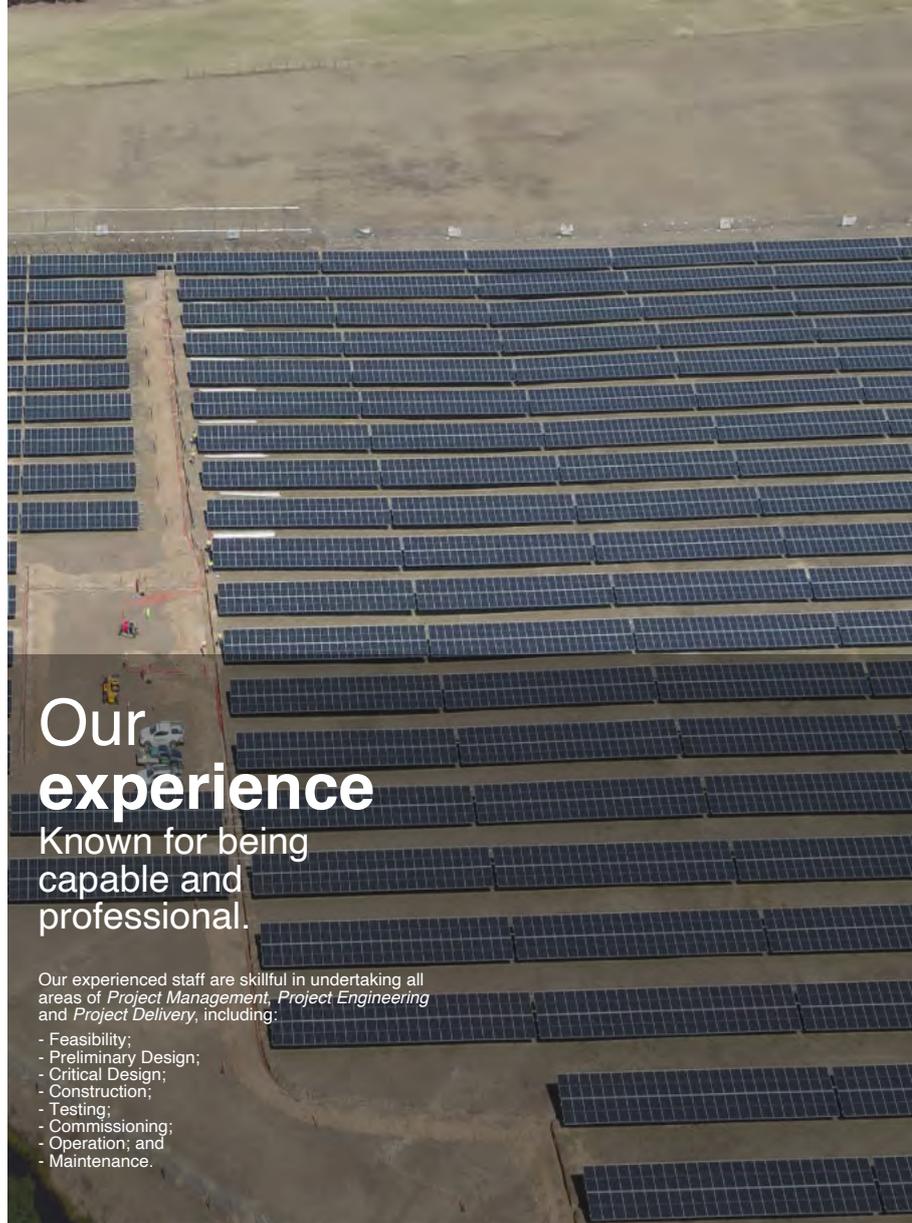
Expect the best with a full in-house end-to-end solar solution.

We'll provide you with accurate predictions using industry-leading power system modelling tools that compare yields for individual sites and includes comprehensive information to precisely evaluate feasibility for grid connect hybrid and stand-alone solar systems.

We also offer:

- Financial and production modelling that reflects user tariffs and captured value;
- Electricity market analysis;
- Risk management profiling;
- Grid connect, hybrid and stand-alone solar system design;
- Product selection and optimisation;
- Energy generation and distribution optimisation;
- Cost and budget planning and management;
- System installation;
- Comprehensive 24/7 software monitoring of system performance; and
- Coordination of building and planning approval (where required).

Medium and large scale energy solutions require diverse and specialist skills to design, install and commission, which is why you can trust in earthconnect to ensure your solar project is delivered to the highest standard to provide maximum efficiency and effectiveness.



Our experience

Known for being capable and professional.

Our experienced staff are skillful in undertaking all areas of *Project Management*, *Project Engineering* and *Project Delivery*, including:

- Feasibility;
- Preliminary Design;
- Critical Design;
- Construction;
- Testing;
- Commissioning;
- Operation; and
- Maintenance.

Our team includes:

- Mr Adam James – Chief Executive Officer
- Mr Jason Marko – Chief Technical Officer
- Mr Darcy Haines – Delivery Manager - Major Projects
- Mr Michael McGregor – Site Manager - Major Projects
- Mrs Shelbee Miller – Operations Manager
- Mrs Amy Page – Administration Manager



Value Offering

We are committed to providing outstanding work regardless of project size or complexity.

Since being established, earthconnect has delivered over 44 megawatts with a further 8.0MW currently in construction. Further to this, we have a 7.85MW Solar Farm before local council awaiting approval.

Our scope is broad, and because every project is managed in-house by our professional team, we have a consistent track record of success.

At earthconnect, we take appropriate steps to ensure processes are put in place to manage or eliminate any potential environmental impacts that may occur during the design phase, throughout construction or post-delivery.

Our objective throughout the project lifecycle is to deliver an asset which will represent value for the client.

Which is why every project earthconnect delivers includes four (4) quarterly complimentary on-site inspections to ensure every system is operating at its full potential. Additionally, to give us better insight into how a system is running, we conduct remote system monitoring using platforms such as Sunny Portal and Solar Analytics.

Moreover, we may engage industry experts to provide independent assessments and advice for specific tasks like geotechnical studies and structural adequacy reviews, if required. We can also evaluate solar resources, estimate energy yields and losses as well as minimise risks for a bankable basis.

Finally, we can also provide a comprehensive five (5) year scheduled/preventative maintenance program with every megawatt installation as our promise to you.

Quality Assurance

We follow stringent quality standards that exceed our client's expectations.

We promise to deliver and carry out quality construction work following the manufacturer's installation guidelines and under our Quality Management System which has been certified as meeting ISO 9001 Quality Management System requirements.

To achieve this, we use a comprehensive ITP (Inspection and Test Plan) to review and assess works at every stage of construction.

Whether it be mechanical/structural ITP's, electrical ITP's, point to point or megohm tests, rest assured that all our QA results will be meticulously documented and filed.

HUNTER SOLAR FARM 2019

In late 2019, earthconnect fully commissioned this 5.0MW solar farm, which allowed the project to move into the final phase of Revenue Service.

One primary objective was to ensure we left the site in a better condition than it was when the project commenced. The Vegetation Management Plan, which included the planting of new native flora, was established after the commissioning of the system and allowed for handover to our client in March 2020.

BACKGROUND PICTURED IS THE PANEL UP COMPLETED



95mm² DC CABLE PAIRS FROM COMBINERS



FORMWORK AND STEEL RIO FOR MVPS FOOTINGS



EXPECT ATTENTION TO DETAIL. EVEN FOR WORKS UNSEEN.



SOON TO BE BURIED CONDUITS CARRYING 95mm² DC CABLING.



PLACEMENT OF MVPS (MEDIUM VOLTAGE POWER STATION) UNIT

**RIGHT:
22 DC COMBINER
BOXES**

Pictured to the right is one of 22 DC combiner boxes located on-site, with an average of 24 DC strings terminated inside each combiner box.

The large red and black cable pair visible in the centre of the image is one of the 95mm² DC cable pairs which run through the ground via the conduits seen earlier and terminate in one of the two MVPS units.



**MIDDLE:
PURPOSE-DESIGNED
AND BUILT SWITCH
ROOM**

Pictured in the middle is our purpose-designed and built switch room, specifically designed to complement this rural setting.

The LV side contains the NPU (Network Protection Unit) plus all of the communications gear.

The segregated HV side houses the HV main switch board and associated control systems.



**LEFT:
HV MAIN
SWITCH BOARD**

Pictured to the left is the HV main switch board.

The large black cables yet to be terminated will carry 11kV (11,000 Volts AC). This energy originates from the two MVPS units.

It enters the MSB via CB01, travels along the 3 phase busbars through monitoring CT's (Current Transformers) and VT's (Voltage Transformers), into CB02 and then underground to the intelli-rupter where it joins the Ausgrid Network feeding power into the grid to power surrounding businesses.

FROM FEASIBILITY TO REALITY. SOME OF THE MANY PROCESSES REQUIRED TO PROGRESS A DREAM.

To come up with a proficient Feasibility Program, we take into account the following critical considerations:

Project Feasibility Phase

From integrated project developer/EPC to various levels of project services, we'll tailor each service based on the needs of the project.

We know how vital the feasibility process is to ensure your project will be constructable and bankable.

For example, in completing the Feasibility Phase for the Lovedale Solar Farm Project, we took into consideration the critical tasks that were imperative to ensuring the project was financially viable.

The Geotechnical works included:

- A visual assessment of the existing surface of the site and surrounding area;
- The drilling of thirty-eight (38) boreholes (BH1-BH38) to depths of up to 3.0m;
- The driving of thirty-eight (38) Dynamic Cone Penetrometer probes;
- Recovery of undisturbed and disturbed soil samples for laboratory testing;
- Laboratory testing consisted of:
 - Ten (10) Shrink Swell Index tests;
 - Fifteen (15) aggressivity suites (including pH, Resistivity, Cl, S04 screening).

Environmental and Geotechnical Assessment

Comprising of an environmental constraints assessment, statement of environmental effects, vegetation management plans and a total station survey height datum review.

The blue shaded area in the image to the left represents The Riparian Corridor. Close considerations were necessary for managing this area given the effect the project would have on the native flora and fauna which we identified after independently conducting a site constraints assessment with further guidance and recommendations from The Department of Primary Industries - Water (DPI-Water).

A critical aspect of this particular project was in managing the condition of the 52m AHD Levels associated with the potential of a 1 in 100-year flood event occurring as determined by the local Council and the JRPP (Joint Regional Planning Panel).

We also had to consider the impact this 52m AHD condition would have on the engineering design and sign-off for the proposed Ground Mount structure, as well as the potential effects such an event could have on the site's environmental sustainability.

Mechanical Engineering Design

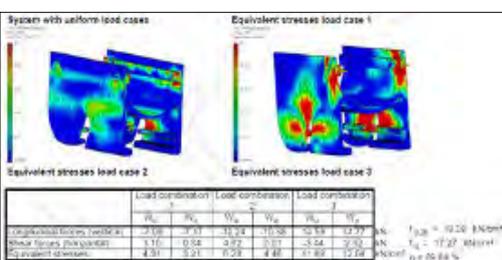
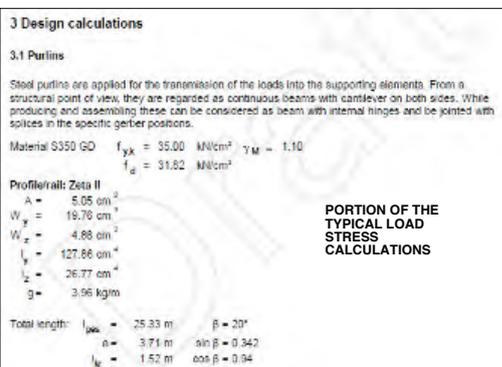
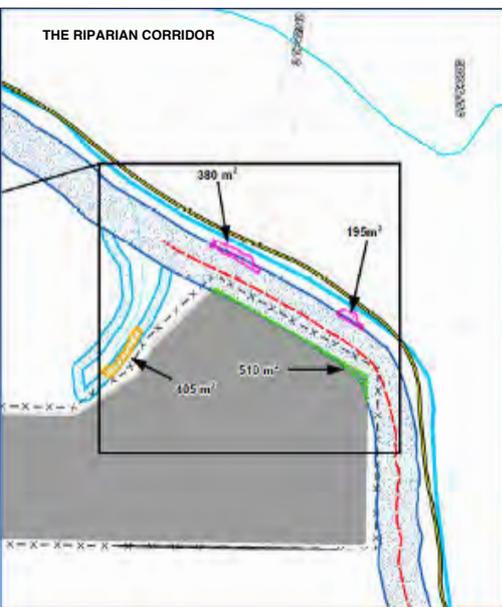
The most critical element of feasibility for a Ground Mount solution is the mechanical engineering design phase. An example of the typical calculations performed by our Ground Mount supply partner to prove structural adequacy for one of their mounting solutions is pictured on the left.

Apart from the obvious impacts on the reliability and longevity of this type of asset from having a solidly build mechanical structure, it can profoundly impact bankability if the ground conditions findings call for a heavily customised engineering solution.

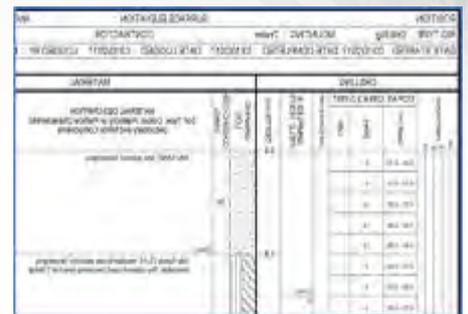
When such a situation arises, we believe that a comprehensive geotechnical survey conducted by industry experts and an independent structural evaluation are mandatory steps to design a "fit for purpose" Ground Mount solution.

CASE STUDY: 5.0MW SOLAR FARM AT LOVEDALE NSW

The Ground Mount solution supplier which we recently partnered with to deliver the 5.0MW Solar farm located in Lovedale NSW recommended that we should obtain a minimum of 2 to 3 core samples at depth per hectare (Ha) for our project. We decided to increase this to 38 individual core samples within our 7Ha footprint, which worked out to be a sampling rate of over 5.4 core samples per Ha.



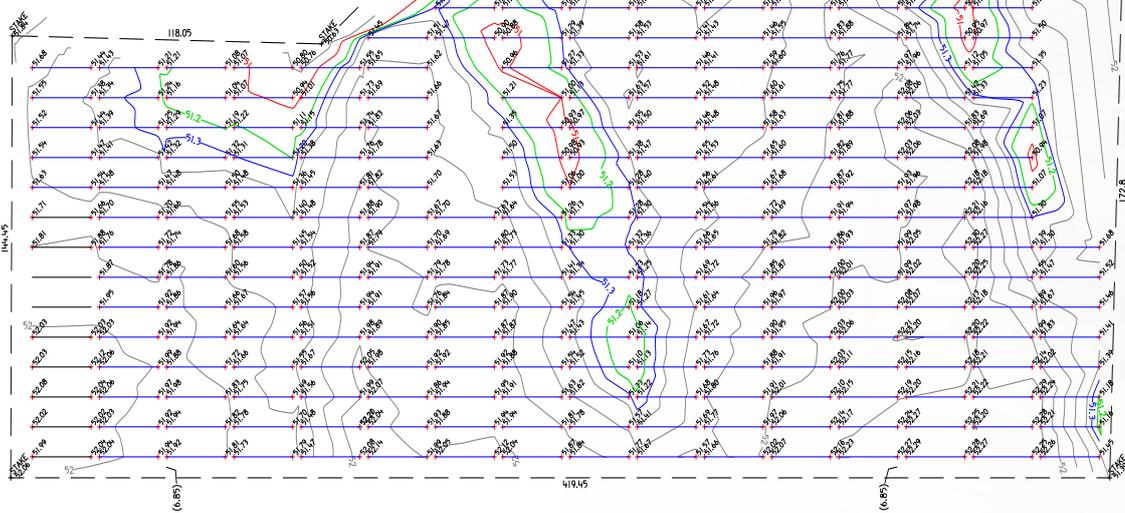
FINITE ANALYSIS PERFORMED UNDER VARYING LOADS



CONTINUED.

NORTH

TOTAL STATION SURVEY DIAGRAM



Total Station Surveying

Being the final stage to prove Structural Design adequacy, this survey was delivered to the Ground Mount suppliers engineering department to confirm structural design adequacy and engineering sign-off.

Certain areas required piles to be further out of the ground than the "normal" design which in turn needed deeper piling embedment depths.

Development Application (DA) / Joint Regional Planning Panel

Complying Development Certificate (CDC)

earthconnect are well versed in all aspects associated with achieving approval through the formal Development Application (DA) process.

Each site contains its own set of challenges, and are generally unique.

Whether it be dealing with a sector of the Department of Primary Industry, officials from the local council, adjoining landholders or the network authorities through formal easement approvals, we are well equipped to face any challenges that a site may present.

To ensure that the project achieved the 52m AHD compliance (1 in 100-year flooding requirement) and final approval from the independent certifier and local council, we conducted a total station survey which determined the AHD (Australian Height Datum) at 520 individual points within the 7Ha solar farm envelope. These points represented the first and last pile of every Ground Mount table (rack).

Test Pile Driving - Vertical and Lateral "Pull-Testing"

earthconnect compiled the Geotech report and made it available to our Ground Mount solution partner, allowing them to complete the interim design.

The next stage was to perform test piling and pull testing.

The test data gathering exercise is a critical part of designing a Ground Mount solution and proving structural adequacy.

We drove the test piles to the recommended depths with all vertical and lateral test results witnessed and documented by our independent consulting engineering partner.

We then compiled the test results and presented them to the Ground Mount suppliers own engineering department for review to determine whether any mounting design fine-tuning was required.

Test Specification - Edge Zone

Area	Support Pile	Embedment	Minimum number of test piles	Design Vertical uplift Force	Design Moment at ground level	Test Pile Dia. Rise at top of Pile	Lateral Test Load at 1m above ground
Array	1877	2.065	1.2 per 50MM specified by Spencer Australia Pty Ltd	21.50	1.0.80	43.00	21.00
						Applied Force (kN)	Applied Force (kN)
						43.83	22.50

Area	Support	Embedment	Lateral		
			Calculated Test Load at 1m	Load Applied (kN) above ground	Permissible Deflection within 75mm above ground
Array	1877	2.065	Applied Force (kN)	18.750	30mm

Table 1 - Edge Zone - Lateral





**OUR REPUTATION
PRECEDES US.
TRUST IN
EARTHCONNECT
FOR YOUR NEXT
SOLAR PROJECT.**

**Talk to one of our
specialists today.**

HEAD OFFICE

1 / 5 Arunga Drive,
Beresfield NSW 2322

P: +61 2 4028 6948

S: earthconnect-australia

E: info@earthconnect-australia.com

POSTAL ADDRESS:

PO. Box: 982 Warners Bay NSW 2282

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