

Essential Energy NSW

Intruder resistant fencing around zone substations



The Client

Essential Energy (formerly Country Energy) operates Australia's largest electricity network spanning 95 per cent of New South Wales, Australia (see shaded area on map at right). This includes maintaining around 200,000 kilometres of power lines and 1.4 million power poles across urban, coastal, mountain, tableland and outback environments.

Project Background

In Essential Energy's Regulatory Proposal 2009-2014, under the heading 'Asset Renewal Programs and Initiatives', substation perimeter fencing is identified by Essential Energy as one of eight components representing "greatest failure risks" for its zone substation equipment (p.113). One of the primary risks arising from such failure is unauthorised access into the substation. The resulting risks and adverse outcomes of which include: the theft of valuable assets (requiring replacement), the damage to assets (requiring repair or replacement); the loss of power supply (resulting in cost and inconvenience to customers); and electrocution resulting in the serious injury or death of person(s). The potential results for Essential Energy include substantial costs to repair and replace assets, liability for damages and prosecution, loss of customers, reputational damage and damaging media attention. The tragic death of a 12 year old boy in 2001, from electrocution at a substation in Cronulla, highlights the sensitivity and severity of the potential risks.

Against this backdrop, Essential Energy took the position that it "is required to implement all appropriate preventative security measures to ensure the continued provision of supply and prevention of unauthorised access to electrical installations" (ibid p.124). Installation of high security fencing was identified as one of the primary measures to achieve this and Essential Energy envisaged a program of fencing a further 200 sites over the next 5 years. To deliver this program, Essential Energy released a Request for Proposal (RFP) for the supply and install of high security fencing, to evaluate the type of fencing product(s) to adopt, and whether or not to combine supply and install as the mode of project delivery. Bluedog provided a detailed proposal including a schedule of rates based on a small, medium and large site.

NSW Public Works was subsequently engaged by Essential Energy to project manage the perimeter fence upgrade. Public Works released a Request for Tender (RFT) from suitably experienced companies to supply and install high security fencing solutions for Essential Energy's Electricity Substations. The RFT set out a fence specification with various performance and specific aspects. Key aspects included:

- The intruder resistant fence assemblies and components were required to comply with the guidelines specified in ENA DOC 015-2006.
- The fence design has to comply with the relevant Clauses of AS 1170.1, AS 1170.2, AS 1170.3 and AS 1170.4 and engineers certification was necessary.



Low loader with all the materials, temporary fence panels and all terrain forklift arrives at site (Dubbo)



Excavation of earth grading ring around the outside of the zone substation (Coonabarabran)

- The Contractors were responsible for producing a full set of standard details to address all fencing details used in the Contractors’ design
- commencement of work, arrange a joint inspection with the Principal’s Representative for the proposed works Provide self supporting, modular, temporary security fencing to a minimum height of 1800 mm. Arrange earthing of temporary fencing to high voltage substation work areas as required.

Project Statistics

Location:	16 zone substations across regional NSW
Product:	GuardForce® 358 welded mesh fence system
Style:	2400mm high welded mesh with Ø550 short blade concertina barb topping
Length:	~2,500m incl. gates
Duration:	65 weeks
Completion Date	June 2013
Final Contract Sum:	~\$2.5M

Project Description

In January 2011, Bluedog was contracted for two years under a schedule of rates period contract, to manufacture and install fencing at operational high-voltage zone substations throughout regional NSW. The contract involved scoping the site, manufacturing the materials and installing the fencing.

The program of works involved:

- Preparation of detailed dilapidation reports.
- Preparation of workshop drawings.
- Manufacture of materials.
- All staff to attend a “Sub Station Entry Course” and a “Safety Rules for Unqualified Workers” course.
- Erection of temporary fencing around the entire site with fencing earthed and isolation panels installed.
- Location of underground services.
- Location of existing earth grading ring.
- Excavation of trenches for new earth grading rings, placing of copper earthing cable and connection to the existing grading ring, back fill and compaction of trenching.
- Demolish and remove existing Chainwire fencing and gates.
- Excavated trench along new fence alignment for concrete plinth.
- Excavate new post footings, place and set posts to height.
- Form plinth around posts. Place and finish polyfibre reinforced concrete plinth including expansion joints and bringing earthing riser cables up through the plinth.
- Assembly the fence including the concertina barb topping.
- Install the gates including insulated gate retainers for the double gates.
- Install fibreglass I beam isolation panels.
- Removing existing dilapidated brick retaining walls and form concrete retaining walls with engineering certification.
- Construct new culverts to handle run off from the site.



Intermediate channel posts are set to height, in line and plumb by adjusting the timber jigs.



Posts erected and the polyfibre concrete mowstrip placed (Coonabarabran)



Fencing finished and asphalt placed around the perimeter of the site for earthing purposes (Coonabarabran)

- Place new blue metal aggregate in the switch yard.
- Complete Inspection and Test Plans.
- Complete Work as Executed drawings.

Project Specific Challenges

- Working in close proximity to “live” high voltage power including overhead and underground power entering the site.
- Excavation equipment needing to be earthed while digging.
- Developing, implementing and monitoring stringent WHS work flow protocols for working in close proximity to high voltage power infrastructure.
- Extensive trenching to enable the placement of new earth grading rings.
- Mobilising materials and labour resources to remote regional locations.
- Meeting contractual delivery timeframes notwithstanding poor weather conditions.



The use of water vacuum excavation to locate optic fibre in close vicinity to the new fence line (Dubbo)

Innovation & Added Value

- Design and engineering certification of a new folded post section that bolts back-to-back with to form a post assembly. The post is stronger than other similar designs in the market and has a number of other advantages including the ability to ‘nest’ making for very efficient packing (see image right).
- Development of a timber jig system to support the channel posts at the correct height. This allows a large number of posts to be set up and then place concrete in a large run.
- Design and manufacture of a locking hardware arrangement to fence system to meet client performance requirements.
- Design and manufacture of a gate stop for large double gates to prevent the gate leaves swinging outward and also to support the gate leaves in the closed position.
- Design and manufacture of modular double gates to allow easier freight and handling.
- Design and manufacture of a heavy duty hinge arrangement to



The proprietary post designed by Bluedog to comply with the performance requirements of the client.



Prior to commencing the security fencing upgrade (Coonabarabran)



Fencing project complete (Coonabarabran)