Case Study

Geosynthetics

Engineered Load Transfer Platform for Substation Extension

Rhigos 400kV Substation Extension



Contractor: M Group

Sector: Renewables, Energy & Utilities

Rhigos National Grid Substation, Hirwaun, Aberdare, CF44 9UP

Client: National Grid

Project Overview

At the Rhigos National Grid 400kV Substation in Aberdare, an infrastructure extension was required to connect a 299MW Open Cycle Gas Turbine (OCGT) power plant. Designed to power up to 150,000 homes during peak demand, the facility supports Great Britain's energy security and transition to low-carbon power.

To accommodate new air-insulated switchgear (AIS), main contractor M Group and engineers Rogers Clarke Lander Ltd collaborated with Geosynthetics Ltd to design a robust load transfer platform over soft, unstable ground.

The Challenge

Highly compressible peat soils beneath variable made ground made standard shallow foundations unviable. The extension required a high-strength load transfer platform (LTP) to bridge piled foundations and prevent differential settlement.

Key technical constraints included:
Spanning Pile Spacings: Safely distributing loads across a 2.5m pile grid with 900mm diameter pile caps.
High Load Capacity: Supporting a total surcharge load of 65kN/m^2.
Platform Integration: Tying seamlessly into the existing substation platform to maintain uniform structural performance.
Material Efficiency: Optimising aggregate depth to minimise costly earthworks and imported fill.

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Innovative Solutions:

Geosynthetics Ltd's engineering team carried out detailed basal reinforcement calculations to specify a targeted high-strength Load Transfer Platform (LTP) solution.

The engineered design, in accordance with BS 8006, incorporated two orthogonal layers of StrataGrid™ SGU800 structural geogrid laid within a 1.2m thick compacted platform of imported 6F4 quarried aggregate:



- **Bi-Directional High Tensile Reinforcement:** Two layers of StrataGrid™ SGU800 (800 kN/m ultimate tensile strength) were placed horizontally, one layer oriented North–South and the second East–West, directly above the pile caps.
- **Arching & Tensioned Membrane Action:** The high-modulus StrataGrid™ layers interlock with the 6F4 aggregate, creating a stiffened structural mattress that distributes surcharge loads via soil arching directly into the piled foundations.
- **Foundation Stability:** By bridging the 2.5m pile voids, the system effectively minimises settlement in the underlying weak peat soils and prevents punch-through failure.
- **Transition & Anchorage:** A specific detail was developed to transition between the existing and new LTPs. Prefabricated blocks provided StrataGrid™ anchorage on the last row of existing piles, eliminating the need for an anchor trench and avoiding excavation that could affect the stability of the existing LTP.

Results & Benefits Delivered:

1. **Rapid Installation:** Unidirectional placement of StrataGrid™ SGU800 roll layers allowed the groundworks team to construct the platform quickly without complex site machinery.
2. **Schedule Efficiency:** Simplified the ground preparation phase, helping keep the overall substation extension project strictly on track.
3. **Reduced Excavation:** Minimised deep earthworks in soft peat, significantly reducing muck-away volumes and heavy vehicle movements on site.
4. **Seamless Site Integration:** Created a stable, uniform working platform that tied effortlessly into the existing substation level, providing immediate safe access for follow-on trades.

Client Testimonial

"Geosynthetics worked closely with our site team and client's engineer to determine a robust solution that tied in seamlessly with the existing platform. The StrataGrid™ LTP provided the structural reinforcement needed to safely install the new air-insulated switchgear over challenging ground conditions."

— Project Delivery Team, M Group / Rogers Clarke Lander Ltd

Key Takeaway

The Rhigos 400kV Substation Extension highlights Geosynthetics Ltd's expertise in engineering Load Transfer Platform solutions for complex ground conditions. By combining high-strength StrataGrid™ SGU800 geogrids with tailored technical support, Geosynthetics Ltd delivered a cost-effective, high-performance load transfer platform that supports Great Britain's clean energy transition.

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