

Qiubei Independent Energy Storage Project, Yunnan, China



Supporting BESS construction from the ground up

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CLIENT'S CHALLENGE

The client needed a reliable solution to build a battery energy storage station (BESS) over closed depressions and valleys. The existing ground had underlying stiff red clay of variable thickness over moderately weathered stone strata, which was unable to support the construction activity. It called for a foundation solution prior to the retaining structure construction with maximum height of 19m to level the site.

TENSAR SOLUTION

The TensarTech earth-retaining system composed of a TensarTech Green Slope and the SierraScape system. This was adopted for the construction of the plant's retaining structures to meet the land use requirements. Meanwhile, the mechanically stabilised layer (MSL) incorporating Tensar InterAx geogrids were adopted to stabilise the soft ground, which effectively reduced differential settlement. The flexible structural system eliminated the need for costly ground improvement. Utilising on-site materials minimised the overall construction cost and reduced carbon emissions.

B E N E F I T S

- **The solution provided enough flexibility in design** to satisfy both the structure's stability and the client's aesthetic requirement
- **On-site materials were utilised**, reducing the need for import of structural soil for earthwork
- **MSL eliminated costly ground improvement**

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PROJECT DETAILS

Application

Earth Retaining Walls & Slopes and Sub-grade Stabilisation | No. 564

Constructed in

2024

Contractor

China Southern Power Grid



Aerial view of the project

PROJECT BACKGROUND

This is the first battery energy storage station (BESS) pilot project in Yunnan Province as well as the largest grid-forming lithium and sodium hybrid technology-based BESS nationwide. The project aimed to improve the power supply stability and promote the regional transition to low carbon energy source.

The project site lies within karst topography characterised by closed depressions and valleys, predominantly underlain by red clay of variable thickness over competent soil. Site levelling required a green retaining structures with a maximum height of 19m that integrated with the surrounding environment upon completion. The space constraint due to adjacent farmland and structure side slope sitting on existing slope posted significant challenges in construction.

The original proposal was to excavate down to the competent foundation. However, the complete removal of all underlying soil was not practical and other ground improvement measures were deemed to be expensive. TensarTech Green Slope and Sierrascape system were proposed due to their inherent flexibility to tolerate differential settlement compared to rigid form of structures.

Sierrascape with a gradient of 1V:0.3H was constructed with max height of 11m, followed by a wraparound slope using uniaxial geogrid with gradient of 1V:0.6H and maximum height of 8m. The combination of the retaining wall system reduced the weight of the structure without compromising the stability and overall aesthetic. Considering variable thickness of foundation strata, Tensar Mechanically Stabilised layer incorporating Tensar InterAx layers was proposed to mitigate differential settlement if any.

The solution made use of the existing material as backfilled soil, which greatly reduced the need for soil material transportation caused by the earthwork activity. Apart from significant saving in construction cost, time and carbon, the solution also satisfied the earthquake design requirement. This project served as an exemplary benchmark for BESS.



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