

Case Study

500 / 330 kV Switch Yard

Mt Piper Power Station, NSW

Market Sector

INFRASTRUCTURE



Application

DEEP IMPACT COMPACTION



Site Conditions

**UN-ENGINEERED VOIDED
COARSE GRANULAR FILL**



LANDPAC

INTELLIGENT GROUND ENGINEERING SOLUTIONS

Project

The purpose of the Mt Piper development was to provide a uniform engineered sub-grade in order to build a new 500/330kV Power Station Switch Yard. The requirement was to induce as much settlement as possible using the nominated machine and provide bearing capacities of 100kPa and 150Kpa at 3m and 1.5m respectively with post settlement criterion.

Soil Conditions

The site consisted of reasonable quality, variable fill, that ranged from 10m -14m, however drilling results indicated voids present in the fill with sudden drops in auger flights of between 0.1m - 0.3m. The fill also comprised of some boulders and variation in strength.

Construction

The completion of a 500/330kV Power Station Switch Yard. The major Pylons were piled whilst all other structures supported on upper level footings.

Client: Transgrid

Engineering Consultant: Transgrid

Main Contractor: United Group

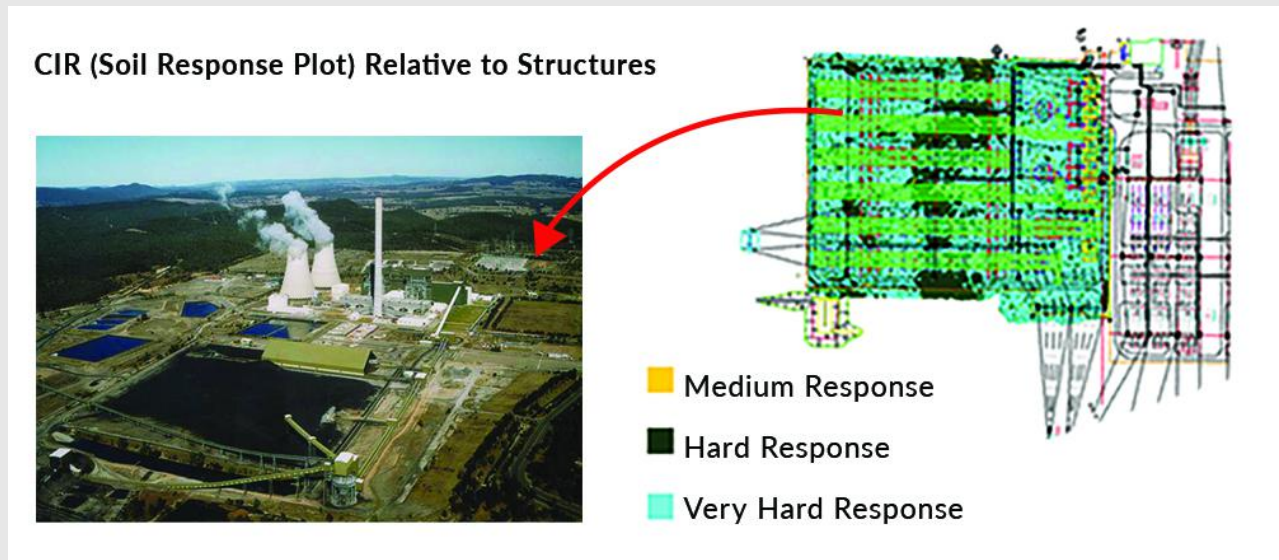
Ground Engineering Contractor: Landpac

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Geotechnical Solution

Impact Compaction using one of Landpac's 135kJ machines was used as an alternative to remove and replace the in-situ fill. Deep Impact Compaction was used to collapse the voids present whilst also providing significant mechanical interlock between the boulders.

Due to the frequency of high level footings required a combination of Landpac's quality control (CIR and CIS) system during Impact Compaction together with post compaction CPT testing and MASW (Multi-Channel Analysis of Surface Waves) testing provided an economical solution to an intricate project.



Monitoring & Verification / QA

The Impact Compaction works were monitored with Landpac's (CIS)-Settlement Monitoring System and (CIR)-Soil Response System. The CIR provided engineers with sub-grade stiffness values precise to GPS points on site relative to the many footing locations.

Due to the nature of the fill (coarse grained fill) the CPT comparison between pre and post was not exactly comparable and therefore MASW tests were carried out to validate a higher confidence level in post compaction results. A settlement analysis indicated that the combined weak layers would induce theoretical deflections of zero to 1.25 mm.

The weak layers were cohesionless so it was considered the settlements would occur as the load was applied and that there would be no time dependant settlement. The entire sub-grade was subject to High Energy Impact Compaction (HEIC) to sustained and onerous dynamic proof loads that exceeded the likely operating static loads.

The array of testing substantially determined that the sub-grade would satisfactorily support the proposed switchyard loads using upper level footings. Structures within the power station are subjected to very high wind loads (uplift) therefore the combination of Landpac's quality control (CIR and CIS) system during Impact Compaction together with post compaction CPT testing and MASW testing proved to be invaluable.

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