

Case Analysis

Uncontrolled Fill and Ground Improvement — Goodna, QLD

Market Sector

RESIDENTIAL



Application

IN-SITU COMPACTION



Project Phase

CONSTRUCTION PHASE



LANDPAC

INTELLIGENT GROUND ENGINEERING SOLUTIONS

Project

This project involves the residential subdivision of the site, designated for a range of housing typologies, including townhouses and low-rise residential structures up to three storeys.

To address identified geotechnical constraints, Landpac was engaged to perform site-wide ground improvement using High Energy Impact Compaction (HEIC). The compaction strategy involved the systematic treatment of in-situ soils (prior to filling), cut areas (compacted prior to filling), and fill zones in 1-meter nominal lifts, providing the necessary engineering performance to support the proposed infrastructure and building foundations.

Site Condition

A review of the Geological Survey of Queensland 1:500,000 Moreton Geological Map indicates that the site is predominantly underlain by sedimentary formations, specifically sandstone, siltstone, shale, and coal measures.

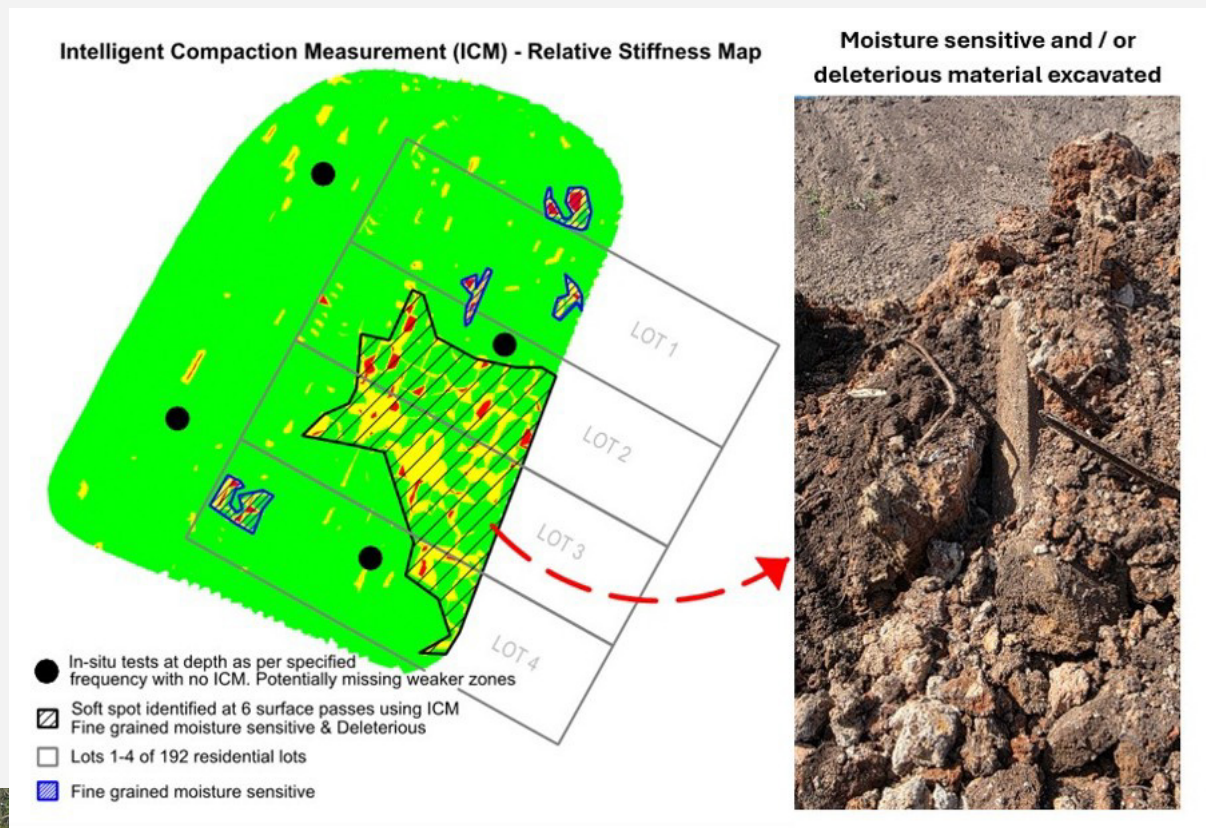
The site's geotechnical profile is further complicated by its proximity to historic underground coal mining operations. Subsurface investigations and bulk earthworks, most notably in 2016, revealed localised voids within the fill. These features are interpreted to have been caused by subsurface erosion and piping, where preferential flow paths facilitated the migration and loss of fines into adjacent historical mine voids.

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Geotechnical Solution

Ground improvement was executed through a multi-faceted HEIC strategy, utilizing a combination of three and five sided impact modules with real time ICM monitoring at every stage of the works. The process began with the treatment of in-situ subgrades and cut zones, followed by the systematic placement and compaction of 1-meter nominal lifts. This methodology was precisely calibrated to address the site's specific geotechnical constraints across in-situ, cut, and fill areas.

Crucially, the HEIC technique offered significant logistical advantages by successfully incorporating larger particle sizes within the engineered fill. This approach bypassed the need for traditional mechanical crushing an otherwise mandatory and costly requirement under conventional compaction specifications, thereby delivering substantial reductions in both project expenditure and construction timelines.



Sub-grade instability detected after just 6 passes



Monitoring & Verification/QA

HEIC operations were governed by a comprehensive monitoring framework, encompassing settlement, soil response, and pass-count verification. The implementation of Landpac's ICM system provided a continuous data stream, allowing for the precise geolocation of soft spots through relative soil stiffness mapping.

The efficacy of this methodology was demonstrated in Area 6, where the ICM system signaled potential sub-grade instability after only six surface passes. This early detection facilitated immediate rectification, enabling the removal of deleterious material (including construction waste) prior to the completion of the full compaction cycle. This proactive intervention minimised rework, prevented the squandering of resources on futile pass counts, and ensured consistent structural integrity across the project's critical path.

Final validation was executed by reconciling conventional geotechnical field testing with the ICM data generated throughout the compaction process.

The ICM system provided a continuous, real-time audit for each square meter covered, which was subsequently verified and authenticated by the project's geotechnical engineers. This integrated approach effectively bridged the gap between point-source spot testing and total-area compaction validation.

**83% of the site
treated with HEIC**



Summary

- ✓ Real-time ICM monitoring at every compaction stage
- ✓ Continuous data verified against geotechnical field testing
- ✓ Reduced environmental impacts
- ✓ Treated in-situ, cut, and fill zones
- ✓ Time and Cost Savings.

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