



Case Analysis

Marlin Coast Waste Water Treatment Plant Cairns, QLD

Market Sector

INFRASTRUCTURE



Application

DEEP IMPACT COMPACTION



Soil Conditions

**UN-ENGINEERED VOIDED
COARSE GRANULAR FILL**



LANDPAC

INTELLIGENT GROUND ENGINEERING SOLUTIONS

Project

This purpose of this development was an extension of the existing Waste Water Treatment Plant located in Smithfield, Cairns. High Energy Impact Compaction (HEIC) was used adjacent to the existing waste water treatment plant.

Soil Conditions

The upgrade works generally comprised of fill material including sandy clays, silty clays, gravelly sands, and sandy gravels down to 6.5m underlain by clayey sands and sandy clays. Field and laboratory tests confirmed the presence of PASS and possible ASS materials across parts of the site. The water table was in some cases as high as 0.8m below the compacted surface.

Client: Cleaner Seas Alliance

Engineering Consultant: Golder Associates

Main Contractor: CEC Group

Ground Engineering Contractor: Landpac

Geotechnical Solution

Impact Compaction using one of Landpac's 135kJ machines was used to compact the in-situ fill. Deep Impact Compaction was used to densify the sub-grade down to 5m (to achieve $\geq 5\text{MPa}$ down to 5m) as it was not economically viable to remove and replace PASS and possible ASS materials with the water table up to 0.8m in places below the impacted working surface.

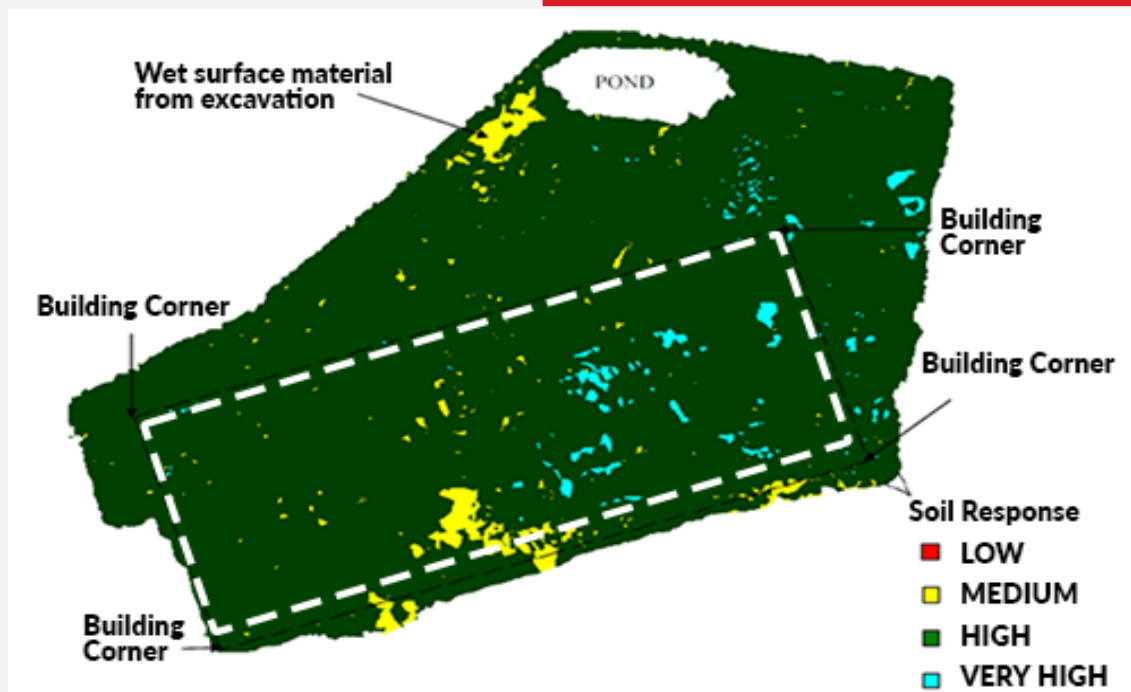


Discussion

The induced settlement on the area was reduced to a near 'zero' settlement condition within the capabilities of the respective machine after a varying number of surface passes with the use of the 3-sided Impact Compactor.

The compacted areas are indicated on the soil response plot (CIR) in the image shown. Low or medium response locations on the CIR plot identified the material as silty clay with high moisture content which proved un-compactable until replaced.

Soil Response



Discussion cont.

HEIC provided a uniform engineered platform for the construction of the waste water treatment plant extension upgrade. De-watering during impact compaction in the south western end proved to be extremely valuable as ponded water did not intervene with the compaction process.

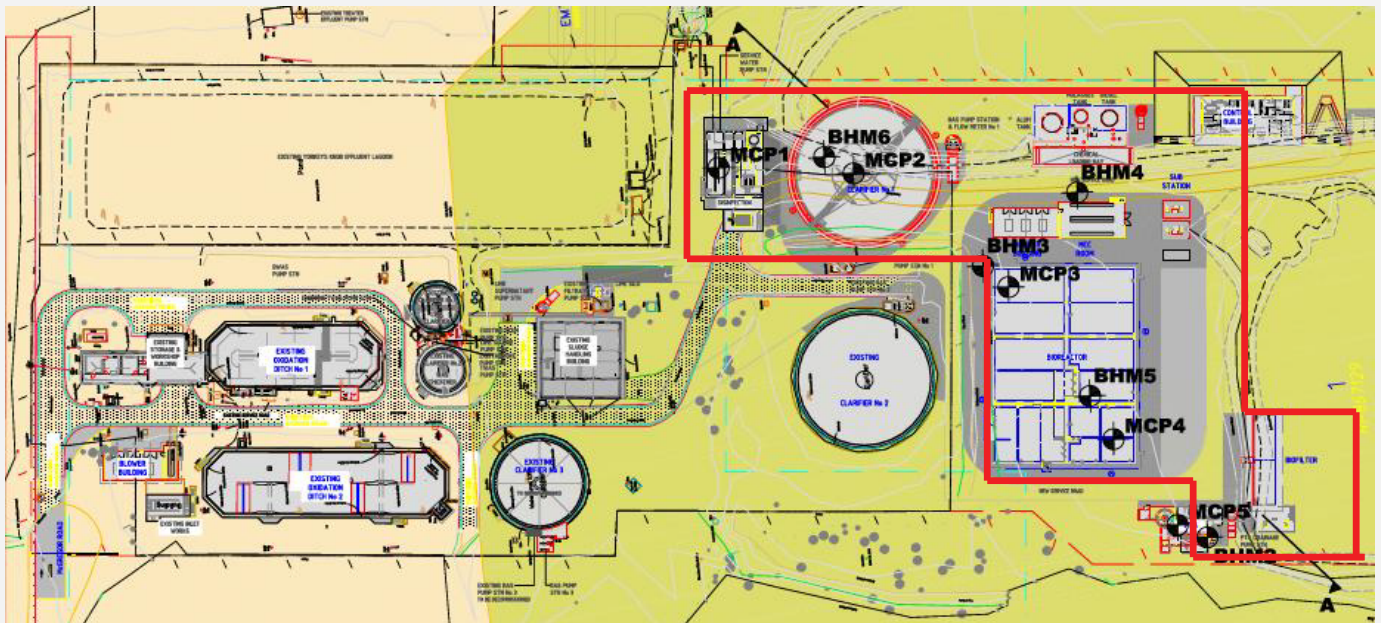
Construction

Construction of the Smithfield, Cairns Waste Water Treatment Plant extension.

Monitoring & Verification/QA

Landpac used their integrated GPS technology to identify the weaker pockets present within the sub-grade. Weaker areas were replaced with good compactable material and then using the 135kJ machine the replaced sub-grade was subject to impact compaction.

Constant vibration monitoring integrated with sound alarms were used to ensure the integrity of the adjacent structures were maintained. The post CPT's provided engineers with the appropriate test results which permitted the use of high level footings to be engaged. CPT testing was used to verify the bearing capacities and post construction settlements. Some CPT tests showed there was some soft clay and silt lenses that did not achieve and would never achieve (Due to High Fines) the required specification however it was determined that the lenses were very slight and the structures would have no adverse effects on the upper level footings proposed.



Compaction Zone

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