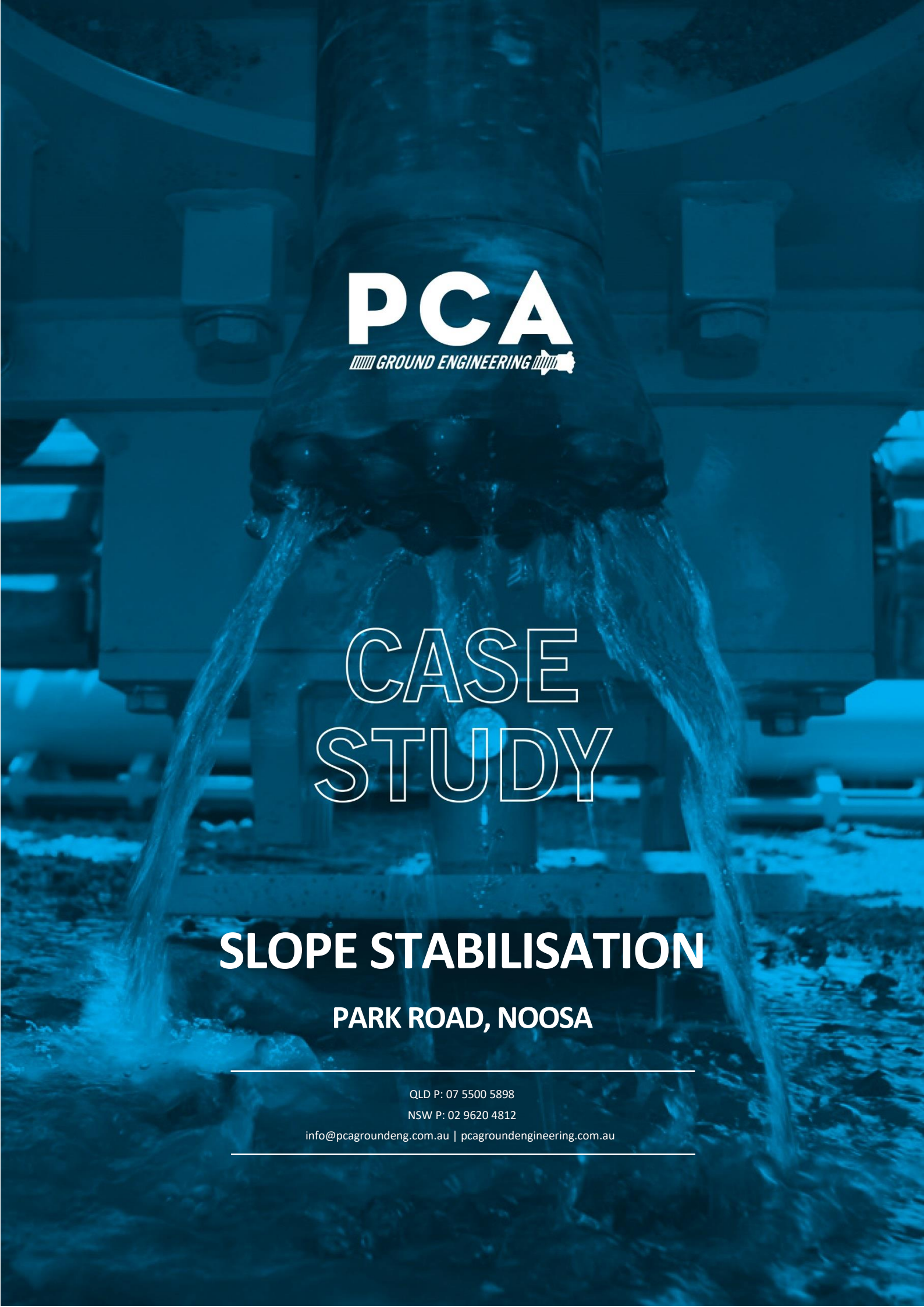

PCA GROUND ENGINEERING

CASE STUDY

SLOPE STABILISATION

PARK ROAD, NOOSA

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CASE STUDY

PCA GROUND ENGINEERING

SHOTCRETING I EARTH RETENTION I PILING I GROUTING I ENGINEERING GROUND IMPROVEMENT I CIVIL CONSTRUCTION

PROJECT ENGINEERS: GHD
BUILDER: Ark Construction Group
Sunshine Coast Regional Council
NUMBER OF PILES: 320
CAPACITY OF PILES: SWL 180kN Compressions and 211kN Tension **CLIENT:**
PROJECT COMMENCEMENT DATE: August 2010

Hastings Street and Park Road Noosa

One lane of traffic remained open during construction

CHALLENGES

Park Road at Noosa on Queensland's Sunshine Coast is the gateway for 1 million visitors per year to the spectacular Noosa Heads National Park. In the mid 1990's, a major rain event caused sections of the road to slip and temporary remedial works were undertaken to attempt to stabilise the slope. However, further investigative work in 2009 resulted in a recommendation that a permanent solution be found to stabilise this important lifeline for local residents and visitors. Finding a solution to stabilise the slope had to solve the following engineering and construction challenges;

- Preserve the vegetation on the down slope area to retain visual aesthetics and protect important koala habitat.
- Allow vehicle and pedestrian access through the site during construction.
- Retain the slope and protect the road users from future slips.
- The structure would need to support a new 3m wide cantilevered pedestrian boardwalk.
- The structure needed to be free draining and handle a rising and falling water table.
- The structure needed to protect road users and take the 100kN/m impact loads from vehicular traffic.

SOLUTION

Although an Australian first, the solution provided to both stabilise the slope and carry the applied loads was taken from technology used in the Alpine regions of Europe. An "A Frame" structure consisting of 320 high pressure grouted micro piles fixed at the apex by a concrete capping beam was adopted.

The triangular soil wedge within the "A Frame" acts as a reinforced soil mass while the applied structural and geotechnical loads are carried axially within the piles. The piles were drilled into the underlying sandstone which was beneath the critical slip failure. The solution raised the factor of safety against failure from 1.01 (pre-construction) to 3 (post construction).

"A popular tourist strip - traffic had to keep moving"

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CASE STUDY

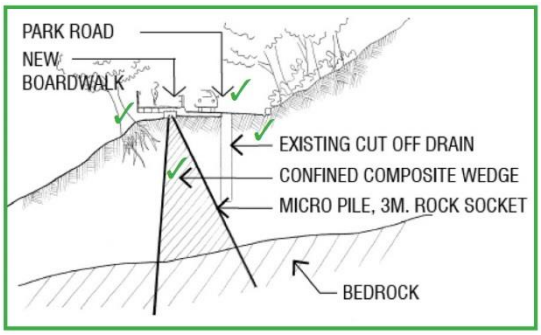
PCA GROUND ENGINEERING

SHOTCRETING | EARTH RETENTION | PILING | GROUTING | ENGINEERING GROUND IMPROVEMENT | CIVIL CONSTRUCTION

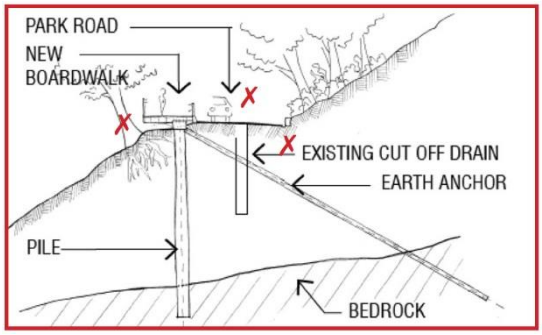
THE BETTER ALTERNATIVE

Originally designed using a series of 12m long 750mm diameter bored piers socketed 2m into the underlying bedrock and tied back with post tensioned earth anchors, PCA's alternative "A Frame" micro pile wall approach was enthusiastically adopted by the Sunshine Coast Regional council due to the following benefits;

- 4 Weeks less construction time (18 weeks vs 22)
- No spoil removal.
- Practically no tree pruning required. The vegetation in the adjacent National Park could remain due to the relatively small and nimble piling rig.
- Low impact on tree roots. The 90mm diameter drill bits could weave through the root systems of adjacent trees. In contrast, the 750mm diameter bored pier solution would have necessitated tree removal and destroyed root systems vital for the local koala population.
- No need for earth anchors which would have restricted future road construction and services
- No impact on the deep drainage remedial works carried out in the mid-1990's.
- Significant cost savings and reduced risk of variation.
- No road closure. PCA's piling rig could work from one lane leaving the second lane open under 24 hour traffic management.



PCA's "A Frame" micro pile alternative



Original 750mm bored pier design

Precision angles on raked piles

Piles were load tested to confirm design assumptions

New boardwalk under construction

Noosa Boardwalk Completed

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