Site Profile

The Northern Pipeline Interconnector (NPI) is a bi-directional water pipeline connecting Sunshine Coast and Brisbane water sources. Part of the $9 billion South East Queensland water grid, the pipeline will protect both regions from localised droughts. Up to 65 ML/day of treated potable water may be transported from the Sunshine Coast to Brisbane or vice versa.

The alignment of the NPI-2 (Stage 2) intersects the South Maroochy River at Yandina. At this point, the pipeline must detour under the river via a micro-tunnel constructed by tunnelling contractor Rob Carr Pty Ltd.

The Situation

Construction of a micro-tunnel is performed by a Tunnel Boring Machine (TBM). For the TBM to tunnel, a shaft must be sunk at either end of the proposed tunnel from which the TBM can be launched and retrieved.

During excavation of the launch shaft, a very hard Rhyolitic Tuff was encountered which exceeded available mechanical rock breaking capabilities. Orica was contracted to risk assess, design, gain approvals and execute a programme of blasting to improve the rate of excavation.

A politically and environmentally sensitive project, attention turned to the impact that blasting may have on local bird and bat populations within the South Maroochy River corridor. A caravan park located 120m away as well as other nearby residents further complicated the issue.

In consultation with Rob Carr Pty Ltd and pipeline construction overseers, the Northern Network Alliance, it was determined that airblast was a key risk. Whilst disruption to local fauna was the primary concern, blasting at the base of a shaft also has the potential to create a ‘gun-barrel’ type effect whereby airblast is directed skyward and, in certain conditions, can be reflected back to earth a long distance from the source.

Technical Solutions

Orica applied its ‘Risk Management’ approach to blasting in considering and assessing the risks of a variety of airblast controls. Practical considerations ultimately led Orica to present a water cover solution which was accepted.

The 8m diameter shaft was loaded with waterproof Senatel™Magnum™ packaged explosive and primed with Orica’s waterproof i-kon™ electronic detonator. Finally, the shaft was flooded with water before overlaying a number of blast mats across the shaft opening.
The Result

The result was a blast which some onlookers described as “an anti-climax”. Others were unsure the blast had even fired given the controlled nature of the blast. Airblast readings at a monitor 20m away were an insignificant 109dB(L) whilst airblast levels at the nearby caravan park were almost indiscernible from background levels at just 96dB(L).

The resulting fragmentation allowed tunnelling contractors Rob Carr Pty Ltd to excavate to floor level without need for additional blasting.

Acknowledgements

Orica wishes to acknowledge Rob Carr Pty Ltd and the Northern Network Alliance for their co-operation as well as the patience of the launch shaft site land owners throughout the blasting programme.