

# ALSTONVILLE BYPASS

The Reed Group and RTA have overcome numerous technical and environmental challenges along the way to produce a bypass that represents a win for everyone involved.

THE REED GROUP



# THE REED GROUP IS DELIVERING AN ALL-ROUND WINNER

Redirecting the highway traffic to help a village with its circulation.

ALSTONVILLE BYPASS/ THE REED GROUP

**Below** Looking down the line of a section of the Alstonville Bypass project overseen by The Reed Group.



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The long-awaited Alstonville bypass will represent a win for everyone. The Alstonville community will no longer have the Bruxner Highway traffic in the village and North Coast commuters will be able to get to places earlier.

The project timeframe has been extended due to the North Coast's ongoing heavy rainfall events, with extended wet periods a feature of the entire construction period and proving a major impact on works. Maintaining the planned rate of progress with bulk earthworks was complicated by a wetter than average winter, during which the region's clayey/silty volcanic soils were regularly saturated and had little drying potential during the cooler months.

Similarly there were risks during the summer months due to damaging storms that developed with minimal warning. Partially completed earth embankments required constant surveillance, with The Reed Group's project team maintaining vigilance in executing normal protective measures such as sealing off, grading to promote overland runoff and construction of intercept drains and lined batter chutes to protect fill batters.

Overall, it has been challenging completing the bulk earthworks and pavement phases of the project, while also managing large quantities of sediment-laden runoff water. The RTA sets high environmental standards in its projects requiring a strong contractor commitment. Managing the installation and on-going maintenance of a vast array of erosion and sedimentation control measures and sediment basins situated over the 6.2km length of the project required, and continues to require, a significant commitment by the project team.

The project involves a 5.5 km "green field" section of new carriageway through acquired land comprising farmers' paddocks with creeks and other intermittent watercourses. The sequencing of this work involved clearing, topsoil stripping, construction of three sealed access roads to local properties, drainage culverts, bulk earthworks and structures,

subsurface drainage, pavements, traffic barriers, street-lighting and road furniture.

At the eastern and western ends of the project, "tie-ins" are being built to connect back onto the old Highway and internally onto local roads at Kays Lane. This work involves construction of temporary side-roads on which to move the traffic, around 15,000 vehicles per day, away from the work zone. The work zones are typically separated from moving traffic by long runs of concrete jersey barriers and considerable sections of work were carried out in a staged manner under traffic control.

The RTA specification required traffic on the Bruxner Highway between Lismore and the Pacific Highway to be only restricted by lane closures between the hours of 9.30am and 2.30pm. Also, carrying out night work during reduced traffic periods was subject to stringent noise mitigation controls in order to avoid nuisance to surrounding residents in the sensitive semi-urban/rural environment.

Up to sixteen of The Reed Group staff worked on-site undertaking project management, site engineering, survey, quality assurance, site administration, OH&S and environmental management. This team was kept on its toes meeting the challenges of site safety, environmental protection, effective management of more than twenty-five sub-contractors and an extensive array of heavy equipment including blasting equipment and a peak daily workforce of around eighty-five people.

Structures constructed comprised two bridges with precast super-T girders and an 18m wide concrete arch over Maguires Creek.

An innovative "top down" construction technique has been used for the single span bridge at Wardell Road, which entailed installation of piled bridge abutment foundations and construction of the substructure and bridge deck before excavating the natural ground under the bridge to

form a cutting for the bypass. This method provided both a time and cost saving in not having to wait for completion of the bypass excavation work and subsequent construction of a reinforced earth retaining structure at each abutment, before commencing work on the bridge abutment sill beams. It also enabled the bridge to open to traffic somewhat earlier, before completion of work underneath the superstructure to complete shotcrete infills between the bored foundation piles.

Environmentally, on the project there has been a range of measures including frequent monitoring of vibration, noise, water and air quality; dust mitigation by screening and watering; vibration controls on compaction plant; timely revegetation of completed earth batters; strict controls on blasting activities; and muffling of reversing beepers on plant used outside normal work hours.

Noxious camphor laurel trees cleared from the site were transported to the Broadwater sugar mill for power generation.

Any threatened species or native vegetation in clearing zones were identified by a specialist for trans-location to adjacent undisturbed areas. Non-noxious cleared vegetation was mulched for use on planting beds and stripped top soil was re-used on finished earth batters prior to revegetation.

For future management of storm water, two large stormwater detention basins with a combined capacity of around twenty-three mega-litres have been used to temporarily store the runoff generated by significant rainfall events during construction. The basins have been designed to discharge fully into existing town stormwater systems within a few hours via outlet pipes. Designed to cope with 1 in 5 year storm events of 3 hours duration, they also incorporate spillways to prevent over-topping.



**Below** The Wardell Road Bridge. Some of the work along the 6.2km length of the project.  
**Below Left** An aerial view of the Kays Lane interchange.



Concrete lined clean water swale drains up to 3 metres in width with gabion basket energy dissipaters have been constructed along the toe-line of the major embankments on the project, designed to transfer runoff from the new bypass into local watercourses without scouring or erosion.

Large culverts have been installed under the fill embankments to carry stormwater runoff in approximately the same routes as before construction commenced. Due to the intensity of rainfall experienced in the Northern Rivers region, these culverts include double 1500dia and triple 1500dia pipe cells, a 3 metre x 3 metre box culvert and the 18 metre wide x 6 metre high arch structure at Maguires Creek.

The RTA is acutely aware of the importance of the project to the local community and need to keep motorists on this critical link between Lismore and the Pacific Highway informed of construction activities. As a result, significant community information strategies have been used. Regular interactive community information sessions have been conducted, as well as the use of variable message boards, letterbox drops and media advertising.

ALSTONVILLE BYPASS/ THE REED GROUP

**Below** Anti-throw screens were an RTA safety requirement. Wardell Road Bridge showing top-down construction method where piles under abutments and wingwalls are exposed. The bridge will provide a grade-separated crossing of the new Bypass.



**When the RTA and The Reed Group needed expertise to resolve** some important design and engineering issues on the Alstonville Bypass project, they turned to the multidisciplinary team in the Sydney office of Opus International Consultants.

Opus was involved in the project throughout construction, from June 2009 through to April 2010, and its project team designed the foundations for the arches supplied by Humes for the Maguires Creek Bridge, the base slab, wingwalls and apron slabs for a fauna and cattle underpass, and redesigned the bridge that carries Wardell Road across the new bypass.

Bridge designer Long Bai said: "The original RTA concept design geometry for the Wardell Road bridge, especially the wingwalls, had to be altered to avoid services."

The bridge, as built to the revised design using top-down techniques, is 25 metre long, with one end leading to a roundabout, requiring that end to be flared. This meant the conventional design of parallel beams had to be replaced with beams which were each tapered at the top flange so the super T girders would fit to the tapered plan.

Long Bai added: "One problem caused the Wardell Bridge to be changed in a major way. Once the contractor was on site they found there were conflicting underground services; this created a lot of design issues for us. We worked closely with Reed to ensure the RTA was satisfied. It was a good three way relationship."

Other recent successes for Opus include a futuristic yacht club on Hamilton Island which received an Excellence Award from the Engineers Australia Sydney Division this year; designing parts of the stations for the Chatswood to Epping Rail Line; and designing 23km of new rural road and five bridges for the Tillegra Dam project, north of Newcastle.

**For more information contact Opus International Consultants** at their Sydney office, Level 12, North Tower, 1-5 Railway Street Chatswood NSW 2067, P.O. Box 5340 West Chatswood NSW 1515, phone 02 9325 5600, fax 02 9904 6777. Website: [www.opus.com.au](http://www.opus.com.au)

ALSTONVILLE BYPASS/ OPUS INTERNATIONAL CONSULTANTS

Below Vibropile's history has equipped them with the skills and resources to contribute to the Alstonville Bypass project.



Below Onsite Environmental Management gave the highest level of commitment, experience, knowledge and diplomacy as an independent advisor on environmental matters.



**Vibropile specialise in giving major projects strong foundations.**

In the case of the Alstonville Bypass project, their skill in dealing with difficult geophysical situations and sensitive areas was an asset to the project.

The company is no stranger to the North Coast and the challenging combination of extreme environmental sensitivity and extreme rain events which are an added factor of difficulty when working on and below the ground. Having laid the foundations for the Byron Bay Village development, Vibropile know their way into the North Coast soil types.

Add to this the company's leading edge equipment, which includes four Enteco E25SD drills, custom made to the company's specifications and amongst the most powerful CFA drill rigs in the world. All of Vibropile's CFA piling and Displacement Screw Piling rigs are equipped with the latest in quality assuring digital technology, with on board computer monitoring systems displaying and recording every piece of critical data during pile construction. This information is not only displayed for the operator, giving him eyes below the ground, but also automatically downloads back to Vibropile's office as each pile is completed.

This is the kind of attention to detail which earned the company ISO 9001 Quality Assurance Accreditation from SAI Global, which promises every project they undertake has a successful resolution.

Since 1966 Vibropile have been designing and installing deep foundations, becoming award-winning industry leaders in CFA technology, hard rock drilling and large diameter bored piling, with Australia's largest fleet of high capacity drilling rigs, and a selection of hydraulic hammers and vibrators for installing pre-formed piles and sheet piles.

Other recent major projects include Melbourne Convention Centre and South Wharf precinct for Brookfield Multiplex and Contextx; Wodonga railway bypass waterway bridge for John Holland; Fiona Stanley Hospital for Brookfield; and Port Hedland Railway for BHP Billiton; and the Gateway Bridge Alliance for Leighton Abigroup JV.

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ALSTONVILLE BYPASS/ VIBROPILE

**In a region like the North Coast, where environmental issues and environmental values are of acute concern, the role of Environmental Representative and the task of environmental management on the Alstonville Bypass project required the highest level of commitment, experience, knowledge and diplomacy.** Onsite Environmental Management (OSEM) was appointed by the Department of Planning (DoP) as an independent advisor on environmental matters, with the formal role of Environmental Management Representative (EMR), also known in more recent approvals as the Environmental Representative (ER).

"The EMR was involved in the project from the construction environmental management planning phase, through construction and into post- construction to ensure all conditions of approval are closed out," OSEM Principal David Bone explained.

"OSEM was present on site at Alstonville on a fortnightly basis to review monitoring, implementation of management plans and to discuss upcoming issues; acted as an environmental advisor for both the construction team and RTA; audited management plans and actions to ensure that compliance with commitments and requirements of environmental approvals were achieved and monitored complaints and enquiries from the community and government agencies."

Other aspects to the ER role include being part of the project's community information group, regular reporting to DoP, monitoring rehabilitation, flora identification and weed management advice. OSEM also assisted with approval of construction related environmental documents such as management plan modifications, and gave advice for establishment of ancillary facilities including site offices, batch plants, stockpiles and water storage management options.

OSEM has extensive experience in the field of environmental auditing, biodiversity assessment, EMS and CEMP preparation, contaminated site investigation, environmental reporting, and monitoring of air, water, noise and vibration. A senior environmental scientist, David has completed due diligence auditing for over 300 projects both around Australia and overseas for industries including construction, manufacturing, mining, utility and infrastructure development. OSEM's track record over the last five years includes such major contracts over \$200m as Cronulla Rail Duplication Alliance, Kooragang Island Coal Export Terminal, Coopers Creek to Herons Creek Pacific Highway Upgrade Alliance, and Tomago to Tomaree 132Kv Powerline Upgrade.

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One of the final things that needed to be done for the Alstonville Bypass Project to be complete was turning on the streetlights, supplied and installed by NJ Construction. They were involved with the project from the earliest stages, and are one of the last contractors to wind up at the site.

Established in 1994, NJ Construction provide electrical and communications infrastructure services including engineering and design; installation and construction; upgrade and refurbishment; and maintenance of both underground and overhead transmission and distribution services.

NJ Construction have a strong track record of completed projects across South Eastern Australia, and a growing client base around the state. Having a depot at Alstonville meant the company was perfectly situated to manage this project.

Five NJ Construction staff worked in the field on the installation of over 100 street lights for the new section of this vital link between Lismore and the Pacific Highway, supported by two designers and four administration staff. The logistics of ordering, transporting to site and installing so many lights was the project's main challenge, one overcome by experience and excellent supplier networks.

The Alstonville Depot has over 20 field staff servicing a diversity of projects in the booming North Coast region. NJ Construction head office is in Queanbeyan, and the company has another depot at Port Macquarie. The company's resource base in terms of staff and capital equipment has continued to grow as more diverse projects have been 'sparked up' successfully.

These have included the 2003 Hudson Creek to Berrimah Transmission Line out of Darwin for Power and Water Corporation; Moree to Bellata 66kV Transmission Line for Country Energy; Awoonga Dam 66kV Transmission Line Relocation at Calliope, QLD, for Ergon Energy; and Boeing High Frequency Modernisation (Riverina, NSW), for Thiess.

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ALSTONVILLE BYPASS/ NJ CONSTRUCTION

For over fifty years, the Australian Seed Company has been supplying bush-collected seeds of trees, shrubs, and understorey species to nurseries in all states, forest plantation projects, construction projects, hydromulching services, rural landholders and mine rehabilitation projects. For the revegetation works on the Alstonville Bypass Project, they supplied The Reed Group with seed for trees, shrubs and grasses, which had been collected over several months from both the local area and similar ecosystems.

The Australian Seed Company collect, process, store and supply seed for over 1,500 native species ranging from trees to wetland species and grasses, send orders around the nation and have exported to more than forty countries. Owners and Managers, Bourne Forestry Services, have been forest consultants and forest managers for over forty years. This commercial forestry and silvicultural experience gives the Australian Seed Company expertise on the varied seed production cycles of tropical, temperate, cold-tolerant and arid-zone species. Their access to quality collection sources and efficient time-tested methods ensure a viable result.

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Above The Australian Seed Company provided the seeds for revegetation of the native plants in the project.