KEEPING NORTHERN SYDNEY'S TRANSPORT LIFEBLOOD CIRCULATING

"The Hills M2 is more than a construction project, we have to balance the drive to complete the project ensuring we minimise our impacts on the 100,000 motorists and 27,000 bus patrons that use the motorway each day,"

- CRAIG GREENE / **HEAD OF HILLS M2**

HILLS M2 OWNER & OPERATOR : Transurban
MAIN CONSTRUCTION COMPANY : Leighton Contractors Pty Ltd
COMPLETION : Mid 2013
PROJECT VALUE : $550 Million

Keeping Sydney traffic moving as the city continues to grow outwards requires ongoing investment of money and effort in road infrastructure. One of the most recent major projects has been the $550 million upgrade of the Hills M2 Motorway, with the design and construct contract undertaken by Leighton Contractors Pty Ltd for motorway owner and operator, Transurban. The Hills M2 is a key commuter and freight route, which connects the north-west region to the lower North Shore and the CBD. It is estimated the route is travelled by more than 100,000 vehicles and 27,000 bus commuters every day.

Key elements of the upgrade include: new west facing Windsor Road on and off ramps; an additional eastbound lane from Windsor Road to Pennant Hills Road; an additional eastbound lane from Pennant Hills Road, through the Norfolk Tunnel, to Lane Cove Road; a new Christie Road eastbound on ramp; new Herring Road westbound off ramp; widened westbound lanes from Lane Cove Road to Beecroft Road; and an additional westbound lane from Beecroft Road to Pennant Hills Road.

The upgrade also includes the installation of a new motorway Operation and Maintenance Control System (OMCS) and other Intelligent Transport System (ITS) upgrades.

The widening of the Norfolk Tunnel to accommodate the additional east bound and west bound lanes is the first time an operating tunnel has been widened in Australia. Meticulous traffic planning, scheduling of works and safety management have been required to ensure this work proceeds with minimal risk and without major inconvenience to road users.

Widening or lengthening works have also been undertaken on 11 bridges, including the conversion of the three-span Beecroft Road Bridge to two-span, while maintaining traffic both on the bridge and below it on the motorway.

During the peak of construction works, the monthly workforce totalled around 600 people, with around 70 pieces of plant deployed on the project, ranging from Liebherr R944T 45t excavators with mounted Atlas Copco HB2500 dust protected hydraulic rockbreakers to two Mitsui S2000 roadheaders.

"The Hills M2 is more than a construction project, we have to balance the drive to complete the project ensuring we minimise our impacts on the 100,000 motorists and 27,000 bus patrons that use the motorway each day," said Craig Greene, Head of Hills M2.

"We have increased the number of incident response vehicles on the motorway during peak hours from two incident responders to five responders plus two tow trucks. This team provides the backbone of the motorway's commitment to keep traffic moving during the roadwork."

The need to undertake work in a way which minimised disruption to commuter traffic created the need for periods of intense effort to complete elements of the works. For example, in February 2012 six excavators worked around the clock over three consecutive weekends to demolish the Beecroft Road bus ramp.

Transurban, Roads and Maritime Services (RMS) and Leighton Contractors worked closely together to ensure a smooth process, with all three organisations having project team embedded onsite in the project office at North Ryde.

"The motorway operations team and the project team meet daily to discuss the upcoming work on the motorway. Weekly, a larger group incorporating RMS and the Transport Management Centre also participate. Monthly, there were project coordination meetings and quarterly meetings, which involved the project team and a broad group of stakeholders including major transport operators, bus companies, cycling groups and others.

"The Hills M2 was a wonderful piece of infrastructure when it was built, but once the M7 was completed, it effectively became obsolete," said David Elliott MP, State Member for Baulkham Hills.

"The widening will allow for more traffic, and a better return for the owners of the Hills M2 (Transurban), and allow for quicker transport times for both motorists and public transport users. Half the school aged children in this area go to non-government schools, so there are effectively two peak hours. The construction has succeeded in maintaining a good level of tempo for road users – there is always some short term pain, but this project will make for a much better motorway.

"Despite the fact the Hills M2 looks like an easy road, it does go over two crossings that are approximately 40m in height, at Darling Mills Creek and Terrys Creek. It is a credit to the team they have performed this challenging work safely and avoided serious workplace injuries.

"We wanted this to be a bench mark for toll roads, and an efficient and cost-effective option for my constituents. With this project we want to send a clear message to investors in infrastructure."

The Hills M2 passes through some areas of significant native vegetation, and in depth fauna surveys also identified the threatened Eastern Bent Winged Bat in the project area. Protective measures included the use of tower cranes to minimise vegetation clearing; recycling or reprocessing of sandstone excavated within the corridor for use in construction of new ramps and associated works; and scheduling of work to minimise impacts on the microbat nesting season.

Fauna rescue works were also carried out, with an eastern snake-necked turtle and longfin eel found during the cleaning of the Craig Avenue basin in Baulkham Hills. These animals were relocated to the adjacent creek. All the basins upgraded as part of the Hills M2 Upgrade are inspected regularly for fauna, and are being revegetated as part of the final landscaping works. Across the project area, 105 nest boxes have been installed for local birds and mammals including possums and gliders.

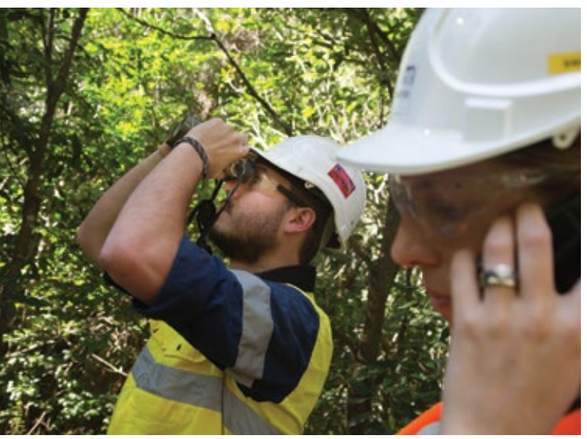
New noise walls are being constructed, to ensure the amenity of residents adjacent to the Hills M2. The CSR Hebel concrete panels feature textures and a colour palette which reflects the local vegetation, as part of the project's overall Urban Design and Landscape Management Plan.

Extensive revegetation works are being undertaken, including restoration of the area under Darling Mills Creek Bridge where the 65m tower crane stood. These works have also extended along the creek, including reinstating erosion protection, reshaping slope batters and replating vegetation. Across the project, where restoration works have been undertaken using a mixture of native grasses, shrubs and trees selected by the project's environmental consultant, a variety of techniques have been used. These include individual plantings, hydromulch and installing natural sandstone redeployed from elsewhere on the project site.

"The challenge of work on a brownfield motorway should not be underestimated. We are constantly walking a fine balance to ensure our impacts on motorists and the neighbouring community are minimised," said Craig Greene.

"The long-term benefits from the Upgrade will ultimately outweigh the short-term impacts from construction. Motorists in the morning peak will experience travel time savings of up to 40% or 15 minutes, while motorists travelling in the evening peak will see their travel times reduced by up to a quarter."

Project information:
http://www.hillsm2upgrade.com.au/



CREATING CONDITIONS FOR BALANCED COEXISTENCE

In an era where minimising the ecological footprint of major projects is a key part of the overall planning and approval process, specialists like the ecological consultancy Cumberland Ecology provide the expertise which allows progress and nature to coexist. For the Hills M2 upgrade, Cumberland Ecology have been providing flora and fauna expertise and advice since 2010, including undertaking surveys for threatened species; advising on the design and implementation of mitigation measures; conducting pre-clearing inspections and fauna rescue for vegetation removal operations during construction; undertaking monitoring and reporting; and providing ongoing ecological advice to ensure the project's compliance with the conditions of the Environmental Assessment.

"Monitoring and impact minimisation measures have included the inspection of Eastern Bentwing-bat roosting sites under several culverts pre, during and post construction, which have been documented in a Bat Survey Report along with recommendations for minimising disturbance to this species " said Cumberland Ecology Director, David Robertson. "Additional measures have included the fencing of threatened species habitat and searching for the presence of newly recorded threatened plants along the motorway corridor so that these areas can be protected from disturbance where possible during construction and conserved in-perpetuity. "As part of the compensatory measures, Cumberland Ecology mapped endangered ecological communities and other native vegetation areas along the motorway corridor and prepared a comprehensive Biodiversity Offset Strategy for the project". "We also prepared a Nest Box Management Plan and have progressively deployed numerous nest boxes across the Motorway corridor, including 15 different designs to accommodate species including gliders, owls and microbats. These are placed in strategic locations according to clearing areas, and we continue to monitor them using an innovative camera and pole technique to negate the need for ladders and minimize disruption to fauna."

Unique aspects of the project included a highly constrained work area due to the adjacent motorway, with stringent attention paid to managing the risks to fauna, motorists and site staff. Cumberland Ecology remained on-call throughout, providing a fast-response fauna relocation service, and undertook complex aquatic fauna rescues during live clearing and de-mucking operations.

Cumberland Ecology has worked extensively for the mining and quarrying sectors both in Australia and overseas, including coal mines, gold mines, opal mines, base metals and sand mines. They are currently engaged in providing environmental assessment services for Xstrata's Tampakan Copper/Gold Mine in the Philippines. Senior staff members have also assisted the NSW Department of Planning and Infrastructure in assessments of mining projects. The company has contributed to numerous major infrastructure projects, including carrying out baseline monitoring, impact assessment and ongoing compliance monitoring of the Coffs Harbour dam project; and undertaking extensive ecological surveys throughout western Sydney prior to sewerage and drinking water infrastructure being installed as part of the Growth Centres Programme.

Just as the environment is a long-term proposition, Cumberland Ecology provides a long-term commitment to their projects, with assessment, management and ongoing compliance and monitoring services provided from the early planning stages through to the post-construction operational phase.

For more information contact Cumberland Ecology Pty Ltd, David Robertson | Director, phone 02 9868 1933, website: www.cumberlandecology.com.au

NETWORK GEOTECHNICS

Network Geotechnics Pty Ltd was established in 1995 and have grown into a diversified provider of Construction Materials Testing and Geotechnical Services, servicing the NSW construction and civil infrastructure industries.

The company holds NATA Corporate Accreditation (No. 1318) and currently operates base laboratories at Mt Kuring-Gai and Wollongong as well as various annex site laboratories across NSW with a total of 80 professional, technical and support staff.

Network Geotechnics involvement on the Hills M2 Upgrade project was to provide the soil, concrete and aggregate QC/QA testing to RMS standards. This involved mobilising a NATA accredited annex laboratory on site and providing up to 15 Technicians to perform the site based testing.

During the early stages of the project it also became apparent that a large volume of soil used as reinforced earth wall backfill would require full RMS R57/R58 conformance testing. This included large quantities of 300mm Direct Shear Testing which is a highly specialised and difficult to source test.

Knowing that outsourcing this testing to a 3rd party would likely cause delays to the construction program, the company chose to invest in two 300mm Direct Shear Testing machines (shown above) and commission a new geo-mechanical testing facility at its Mt Kuring-Gai laboratory.

After a successful NATA assessment in mid 2011, the company then performed over 90 Direct Shear tests within a 5 month period, keeping the construction program on schedule and ensuring a satisfied client in Leighton Contractors.

Richard King, Director and Principal Geotechnical Engineer of Network Geotechnics was pleased with the way the company executed its scope of works, particularly its fast response to the Direct Shear test issue.

"I was really pleased with the way our team responded to the changing requirements of the QC/QA testing regime. Testing quantities for soil and concrete were higher than expected and the Direct Shear tests were going to become a major issue if we didn't invest in our own gear. We now have a brand new geo-mechanical testing facility that is now servicing a major RMS road upgrade project."

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POLES & UNDERGROUND KEEPS THE POWER ON

Poles & Underground Pty Ltd was engaged by Leighton Contractors to remove and relocate existing overhead and underground high voltage 11Kva transmission lines and low voltage power lines during the road widening upgrade of the Hills M2 Motorway.

P&U removed and relocated existing overhead and underground electricity transmission assets, and designed and constructed new assets, including poles and street lighting. Much of the work was to do with electricity supply services affected by construction works to lengthen the bridges that cross over the motorway and to build new road ramps for improved motorway access.

The major challenge was working alongside a 'live' motorway and the very busy arterial roads crossing it. Fortunately P&U has extensive experience in working in live railway corridors. Working in close cooperation with Leightons and the other subcontractors was the key to success.

P&U's work was carefully planned to ensure the safety of workers on the site and the passing traffic, and to complete tasks within the scheduled time periods, both to avoid interruptions to power supply in the area, and to minimise traffic delays on the motorway and arterial roads.

Dave Hansen, the P&U project manager said, "Leightons did a great job of coordinating and managing all of the work. Their team was good to work with."

P&U's work included the design and construction of temporary overhead and underground transmission lines during the bridge lengthening (to accommodate the new motorway lanes) and road construction works at Barclay Road at North Rocks and on Murray Farm Road. Both of these roads carry heavy arterial traffic so much of the work was done at periods of low traffic flow to avoid traffic holdups.

When the bridge and road construction works were completed the transmission lines were relocated permanently, mainly underground. Underground installation improves the overall appearance of the roadway and increases the reliability of electricity supply. It is also much safer, particularly during severe weather conditions.

For more inofrmation contact Poles & Underground, 55 Vore Street Silverwater NSW 1811, phone 02 9748 2242, fax 02 9748 2246

WIRELESS EYES ON THE SKY PROTECT WORKS ON GROUND

While no major project can control the weather, knowing what Huey has in mind and what the impact will be is need-to-know information. For Leighton's team on the M2 Upgrade project, Boztek Solutions designed, manufactured and installed environmental monitoring technology which delivered the data required to ensure more effective compliance with the project's EPL licence.

Boztek's Remote Telemetry Units (RTUs) were installed at either end of the site. These record data on temperature, rainfall, dust levels, wind speeds and directions, and when it is required, can issue weather alerts via SMS to relevant staff when heavy rainfall, high winds or lightning are expected.

"The units ensure people proactively receive early warning alarms. And after the event, for example heavy rain, they know exactly how much fell," explained Boztek Solutions Director, Brett Vilnis.

"We design our weather stations to suit specific client needs. We take into account the EPL requirements for their project, the relevant Australian standards, what information they need, and then we put together the complete package.

"We do the programming, the fabrication at the component level, the welding, the bending and the cases. We do both heavy gauge galvanised steel, and impact and vibration resistant fibreglass cases, depending on the setting."

Some of the other projects Boztek has provided their technologically-advanced RTUs for include the Wonthaggi Desalination plant, which used custom-designed wind alarm stations on the cranes. For the Hume and Pacific Highway upgrades, Boztek designed a specific RTU featuring a stainless steel probe, which was installed on the machine laying the concrete paving to give temperature data and low temperature alerts.

The company has been in business for over 25 years, with their previous focus on ISP provision and internet applications evolving into a weather focus 14 years ago. Their clients cross the industrial, infrastructure, civil, mining, government and environmental sectors.

The RTA has a network of 50 Boztek RTUs, and the Rural Fire Service also use their equipment, which is donated as part of Boztek's community commitment. A system has been designed for 50m power towers for Transfield, Electranet and Ausnet, which measures the tension of the wires and gives warning of grid overloads, high winds or lightning strikes.

All Boztek technology is wireless, with the data accessible to clients via mobile phone or the internet. Their power source is either a small solar panel where appropriate, or a home smoke alarm battery. Built to be efficient, the RTUs consume only 60 milliamps of power and have programmed switching.

"We listen carefully and give good service at a good price," said Brett. "Our focus is on better recording and delivery of the data which can help deliver progressive environmental outcomes."

For more information contact Boztek Solutions, phone 02 4577 6269, email: info@boztek.com.au, website: www.boztek.com.au

24/7 RAPID RESPONSE

No injuries is the ideal, but a major project like the Hills M2 Upgrade still needs the right assistance on call in the event an incident occurs. Workcare Medical provided Leighton Contractors with a 24/7 rapid response service, which included sending a medic to site within 30 minutes for triage and assessment, and if necessary, transfer to the Workcare Medical facility for treatment by the company's in-house professionals.

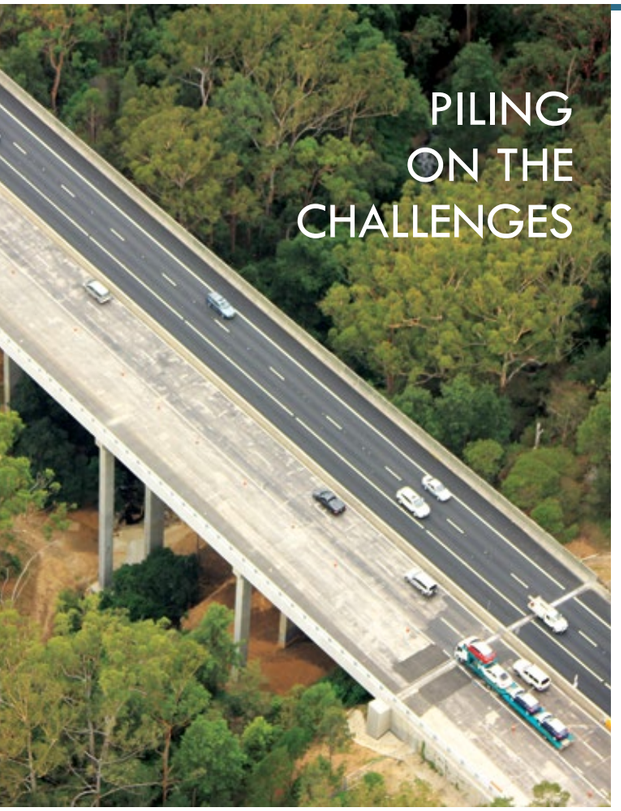
"Our doctors understand workplaces, and what duties people can do after an injury. Usually workers are back on site within three hours - return to work is our focus," explained Workcare Medical Client Relationship Manager, Lana Mircevska.

The company provides a comprehensive range of services, including pre-employment medicals for rail, ports, mining, construction, aviation, retail, statutory authority and industrial employers; also drug and alcohol testing, second opinions, annual medicals, diagnostic imaging, and injury management.

Workcare Medical's in-house professionals include doctors, clinical support staff, psychologists, occupational therapists, chiropractors and physiotherapists, allowing them to manage complex situations quickly and effectively. In their eight years of operation, the company has been recognised with a range of awards for excellence, including excellence in innovation and customer service.

"Our services give a company assurance," said Lana.

For more information contact Workcare Medical, phone 9707 7800, email: CRM@workcaremedical.com.au, website: www.workcaremedical.com.au



PILING ON THE CHALLENGES

Difficult access situations and unexpected ground conditions on the Hills M2 Upgrade were just two of the challenges MGI Piling resolved when completing bored cast in-situ bridge piles up to 1.5m dia; and sound wall, sign post and retaining wall piling works. Their crews worked the length of the project for close to two years, with nine rigs on site at the peak of works. A range of rigs was required. Due to the low headroom under bridges, MGI used compact TESCAR rigs for those sites, along with conventional Soilmec and MAIT rigs for tasks like drilling and constructing the bored, cast in-situ 600mm dia sound wall pilings. MGI also supplied their own concrete pump for some tasks.

"Some of the piles for the Devlins Creek bridge were right in the creek bed, and we had to drill through steel tubes in the water to prevent environmental impacts," said MGI Piling Spokesman, Michael Isaac. "For the Darling Mills Creek bridge pilings, the rig had to be craned over the bridge into a site for piling works."

A high level of logistical management and safety awareness, coupled with sound communication within the MGI team and with Leighton Contractors, ensured a zero-harm result. MGI Piling has been in operation since 1997, providing piling and grout injection services to projects across general and civil construction. Other recent major projects include the Kingsgrove to Revesby Quadruplication; Richmond Line Alliance; Royal Prince Alfred Hospital; Trio for Watpac; Parkes Police Station for Richard Crookes and rail projects in Adelaide for Laing O'Rourke.

For more information contact MGI Piling, phone 02 9625 0160, fax 02 9625 0531, email: info@mgipiling.com.au, website: www.mgipiling.com.au

Hills M2 Upgrade, NSW