



John Cairns

Editorial

In this issue of the Beca Airports Newsletter we once again take the opportunity to feature the diversity of airport projects our team are working on across Australasia and our ongoing commitment to working closely with industry partners to deliver successful projects for both civil airport and defence clients.

Beca Airports is currently working on the planning, design, management and construction of more than 100 airside, landside and terminal building projects of varying sizes with a construction value of over \$500M. Here, we are pleased to feature our ongoing infrastructure work at Melbourne Airport, the runway and AGL upgrade works at Hobart International Airport involving over 20,000 tonnes of asphalt in night-time possession periods, 'Eua Airport's airfield and terminal upgrade in Tonga, and the airfield upgrade works at RNZAF Base Auckland.

We would also like to introduce two recent additions to the Beca Airports team in Melbourne: Joe Walsh, a senior aviation professional and Paula Bradshaw, an Environmental Engineer specialising in air quality monitoring. Details on our apron planning process from concept through to construction and the latest requirements for airport Visual Segment Surface (VSS) Assessments are also featured in this edition.

We hope that you continue to enjoy reading our newsletter and welcome your feedback. From all the Beca Airports team, we look forward to working with you in 2012.

John Cairns

Technical Director – Beca Airports

Editorial

[Whenuapai Airfield Upgrade](#)

[Helping 'Eua Island Stay Connected](#)

[Melbourne Airport Highlights – Airside and Landside Projects](#)

[Is your Aerodrome and Obstacle Survey Data up to date for the Visual Segment Surface \(VSS\) Assessment?](#)

[Hobart International Airport – Runway Overlay and AGL Upgrade](#)

[Our People](#)

[New Zealand, Australia and Pacific Airports Highlights](#)

[Smoothing the Process from Conceptual Apron Design to Construction](#)



Whenuapai Airfield Upgrade

1 April 2012 not only marked the 75th Anniversary of the Royal New Zealand Air Force (RNZAF), but also an important milestone for RNZAF Base Auckland at Whenuapai: the re-opening of Runway 03-21 following an eight month closure for reconstruction.

Beca designed, managed and supervised the project, with the construction undertaken

by Fulton Hogan. The works included construction of a new 1,000m long parallel taxiway, allowing operations from Runway 08-26 which was completed in September 2011, using a multi-layer structural overlay of the runway intersection and a shape correction overlay of Runway 03-21. The project also included a new Airfield Ground Lighting (AGL) system, including approach

lighting masts and foundations for both runways and Movement Area Guidance Signage and power systems.

Of particular interest was the innovative and cost effective solution for the Runway 03-21 reconstruction, involving a structural fill layer of ex-situ foamed bitumen treated aggregate, with an asphalt surface utilising 30% Recycled Asphalt Pavement (RAP) on the outer edges. The project also involved re-grading of the runway strip to provide a new stormwater treatment and discharge system. The earthworks improved the runway surface drainage, the runoff flows and water quality.

Beca's involvement on this project will help to improve RNZAF maritime and transport aircraft operations from Whenuapai and enhance the safety and reliability of the airfield into the future.



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Helping 'Eua Island Stay Connected

“Beca played a key role in getting agreement on the brief from the stakeholders, preparing all detailed documentation, evaluating tenders on a weighted attribute basis and monitoring the construction within the operational airport whilst coordinating each stakeholder’s key requirements.”

Peter McGregor – Beca

On 15 December 2011 the upgrade of Kaufana Airport on Tonga’s ‘Eua Island was opened by Tongan Deputy Prime Minister, Samiu Vaipulu, the Minister of Finance and Planning, Sunia Fili and NZ High Commissioner, Jonathan Austin.

The existing 720m long by 18m wide runway was unsealed compacted coral, overgrown in some areas with grass. The extension to 800m was provided with a new chip, sealed surface, enabling Dash 6 Twin otter aircraft to operate out of ‘Eua Airport. Funded by NZ Aid, the project was managed by the Beca Airports team consisting of Peter McGregor, Andrew Buckthought, Michael Crutchley, Tony Wallis and Ian Thompson. Rajinal Singh

from Erasito Beca Consultants Ltd provided onsite supervision. The contractor for the works was Fulton Hogan, who managed construction activities to allow ongoing operations by initially forming a temporary runway extension and then accommodating the two daily flights within their construction programme.

The new terminal and car park are located in the same area as the existing facilities and provide much improved amenities.

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▲ 'Eua Airport – new terminal building



▲ Opening of the 'Eua Airport terminal – Minister of Finance and Planning Sunia Fili, NZ High Commissioner Jonathan Austin, Tongan Deputy Prime Minister Samiu Vaipulu and Beca's Peter McGregor

Melbourne Airport Highlights – Airside and Landside Projects

Since 2005 Beca has designed and project managed a range of landside and airside infrastructure projects at Melbourne Airport. These include the award winning A380 Runway Widening in 2005, the Runway Overlay Project in 2011, the APAC Drive On Ramp in 2012, various HV Upgrade projects and the upgrade of the Runway 27 Approach Light System. Details of some of our current and recent projects at Melbourne Airport are noted below.

▶ Runway Overlays

As highlighted in our last issue, the Runway Overlay Project was successfully completed in August 2011. The works included placing over 280,000m² of asphalt, laying 180km of cabling, replacing 4,700m² of concrete pavement and replacing runway lights – all while keeping the airport operational 24 hours a day. There were no Lost Time Injuries during the 150,000 man hours worked.

▶ Foxtrot Apron Infill

Beca is currently in the detailed design phase of the new Foxtrot Apron Infill project, aimed at providing additional parking capacity for a combination of Code C and Code E aircraft. The works include construction of over 28,000m² of new concrete pavement along with associated services work including water main, stormwater, high mast lighting and Airfield Ground Lighting systems.

▶ PUG Slab Replacement

To replace the ageing airfield concrete pavement assets on Taxilanes Papa, Uniform and Golf the works include the replacement of over 65,000m² of concrete slabs and modifications to existing apron service infrastructure. The design solution has been developed by APAM and Beca to minimise disruptions to Melbourne Airport's operations through complex works staging plans and the use of Rapid Set Cement Concrete pavement technology.



▲ APAC Drive

▶ APAC Drive On Ramp

The APAC Drive Project is part of a broader strategy to alleviate traffic congestion within the Airport Precinct.

The project comprises an elevated roadway, which passes through the Long Term Car Park, connecting with the city bound lanes of the Tullamarine Freeway. The dual lane ramp is approximately 1,500m in length.

Beca completed the detailed design of the on ramp in 2011 and is now assisting with the construction phase through the provision of project management and construction monitoring services. The APAC Drive On Ramp is scheduled for opening in mid-2012.

▶ HV Upgrade Works

Beca has been involved in the management and design of a number of HV Upgrade projects at Melbourne Airport. For the HV Cable Replacement Project, the final installation of the new HV cable has been completed after establishing a new cable route beneath Taxiway Sierra and was commissioned in late February 2012. The 11:22KV Upgrade project creates a 22kV ring main around the northern part of the airport, providing strong redundancy to the airport HV reticulation system. Design works are well progressed for the construction of two new HV feeders to service landside property developments and the completion of the Stage 1 Works for a new commercial subdivision adjacent the Air Traffic Control Tower with Stage 2 Works are in hand and scheduled for completion in May 2012.

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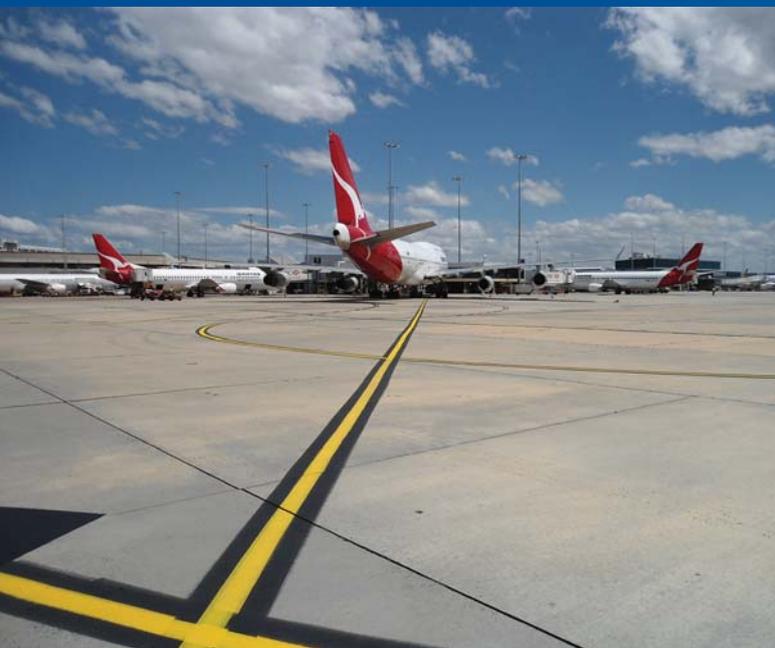
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“Beca has played a key role in the successful delivery of projects at Melbourne Airport by maintaining a high standard of delivery and a proactive approach. As Melbourne Airport continues with its significant capital program, we are looking forward to Beca's continued support to assist us in achieving our objectives.”

Kerr Forbes – Airfield Manager, Melbourne Airport



Is your Aerodrome and Obstacle Survey Data up to date for the Visual Segment Surface (VSS) Assessment?

NZCAA have issued an AIC regarding the Straight-in Approach Procedures – Visual Segment Surface Assessment for New Zealand aerodromes. In accordance with ICAO PANS OPS (Doc 8168 Volume II), all straight-in instrument approaches in New Zealand will have to be protected for obstacles in the visual segment. 23 aerodromes in New Zealand will have their straight-in approach assessed between now and November 2014.

Aerodrome operators need to provide up-to-date aerodrome and obstacle

survey data to the relevant Part 173 organisation in order for the VSS to be assessed. Airways will be in contact with the relevant aerodrome operators to advise the survey data requirements. Beca has extensive experience of project managing and undertaking Aerodrome and Obstacle Limitation Surface (OLS) surveys including WGS84 implementation to ICAO Annex 14 and NZCAA Part 139 specifications in New Zealand and the South Pacific. Our Geospatial team is able to provide advice on the relevant Aerodrome and OLS survey

specifications and delivery formats, assist in the project management of local survey organisations or undertake the obstacle surveys from initial consultation to delivery stage.

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Hobart International Airport – Runway Overlay and AGL Upgrade

In April 2011 Hobart International Airport Pty Ltd (HIAPL) engaged Beca to undertake an assessment and design of Runway 12-30 as well as the upgrade to all airfield ground lighting (AGL) including a new Airfield Lighting Equipment Room (ALER). The programmed completion date for construction was February 2012.

During the early stages of the project careful consideration was given to the selection of appropriate procurement routes to achieve both HIAPL's programme and value-for-money objectives. This required close collaboration with the client and a desired fast track programme led to the development of four tender packages:

- ALER building (Electrical) – design and construction tender
- Pit and duct (Civil) – lump sum tender
- Overlay works (Civil) – measure and value tender
- AGL works (Electrical) – measure and value contract

In order to meet the desired program, the design was bought forward by one month to allow additional time to administer the four contracts. After a detailed tender selection period, Downer Australia

(all civil works) and Thorn Airfield Lighting (all electrical works) were appointed.

The construction required early civil works to be undertaken before the runway overlay could commence. These included complex repairs to the Runway 12 Threshold which had a thin layer of asphalt over existing concrete slabs and also over 5,500m² of deep asphalt patching works.

20 runway night possessions and over 20,000 tonnes of asphalt brought the overlay component of the 2,250m long and 45m wide Runway 12-30 at Hobart International Airport to completion on 15 February 2012 and Beca's role during construction included the role of Superintendent and construction monitoring. A project of this nature required very detailed planning, phasing and coordination by the Hobart International Airport, Downer, Thorn and Beca team and the aircraft operators to minimise any possible disruption to the airfield and the airport's operations.

All activities associated with runway possession periods were coordinated in the finest detail from profiling of the existing surface (with four two metre wide profilers

operating in echelon), preparation of the surface for the Stress Absorbing Membrane (SAM), asphalt placement (two pavers paving in echelon), rolling and finishing of the surface, provision of runway markings, temporary runway lighting where required and temporary runway ramps were made each night. Each activity had a specified timeframe to ensure that the works were completed on time and operations returned to normal for the first flight the following morning.

This successful project further demonstrates Beca's experience in planning, managing, designing and supervising runway overlay projects in challenging operational environments.

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Our People



Joseph Walsh

Technical Leader Airports

Joe recently joined Beca Airports as a Technical Leader in our Melbourne office. He is a Chartered Civil Engineer and has worked in the aviation sector for over 20 years in both client and consultant capacities in the UK, Hong Kong, the Falkland Islands and Ireland.

For the first 10 years of his career, Joe's roles included design and site engineer with BAA, project management of the RAF Mount Pleasant Airfield Refurbishment in the Falkland Islands, design management of the Manchester Runway 2, and construction management of the new airfield pavements at Chep Lap Kok working for the Airport Authority Hong Kong.

In 2003, Joe took up a management role with Bournemouth Airport (part of Manchester Airport Group). He progressed from the Engineering Management division into Planning and Development, leading the delivery of the master plan and the initial stages of the Phase 1 Development.

Prior to joining Beca, Joe was the Managing Director of a regional airport in the West of Ireland, which was a very challenging period in Ireland's aviation industry with the impacts of the Global Financial Crisis playing a significant role in changing government policy on regional airports.

Joe looks forward to bringing his depth of airport experience to help add value to Beca's clients and their projects.

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Paula Bradshaw

Air Quality Specialist

Paula joined Beca's Melbourne office as an Air Quality Specialist in late 2011, bringing over 16 years' international experience in air quality impact assessment and environmental permitting. She has worked on various transport projects and provided strategic advice to clients such as airport operators, air service providers and transport authorities.

At the former Auckland Regional Council Paula managed the air quality permitting, compliance and enforcement team as a regulator. She also has experience as a consultant in New Zealand, Australia and the United States.

Paula recently managed the preparation of an Environmental Issues Report for a proposed Large Aircraft Mock-Up Unit Fire Training Ground at Melbourne Airport. This was a multidisciplinary environmental study that informed the permit applications under the Commonwealth legislation and the ultimate facility design. The purpose of the study was to identify and characterise any reasonably likely environmental risks that could impact on the design, construction and operation of the facility (including ongoing environmental liabilities to the client). Primary studies included air quality and visibility, contamination, ecology, surface water quality and cultural heritage.

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New Zealand, Australia and Pacific Airports Highlights

In addition to the projects featured in this edition, here's a snapshot of our other projects on-the-go:

New Zealand

- **Auckland Airport** – concept design for Taxiway 1 and construction monitoring of the Taxiway Concrete Slab Replacement Works
- **Christchurch International Airport** – ongoing terminal, landside and airside construction monitoring services associated with the Integrated Terminal Project and major airfield maintenance works including the mill and fill of the central length and width of Runway 02-20
- **Wellington International Airport** – ongoing terminal, landside and airside design and project management services
- **Invercargill Airport** – apron planning study
- **Queenstown Airport** – apron design works associated with the terminal expansion

- **Hamilton International Airport** – airfield pavement inspection
- **Kapiti Coast Airport** – Runway 16-34 inspection.

Australia

- **RAAF Airfields** – ongoing airfield pavement maintenance inspections, design and supervision including Point Cook, Jervis Bay, HMAS Albatross, Wagga Wagga and RAAF Bases East Sale, Richmond, Scherger, Townsville and Williamstown as well as the construction monitoring of the Air Transport Apron reconstruction at RAAF Base Edinburgh
- **Brisbane Airport** – ongoing construction monitoring works on the IATE Project, Runway 01-19 inspection, Southern Domestic Apron Peer Review, and design of the Site 135 car park for Airport Village Stage 4
- **Roma Airfield** – apron planning design
- **Adelaide Airport** – airfield master grading study for the planned terminal expansion. Our previous Runway and Taxiway Overlay Project has recently won an Asia Pacific Federation of Project Management Award in the Construction/Engineering under A\$100 million category

- **Launceston Airport** – apron reconstruction design and construction monitoring for two Code C jet aircraft.

Pacific Islands

- **Papua New Guinea** – ongoing airfield upgrade design works at 11 airfields
- **Nadi Airport Terminal** – Lean Six Sigma definition exercise to review possible areas and projects for improvement as a part of building Airports Fiji Limited's business improvement capability and improving passenger processes.

Indonesia

- **Soroako Airfield** – pavement investigation, rehabilitation design, geometric design and plans and contract supervision (alongside PT Inco) of the 1,200m runway widening and taxiway/apron.

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Smoothing the Process from Conceptual Apron Design to Construction

Beca has been involved in apron planning and design across a number of Australian and New Zealand airports for many years.

An often overlooked step in delivering an apron development project is translating a conceptual design into detailed construction drawings through a "design development" phase which fully considers operational requirements. Failing to thoroughly investigate operational requirements during this phase inevitably results in delays, re-work and even the construction of apron areas that have operationally undesirable characteristics.

To more effectively translate planning documentation into construction documentation, airport project managers and their consultants must understand the nature of the information used to prepare, and the purpose of, conceptual apron plans. The project team can then identify the issues that will need further consideration to arrive at a robust "developed design" from which construction drawings can be prepared.

At Concept Planning Stage, "high level" general planning principals are used. These will often include assumptions about future aircraft types, land boundaries, availability of land for development and how the aircraft stands will be serviced and operated. At this stage it is not practical to consider operational as well as engineering design and construction issues in detail. Apron layouts will likely be developed from available information such as aerial photography, as detailed survey of boundaries and levels may not be immediately available.



The Developed Design Phase must address operational requirements in detail, whilst maintaining the operational role of each discrete project within the overall conceptual plan.

Design decisions made at the conceptual planning stage are generally based on less precise information than survey data. Accurate survey information is therefore needed to confirm the boundaries of the development envelope and that design clearances for aircraft and vehicle movements meet the applicable regulations. This is particularly important for apron reconfiguration projects which are trying to squeeze as much functionality as possible out of existing apron areas.

Surveying existing infrastructure boundaries and level information also ensures that subsequent Computer Aided Design (CAD) construction drawings dovetail with existing infrastructure.

Aircraft Operations

At the Concept Planning Stage, stand geometry uses generic aircraft classes with standard spacing and allowances for ground service equipment. Very little if any aircraft tracking will have been undertaken.

Beca uses aircraft tracking tools such as the Simtra "PathPlanner" to accurately model aircraft manoeuvring based on aircraft manufacturers' information. This is used to validate conceptual layouts. This software models aircraft ground manoeuvring to define clearance envelopes and the extent of pavement fillet requirements in the case of manoeuvring around taxiways and taxi-lanes.

Ground Service Equipment (GSE) Operations

Stand access and manoeuvring areas for the operation of GSE in-between aircraft stand positions and adjacent to the terminal and fixed link structures must be investigated to identify and eliminate potential pinch-points that could delay GSE access to aircraft stands and consequently impact on aircraft turn-around times.

Fixed Infrastructure

The requirements for and specifications of fixed infrastructure such as miscellaneous "stand furniture", fixed ground power and pre-conditioned air installations, emergency systems and engineering huts are wide ranging and will vary from airport to airport in accordance with regulatory requirements and airport stakeholder's operational requirements.

Passenger Boarding Infrastructure

The incorporation of passenger boarding bridge (PBB) infrastructure presents one of the most challenging elements of apron design.

In general, the terminal architect designs and details the fixed links while the apron planner models and specifies the PBB installations. These designs need to progress in coordination to ensure that the specified range of aircraft can be docked to within the range of allowable slopes for pedestrian access and to ensure efficient GSE and passenger boarding/disembarking operations. Our PathPlanner software also provides an efficient tool for modelling PBB slopes and docking, particularly when multiple fixed link/PBB configurations need to be investigated.

For boarding aircraft at ramp level, pedestrian access routes must consider GSE manoeuvring on the stand being boarded on, GSE activity on adjacent stands and aspects like noise exposure, tripping hazards, weather protection and walking distances.

A Developed Design Phase that carefully considers all of the operational requirements outlined above is essential to translating a conceptual apron design into a set of "for construction" drawings that will deliver an operationally efficient facility.

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