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# A MESSAGE FROM THE PRESIDENT

*Innovation in engineering is about commitment to quality and the ability to think outside the square to develop a better way of meeting a client's need.*

All entries for such an award go through a rigorous process of scrutiny and assessment by judges skilled in the associated services required for each project under consideration. Due to the rigorous scrutiny and quality of judges the INNOVATE NZ Awards are the première engineering awards in New Zealand.

Any recipient of an INNOVATE NZ Award should be very proud of this achievement as the award is a reflection the recipient has demonstrated very high standards of engineering innovation and excellence.

The award also reflects commitment by the client, consultants and contractor to collaborate and work as a team toward the common goal of excellence through innovation. We thank you all for your involvement in producing these outstanding projects.

We congratulate the recipients for their achievement which provide showcase examples of engineering at its best – a showcase to be shared with the rest of New Zealand and abroad. Thank you also goes to the judges who using their experience and skills, volunteered their time to identify projects worthy of an esteemed INNOVATE NZ Award of Excellence.

*“Innovation distinguishes between a leader and a follower.”  
- Steve Jobs*



# MEMBERSHIP

*ACENZ members make up around 95 per cent of New Zealand's consulting engineers and almost all of the infrastructure design industry. ACENZ membership has been steady with over 175 member firms that represent over 10,000 employees.*

All member firms of ACENZ must be independent, and their principals are required to be people who are full members of a recognised professional body in order to ensure a consistently high standard of quality and service is maintained. All ACENZ members are subject to a code of conduct, and must have processes in place regarding quality management, must display focus upon ongoing development of business and technical education, and must hold professional indemnity insurance to a minimum level of \$500,000.

Our members aspire to be trusted advisors to their clients, providing solutions that involve innovation, excellence and quality and pride themselves in being at the forefront of innovation in engineering consulting. The INNOVATE NZ Awards of Excellence celebrates these achievements.

The ACENZ website, [www.acenz.org.nz](http://www.acenz.org.nz) offers information on the activities of the association, documents available for engaging a consultant, a directory of members and the services they offer and more.

# ABOUT ACENZ

*The Association of Consulting Engineers New Zealand (ACENZ) represents business services and advocacy in the consulting industry for engineering and related professionals.*

ACENZ continues to work with other professionals and the wider construction industry towards implementing reasonable conditions and robust practice in contracts & procurement and has achieved progress in developing relevant guidelines and documentation.

ACENZ is a member of the International Federation of Consulting Engineers (FIDIC) who represent the consulting engineering interests for over 80 countries. ACENZ is proud to contribute in tangible ways to FIDIC by sharing documentation and best practice guidelines with international colleagues, and providing representation for working parties and committees.



ACENZ

# ACENZ AWARDS

President's Award

ACENZ Future Leader Award

Tonkin & Taylor ACENZ Best Practical Work Report Award



# DICK KELL

Director

Cardno International Pty Ltd.

An avid supporter of ACENZ and the engineering industry worldwide, Dick Kell is the recipient of the ACENZ President's Award 2014. Dick began his engineering journey at Sydney University graduating with a Bachelor of Engineering (B.E.), Civil with Honours II.

Since then, Dick has spent his working life as a consulting structural and civil engineer and project manager in infrastructure engineering, as an engineer and as former Managing Director of Sydney based consulting engineers McMillan Briton and Kell. Then serving as Chairman of major Australian and International engineering consultant Cardno Pty Ltd, which has over 8,000 staff and is listed on Australian Stock Exchange (ASX). He was instrumental in growing the company from a small private firm to an international company with a market capitalisation of \$55 million. Dick has since formally resigned from Cardno as chairman but now remains a consultant to Cardno Group and Director of Cardno International Pty Ltd.

In 2003, Dick was elected President of the International Federation of Consulting Engineers (FIDIC) and continues to be active with FIDIC and Consult Australia.

Aside from a life in engineering, Dick is an avid supporter of Australia's National Rugby Union 15-a-side team, the Qantas Wallabies.

## PRESIDENT'S AWARD 2014

*The ACENZ President's Award is presented to an individual within the industry to recognise outstanding service and special efforts performed on behalf of the association and general industry.*



# 2014 ACENZ FUTURE LEADER AWARD

## *About the award*

Introduced by the association in 1998, the award was established to give recognition and acknowledgement to the future leaders of our industry. ACENZ aims to empower young engineers and equip them with the management tools and training through the experiences of this award.

## *Prize*

The winner receives an opportunity of a lifetime, including registration and travel costs for the FIDIC Young Professionals Management Training Programme. This is run through webinars with young professionals from all over the world during the year with the final module to be completed at the 2015 FIDIC Annual Conference. The winner receives the prestige title “Future Leader 2014” and framed certificate, \$1,500 cash prize and a year on the ACENZ Board from November 2015 through July 2016.

Runner-up finalists will receive a framed certificate and \$1,000 towards an approved business management course.



## WINNER

EMILY STEVENS

OPUS INTERNATIONAL CONSULTANTS LTD

Emily is a chartered geotechnical engineer with 8 years of experience in geotechnical and roading engineering, based in Queenstown. She specialises in geotechnical site investigation & design; contract management and construction supervision. Emily achieved her chartered status in February 2013.

A large part of Emily’s role is the leadership of teams composed of contractors in high risk situations following slip and rockfall events on the state highways in Central Otago. Her clear and calm manner is known to provide reassurance in times of stress, earning her significant respect on-site.

Since mid-2013, Emily has taken on the leadership of the Geotechnical Professional Interest Network within Opus as PIN chair, a role that oversees the technical well-being of around 200 professionals worldwide. Being a strong community supporter, she is involved as the current Central Otago representative for IPENZ and is particularly passionate about seeing women in engineering reach management roles.

***“Emily has natural leadership qualities and leads by example in terms of taking ownership of her work, providing clear and concise directives and is a trustworthy and honest person to work with. She fosters the collaborative and open discussion approach to team management and bridges the link between the contractor/consultant easily.”***

*- Clinton Beavan, Fulton Hogan Civil Engineer*



## FINALIST

RACHEL PURDY

JACOBS

Rachel is a planner for Jacobs New Zealand Ltd and has over 6 years experience in resource management planning, consultation, environmental management and project management on a range of public and private sector projects. She has been the lead planner on several project alliances and numerous large teams responsible for the delivery of many notable and high profile projects.

These projects include SH16 Causeway Upgrade Project (which forms part of the Western Wing Route), the Ara Tuhono - Puhoi to Wellsford Road of National Significance and the Victoria Park Tunnel Early Works for the NZ Transport Agency. Other clients include Watercare, Auckland Council and the Thames Coromandel District Council.

Rachel has been acting team leader for the Jacobs New Zealand Ltd Auckland Environmental and Planning Team, responsible for leading nine planners and environmental management consultants.

She has been actively involved in the IPENZ Futureintech Initiative as a Futureintech Ambassador encouraging and inspiring students to chose careers in science, engineering and technology.

***“Rachel has always delivered exceptional outcomes on the projects - she understands complex project requirements, works quickly, effectively and accurately to prepare project outputs and has always delivered good project outcomes.”***

*- Pete Thomas, Auckland Council Stormwater Resource Management Team Manager*



## FINALIST

WADE ROBERTSON

BECA

Wade is a Senior Landscape Architect with Beca, based in Christchurch. His previous employment includes MWH New Zealand and Isthmus Group.

Wade completed a Masters Degree in Landscape Architecture from Lincoln University in 2004 and has built a strong career and varied track record including lead roles on projects for clients

such as NZ Transport Agency, Transpower, Auckland Transport and Vodafone. As a landscape architect, Wade embodies Beca's multidisciplinary approach and is recognised as one of the emerging leaders in the company. He serves as a mentor to several junior staff and recently received a General Manager's 'Care' Award, reflecting his passion, enthusiasm and unwavering commitment to his discipline.

Wade is a registered member of NZ Institute of Landscape Architects (NZILA) and has been an active member on local branch committees since graduating. In addition to his leadership roles at work and within NZILA, Wade has played a significant part in establishing and driving the success of the "Greening the Rubble" Charitable Trust. This group was established to promote the value of urban ecology and creation of usable spaces out of vacant lots following the Christchurch earthquakes.

***“Wade's leadership qualities came to the fore in this environment with his communication skills, cross discipline approach to problem solving and skills in working collaboratively helping to develop an effective and enjoyable team environment and delivery of high quality outputs.”***

*- Craig Nicholson, NZ Transport Agency Principal Project Manager, Transmission Gully*

# TONKIN & TAYLOR ACENZ BEST PRACTICAL WORK REPORT AWARD

## About the award

The student awards were introduced by ACENZ in 1996 for fourth year engineering students. Tonkin & Taylor is pleased to sponsor this award jointly with ACENZ since 2010. The award encourages the next generation of engineers to develop good written skills which is a valuable and important skill to have. The award is presented to the three top marked reports.

## Entry criteria

The student must be studying towards a Washington Accord Bachelor of Engineering (BE) and their practical work experience must be with an ACENZ member firm.

## Prize

The top three students will each receive the opportunity to attend the ACENZ Annual Conference and awards with travel expenses paid, a framed certificate and \$1,500 cash prize.

**WINNER**  
VIVIENNE JONES  
UNIVERSITY OF  
AUCKLAND



**WINNER**  
HARRIET INGHAM  
UNIVERSITY OF  
AUCKLAND



**WINNER**  
TONY FU  
UNIVERSITY OF  
AUCKLAND





# MESSAGE FROM THE CONVENOR

Technological innovations, new project delivery methodologies, enhanced safety-in-design practices, structural integration with great architecture, and complex fire design solutions, are just some of the features of this year's projects that demonstrate the diversity and strength of New Zealand's consulting profession.

May I extend a thank you to all those who make these awards possible but who often do not get a mention. Our clients, contractors, fellow consultants, financiers, project managers to name just a few. I would also like to take this opportunity to thank those in central and local government for continuing to create an environment where innovation is fostered and encouraged, whether this is through the direct funding of innovative projects or through the legislation that encourages innovative practices.

May I thank all the judges for their sterling efforts yet again this year. It is an honour and a privilege to work with you.

Thank you to all who have entered projects and congratulations to those who have won awards.

Andrew Read  
2014 INNOVATE Convenor of Judges

*“Once again, the diversity of projects that consulting engineering companies get involved with is highlighted by this year's entries. From bridges, waste treatment facilities, and electricity distribution, to biochemical processes, milk treatment, and even the housing of animals, New Zealand's consulting engineering community continues to lead the world.”*

*-Andrew Read, Convenor*

# ABOUT INNOVATE NZ AWARDS OF EXCELLENCE

*The INNOVATE NZ Awards of Excellence showcase and celebrate outstanding New Zealand engineering excellence and innovation.*

*The INNOVATE Awards differ from others as the projects are evaluated individually on the merit of each project alone, so there may be more than one award in any of the given categories or none at all. A project is not awarded a prize (being Gold, Silver, or Merit) for simply being a good project. The work, technology, service, and innovation must go above and beyond what is considered standard operating procedure for the industry.*

## JUDGING PROCESS

Each year a panel of 25 to 35 judges evaluate projects in teams, each team reading project submissions, conducting client interviews and tours on many of the project sites. This attention to detail accompanied by a thorough investigation by a panel of industry experts is what makes the INNOVATE NZ Awards of Excellence the pinnacle of industry achievement.

Judges consider the technical excellence of the design and execution by evaluating complexity, innovation, depth of technical knowledge, the elegance of the solution, social environmental impacts and the client relationship of each entry.

## JUDGING PANEL

Andrew Read (Convenor)  
Steve Abley  
Geoff Banks  
David Bridges  
Alistair Cattanach  
Win Clark  
Steve Gentry  
Brett Harries  
Allan Leahy  
Alec McCulloch

Bob Nelligan  
Ray Patton  
Ernst Sansom  
Derek Smith  
Murray Spicer  
Gavin Still  
Adam Thornton  
David Brunson  
Andrew Charleson  
Jim Dobbie

Herb Farrant  
Steve Jenkins  
Trevor Matuschka  
Brent Meekan  
Michael Simpson  
David Voss  
Matt Harris  
and Cam Wylie



**STANDING LEFT TO RIGHT:**

Andrew Read (Convenor), Derek Smith, Herb Farrant, Cam Wylie, Trevor Matuschka, David Voss, Geoff Banks, Brent Meekan, Gavin Still, Michael Simpson, Alistair Cattnach, Bob Nelligan.

**SITTING LEFT TO RIGHT:**

Rosie Thomas (Awards Coordinator), Win Clark, Alec McCulloch, Steve Gentry, Ray Patton, David Bridges, Murray Spicer, Brett Harries, Allan Leahy.

**BOTTOM PHOTOS LEFT TO RIGHT:**

Alistair Cattnach smiles on as fellow judges Derek Smith, David Bridges and Andrew Read (Convenor) discuss a project. Long time judges Gavin Still and Steve Gentry highlight certain aspects of their projects to the group.



GOLD

AUCKLAND ART GALLERY

CHRISTCHURCH INTERNATIONAL AIRPORT - MECHANICAL SERVICES AND ARTESIAN HEATING & COOLING

HVDC POLE 3

WAIRAKEI BIOREACTOR

GOLD



# AUCKLAND ART GALLERY

AUCKLAND

## Holmes Fire for Auckland Art Gallery

Being the oldest public art gallery building in New Zealand and a treasured Auckland icon, the most important aspect of the fire engineering design was the need to evolve fire safety solutions for building code compliance that aligned with the architectural vision and the functional art gallery requirements (climate control, security, exhibition protection). In many cases these various aspects were mutually exclusive.

Engineering consultants, Holmes Fire were involved for more than eight years on this project; from master planning of the redevelopment, discussions with the gallery staff on fire protection for the gallery and artworks, developing fire engineering strategy for building consent, construction monitoring through the length of the project and final systems commissioning. Specific fire engineering design input included finite element smoke modelling, egress modelling to account for the wide range of uses in the new building, fire damage restoration strategies as well as extensive design options to ensure that the fire protection features remained invisible.

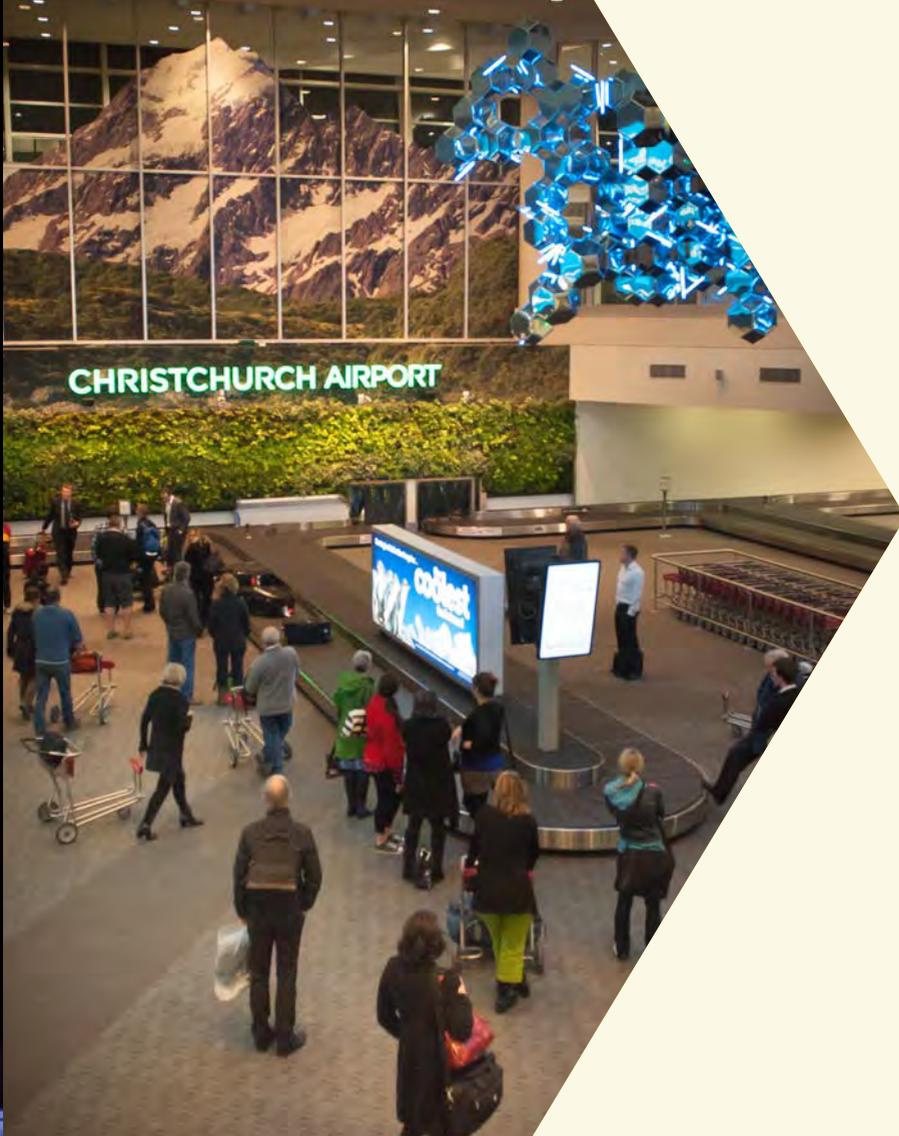
Priorities for building functionality, engineering, architectural and gallery operations were developed collaboratively, with substantial stakeholder involvement. This demanded a high level of consultant communication, open discussion about various design options, attention to detail and a confidence that the project outcome would be worth the effort required to solve these challenges. This was the only way that the conflicting engineering challenges could be integrated into an architectural design that has been successful in its realisation.

***Holmes Fire achieved a fire design that will protect the people, the art and the building with a level of accuracy that is unprecedented in New Zealand.***

ALL PHOTOS BY PATRICK REYNOLDS

GOLD





# CHRISTCHURCH INTERNATIONAL AIRPORT

MECHANICAL SERVICES AND ARTESIAN HEATING & COOLING

GOLD

CHRISTCHURCH

Beca for Christchurch International Airport Ltd

The Integrated Terminal Project (ITP) at Christchurch International Airport is based around the provision of a new terminal with integrated check-in for international and domestic passengers. The new 26,000m<sup>2</sup>, three-story building, costing \$237 million, was partially built in place of and replaces the existing domestic terminal which originally opened in 1960. It required building in stages of new build and demolition, whilst maintaining airport operations. Despite 11,000 earthquakes, the final stage was completed in March 2013 and within 1% of the project budget set in 2009. Beca Engineering Consultants designed the mechanical building services.

The development features a long list of innovative, energy efficient and stand-out features such as moving large amounts of air (sufficient to fill the size of the Sydney Opera House Concert Hall every 44 seconds) and 12 km of Greenpeace Future Approved aqua-therm pipework. This environmentally conscious pipework product is non-metallic, is less susceptible to erosion and reduces the quantity of chemical additives to the heating and cooling water. It also requires no welding, and therefore hot works permits, so presents reduced fire risks.

However, the 'jewel of the crown' is in the artesian heating and cooling system where heat energy is taken and discharged to the artesian water flowing in the aquifer beneath. The new ITP building employs chillers, acting as geothermal heat pumps, to provide both mechanical refrigeration cooling and heating as well as artesian water for direct cooling. The system has the ability to provide a mixture of these three modes at any one time. It can also recover and redistribute heat energy around the building. Thus, only the excess heat energy is extracted to the artesian water making the system the peak of energy efficiency.

The use of artesian water is not only energy efficient; it also reduces the need for cooling towers and boilers. This not only has obvious environmental and maintenance benefits, but also reduces plant space requirements and structural loadings.



GOLD





# HDVC POLE 3

WELLINGTON

Aurecon New Zealand Ltd for Siemens New Zealand Ltd & Transpower NZ Ltd

The \$450 million upgrade of Transpower's critical HVDC power link between the North and South Island was completed in 2013. In 2009 it was claimed by the Minister of Infrastructure, Gerry Brownlee as being, "New Zealand's most important piece of infrastructure work to be carried out in the next 10 years." As part of a Design and Construct (D&C) team lead by Siemens, engineering consultants Aurecon, provided structural, seismic and geotechnical design support. The previously aging system was being operated at reduced capacity and the upgrade project nearly doubled its transfer capability to 1200 MW.

The design involved two world-first seismically base isolated converter stations. The Wellington project required resolution of many complex seismic and geotechnical issues. The building is designed to accommodate horizontal movements in the base isolators of up to 700mm, which to date are the largest displacements designed for in a New Zealand building.

The seismic performance of the plant and building required intensive computer modelling and analysis to a level of detail rarely achieved in seismic engineering in New Zealand. There were innovative solutions to achieve the best outcome for the owner, Transpower. It was imperative that while improving building seismic performance this was not at the expense of the plant seismic performance. The new Pole 3 converter station at Haywards forms a vital piece of key national infrastructure to ensure enhanced reliability of power supply to both islands. Commissioning of the Pole 3 project commenced in March 2013 and the station has now been running successfully in test for market operation for more than one year.

*"The project is one of the most challenging undertaken by Transpower in the last 20 years due to the complex geotechnical and seismic issues on very constrained sites. Aurecon provided innovative technical solutions at the time of tender to deal with the seismic issues and were then responsible for working closely with Siemens to deliver the world's first base isolated HVDC converter stations." - Mike Carter, GM Major Projects for Transpower*



GOLD

GOLD



# WAIRAKEI BIOREACTOR

## WAIRAKEI

### Beca for Contact Energy Ltd

The Wairakei Bioreactor is a treatment facility constructed at Contact Energy's existing Wairakei Geothermal Power Station to remove hydrogen sulphide (H<sup>2</sup>S) from the power station cooling water before it is discharged to the Waikato River.

The facility was designed to use naturally occurring sulphur oxidising bacteria to reduce H<sup>2</sup>S levels as required for discharge consent compliance by Environment Waikato. 17m<sup>3</sup> per second of cooling water enters the bioreactor intake structure and 13m<sup>3</sup> per second is lifted by five submersible pumps into the pipe field. The remaining 4m<sup>3</sup> per second is discharged to the river via a passive overflow weir (river barrier to change flow), capable of overflowing 17m<sup>3</sup> per second.

To meet the new consent requirements, Contact Energy selected a tubular-bioreactor concept proposed by Beca, based upon simplicity of operation and low operating and capital costs. The pipe field consists of 1,890, 200m parallel thin-walled PE pipes supported in an innovative 'soilcrete' matrix. Utilising an abundance of natural and existing material, the cement / sand / soil / pumice mix was created, thus dubbed 'soilcrete'.

The pipes are arranged in a compact 'over and under' arrangement to create a permanent syphon that minimizes the operational costs. The sulphur oxidising bacteria that grow on the inside surface of the pipes use the H<sup>2</sup>S as a feed source while the cooling water passes through the system.

Beca was responsible for the detailed process, mechanical, electrical, instrumentation, civil, hydraulic and structural design. Downer was the lead construction contractor.

The successful completion of the bioreactor allows Contact Energy to continue full and uninterrupted generation at the Wairakei Geothermal Power Station in full compliance with the new discharge consents, providing a substantial reduction in the environmental effects related to geothermal electricity generation.



# SILN

AUT UNIVERSITY - SIR PAUL REEVES BUILDING

CLANDEBOYE LACTOSE EVAPORATOR

KEREPEHI WTP UPGRADE

MILFORD SOUND FRESHWATER BASIN HARBOUR REDEVELOPMENT

SH94 MILFORD ROAD - HOMER TUNNEL WESTERN PORTAL ROCKFALL RISK MANAGEMENT

TAHUNA WASTEWATER TREATMENT PLAN - STAGE 2 UPGRADE



# AUT UNIVERSITY - SIR PAUL REEVES BUILDING

## AUCKLAND

### *Beca for AUT University*

Auckland University of Technology's (AUT) new Sir Paul Reeves Building houses the School of Communication, and now forms the heart of AUT's city campus. Beca, pleased to step up to the myriad of challenges demanded of the structural and fire engineering teams, undertook design services from concept to construction completion.

The building consists of two key elements. First, a five-level entry building featuring expansive and vertically connected levels comprising exhibition spaces, media studies facilities, flexible function and study spaces, cafeteria and a 380-seat lecture theatre. The second element linked the entry building and a 12-level tower via a number of open void spaces. The tower houses a convergent media centre, computer labs, teaching spaces, post-graduate study space, studios and staff offices.

The flexible, open nature of the building presented a number of unique challenges to the design team requiring the development of innovative solutions to realise the architectural and client vision for the building. Said innovations included an integrated mechanical smoke extraction system which linked all areas of the building and included a 'ring plenum extract' detail in the tower levels to remove smoke from the central atrium.

Fire Dynamics Simulator (FDS) modelling of the entire structure for a building of this size and complexity was a first for New Zealand fire engineers requiring innovation in the use of computer modelling. The structure enclosing the main lecture theatre incorporates inclined diaphragms and columns working in conjunction with cranked shear walls and 'hung' columns to achieve a series of dramatic internal spaces.

*"AUT is highly appreciative of the first-class service provided by the Beca team, in particular the commitment to providing excellent solutions using a collaborative and innovative approach. From the outset the team approached this project with the same spirit of creativity and communication that the building itself would seek to embody."*

*- Suzanne Webb, AUT Client Representative*

# CLANDEBOYE LACTOSE EVAPORATOR

SOUTH CANTERBURY

*Aurecon New Zealand Ltd for Fonterra Cooperative Group Ltd*

The Clandeboye Lactose Evaporator Project achieved increased production of edible grade lactose in the Clandeboye Dairy Factory Lactose Plant by more than 20% without any additional plant raw material being required whilst increasing product yield from 64% to 78%.

The objectives were achieved by installing an innovative evaporator designed to simultaneously crystallize lactose and further concentrate raw materials to higher total solids than previously possible in traditional lactose evaporation plants. The Clandeboye Lactose Evaporator is a novel design based on a prototype developed by Aurecon and installed in the Fonterra Hautapu Lactose Plant in 2008. The Clandeboye design incorporates features to control lactose crystal size, extend production run time, improve yield, and reduce loss for both clean-in-place (CIP) chemical and water requirements compared with traditional evaporator methods.

Innovation highlights include: an evaporator low-shear recirculation pump and piping design to minimise crystal attrition and short circuiting in the separator; a fines control system to increase the mean size of crystals discharged from the evaporator and the implementation of model-based feed-forward controls for full automation of density and level.

The technology used sets a new benchmark in lactose processing by improving product yield, reducing the loss of lactose (to lower value by-product) and improving the stability and cost effectiveness of downstream processing operations. Lactose that otherwise would be sold as low value animal feed or spray irrigated on land can now be recovered and incorporated into higher value export dairy products.

This project's innovation and technology in lactose processing has highlighted Aurecon and New Zealand in the global dairy market as winner of the IChemE Awards 2013 Food and Drink Award. Additionally, the technology is the subject of international patent applications and has been licensed to Relco LLC, a major lactose plant manufacturer in the United States. Orders for new plants incorporating the technology have subsequently been placed in the US and Europe.

*The success of this project cements the technology as best practice for the plant production of lactose.*



SILVER



# KEREPEHI WTP UPGRADE

HAURAKI

*Harrison Grierson for Hauraki District Council*

In June 2010, Hauraki District Council commissioned Harrison Grierson to upgrade the Kerepehi Water Treatment Plant with the objectives of meeting the national drinking water standards, increasing the treatment capacity (approximately two-fold, to 12,500 m<sup>3</sup> per day) and enabling the plant to more effectively treat raw water with high turbidity peaks.

The Kerepehi Water Treatment Plant supplies the Hauraki Plains area and the local dairy farming industry (approximately 150,000 cows ) and is therefore crucial to the economic stability of the region.

Harrison Grierson considered a number of process options and developed detailed designs, for each of which realistic cost/benefit estimates were prepared, enabling council to select the most cost effective option.

The selected design underscores the consultant's thorough understanding of the requirements and demonstrates lateral thinking and effective re-use of major components of the original plant. Such re-use included: modifying and upgrading the raw water feed pumping and flocculation functions; converting both clarifiers to tube settling; removing the contents of the sand filters and re- equipping them as feed tanks for an array of new membrane filters.

New work included the design of a building (which incorporated below-floor water tanks) to house the membrane filters, disinfection and sludge de-watering equipment, an electrical switch room, a control and monitoring station and staff facilities.

A close working relationship between the consultant and the two main contractors (civil construction and membrane supplier) enabled the development of a staged, construction methodology which ensured that production of treated water was maintained during the entire period.

In December 2012, the plant was completed on time and at a cost approximately \$3 million below initial estimates. Very soon after commissioning, the plant proved its ability to produce quality water to satisfy the requirements of the region during the most severe drought in 70 years.

# MILFORD SOUND FRESHWATER BASIN HARBOUR REDEVELOPMENT

MILFORD SOUND

*Hadley Consultants for Milford Sound Development Authority*

The Milford Sound Freshwater Basin Harbour is a fundamental element of New Zealand's tourism infrastructure and is located in an iconic New Zealand landscape. During the summer tourist season, the harbour is one of the busiest in New Zealand with up to 120 closely coordinated tourist vessel movements per day! An upgrade of the harbour and facilities was essential to allow for growth in tourist numbers and to meet requisite safety standards.

The \$6.2 million harbour redevelopment was constructed during the 2012 winter and included: relocating the existing breakwater and dredging to enlarge the basin, replacement and realignment of floating wharves including fabrication of new berth pontoons, replacement of berthing and mooring dolphins and extending the visitor terminal promenade and deck to access the new berth locations.

The Milford Sound Development Authority (MDA) appointed Hadley Consultants Ltd to manage the project and act as principal consultant for the harbour expansion and upgrade and additional berths. Smith Crane and Construction Ltd were the lead contractors for the harbour redevelopment and E-Type Engineering was responsible for constructing the new floating berths.

Numerous challenges presented themselves during the project including: the remote location, limited site access, World Heritage Park and National Park status, Coastal Marine Area strict environmental limitations, construction undertaken in a working harbour, unpredictable fiord land winter weather, and difficulties extracting existing piles from the seabed. Despite these challenges, the project was successfully completed on time and under budget.

The completed project was opened in time for the 2012/13, summer tourist season and has been operating with improved efficiencies and greater capacity. The commitment by the MDA Board to this significant redevelopment at this key New Zealand tourism asset is to be commended.



SILVER



# SH94 MILFORD ROAD - HOMER TUNNEL WESTERN PORTAL ROCKFALL RISK MANAGEMENT

MILFORD SOUND

*Opus International Consultants Ltd for NZ Transport Agency*

Milford Sound is an iconic New Zealand tourist destination, attracting over 1 million visitors annually. The sole road to Milford Sound is prone to multiple natural hazards such as avalanche and rockfall, closing the road for several days a year to avalanche risk. For the first time since the construction of the Homer Tunnel, a rockfall in 2012 posed a significant risk to road users. The Milford Rockfall Risk Management Project differs from conventional rockfall projects in many ways. The environment and location required techniques more associated with mountaineering than geological mapping. Opus arranged for specialist mountaineering guides to investigate the history of the site and its condition and used drone aircraft to overcome the lack of base data to assess the risk and design the solution. They worked closely with the client to manage safety and arranged for specialist mountain safety oversight.

Opus used conventional rockfall analysis computer modelling, but took it further by working closely with specialist rockfall contractors, Geobruigg NZ to assess 3D rock fracture along rockfall routes and distributional spread of impacts and velocities following break and scatter of rocks during the fall. Opus designed a temporary rockfall protection shelter. The design of the modular temporary shelter considered the curve and slope of the road, the natural fall of the surrounding slopes, and married into the existing tunnel portal. The road remained open at critical times during drilling as scaling works progressed at altitude and afforded a significant improvement in safety to the travelling public and road users. The rock pinnacle was successfully removed in June 2013 following a specifically designed drill and blast programme. Careful blast design, using information gained by geological mapping, assured a clean and high fracture blast reducing the potential for large boulders and maximized fragmentation whilst minimizing impact on the residual mountain face. The design of the shelter protection system adopted a radical means of assessing site specific rockfall risk and provided a high level of temporary protection in a unique modular form that can be dismantled and transported away from the site or recycled elsewhere with minimal impact on the National Parks environment.

# TAHUNA WASTEWATER TREATMENT PLANT - STAGE 2 UPGRADE

DUNEDIN

*CH2M Beca Ltd for Dunedin City Council*

CH2M Beca was engaged by Dunedin City Council to undertake the design and construction monitoring of Stage 2 of the Tahuna Wastewater Treatment Plant (WWTP) Upgrade, which serves a population of 120,000. Prior to the Stage 2 upgrade the WWTP consisted of primary sedimentation and chlorine disinfection. The Stage 2 upgrade to secondary treatment was required to improve the effluent quality and to allow ultraviolet light (UV) disinfection to replace chlorination.

The liquid stream upgrade included grit removal and the conversion of the existing plant to a high rate activated sludge process. The length of the existing primary sedimentation tanks (PSTs) allowed formation of three zones (grit removal, aeration, sedimentation) using partition walls within the original structures. Conversion of the PSTs included novel approaches such as: converting former sludge hoppers to grit hoppers, suction removal of sludge from rectangular tanks, modification of existing travelling bridge scrapers and high speed aeration blowers.

A unique and innovative feature of the design was the modification of existing travelling bridge scrapers by the addition of vee scrapers operating in conjunction with multiple pipe suction ports, so that sludge was extracted along the length of the tanks.

The upgrade has achieved all of the client's requirements within the project's objectives and constraints. This included the minimisation of odour generation because of the WWTP's immediate proximity to a residential area. The design provides a substantial reduction in the environmental effects related to Dunedin's wastewater discharge to the environment which enabled the plant to continue to operate at full capacity while modifications were made and which maximised use of existing assets in order to minimise capital cost.

***"For over a decade Beca has played a key role in the process that ultimately resulted in the Tahuna Wastewater Treatment Plant Upgrade Project."***

*- Chris Henderson, Manager, Plant Maintenance and Wastewater Treatment for Dunedin City Council*



SILVER

MME

# R

# R

# R

MERIT

CHRISTCHURCH SOUTHERN MOTORWAY - STAGE 1

FONTERRA DARFIELD DRYER #2

HAYWARDS SYNCHRONOUS CONDENSER REFURBISHMENT

SH35 MAREANUI REALIGNMENT

THREE 35 LINCOLN ROAD

WILLIS CENTRAL



# CHRISTCHURCH SOUTHERN MOTORWAY - STAGE 1

## CHRISTCHURCH

*Opus International Consultants Ltd & Beca for NZ Transport Agency and Fulton Hogan*

From the first works undertaken in the 1970s, the Christchurch Southern Motorway has provided a key route between the southwest parts of the city, the central business district and Lyttelton Port. As Christchurch has grown so too has the demand for a safer, more reliable southern corridor.

The NZ Transport Agency along with Beca, Opus and Fulton Hogan embarked on a journey to provide the region with a route that would deliver reduced travelling times, improved motorway access and safer streets. The 10.5km long Christchurch Southern Motorway Stage 1 (CSM1) Project, the first of the Canterbury Region's Roads of National Significance (RoNS), is a complex, large scale motorway and arterial road project encompassing the upgrade of busy existing roads, construction of new interchanges, extensive development through historic and active landfill sites and careful balancing of stakeholder requirements.

A flat topography and liquefiable ground conditions provided technical challenges for the geometric design, disposal and treatment of stormwater and the physical structures of the project.

From the outset of scheme development through to construction, the successful delivery of CSM1 involved extensive collaboration between the project team, Christchurch City Council (CCC), Environment Canterbury (ECan) and affected parties to ensure all facets of the project were integrated into the design. This dedicated team approach proved critical when managing not only technical curve balls, but also needs of the team, wider city, and, most importantly management through the Canterbury earthquakes. To overcome these unique challenges and still deliver this project ahead of programme and under budget is a testament to the skills and dedication of the whole team.

*The outstanding success of this project has given the region a real sense of hope by demonstrating what can be achieved in difficult circumstances as the city rebuilds.*



# FONTERRA DARFIELD DRYER #2

CHRISTCHURCH

*Babbage Consultants Ltd (BCL) for Fonterra Cooperative Group Ltd*

Babbage Consultants were the construction managers for Fonterra in the building and commissioning of the world's largest milk powder dryer at Darfield with a capacity of over 30 tons per hour. The dryer's cost of over \$300 million was Fonterra's single largest capital investment of its type and was completed in a mere 20 months from the decision to proceed. The plant was completed on time to meet the 2013 milk season and at 10% under budgeted cost.

As the construction manager, Babbages coordinated the huge effort this development required from many different parties. The original greenfields site had a new 15 tons per hour dryer already in place with the additional new dryer being built alongside. Together the dryers vastly expanded product storage and the massive ancillary facilities required.

Babbage Consultants ensured not only that the physical plant was commissioned on time, including all the supporting services, but that also all stakeholders achieved their objectives. Since first product was processed in September last year, the dryer has achieved the results and outcome it was designed and built for, both in terms of volume and quality.

This was accomplished through the active implementation and promotion of a 'community of stakeholders' approach to the project where Fonterra, contractors and consultants worked together with the common goal of ensuring all stakeholders were successful. This community approach promoted high levels of personal and company cooperation on site for everyone involved.

As required by Fonterra, the key focus of the community approach was on safety at all levels of construction; from management through design to on-site physical construction. This strategy resulted in higher quality planning, design and construction methodologies making the building work both safer and more efficient. The result was a reportable safety incident rate of just 15% of the national average, further supporting the 'community of stakeholders' approach of cooperation and 'best for project' culture on site to produce better outcomes.



MERIT



# HAYWARDS SYNCHRONOUS CONDENSER REFURBISHMENT

WELLINGTON

*Beca for Transpower NZ Ltd*

As part of the HVDC Pole 3 project, Transpower refurbished four 65 MVar synchronous condenser units which are critical for the HVDC link providing stability to the North Island main grid.

Engineering consultants Beca, were engaged to: design the installation of the replacement 110kV and 11kV transformers, the associated 110kV and 11kV plant and connections, together with seismic strengthening of the three-story structure that supports the condensers, transformers and associated cooling equipment.

This was a technical and complex, multi-disciplinary project requiring expertise in a number of fields. Innovation and collaboration helped to overcome the extreme site specific constraints of carrying out heavy construction, including demolition and major concrete work within a live switchyard.

Located adjacent to the Wellington fault, the installation requires reliable seismic robustness. Beca believe that there are no synchronous condensers installed anywhere in the world in such a severe seismic zone. Beca carried out non-linear time history analysis to predict the expected structural response in a 2500 year return-period earthquake and derived an extremely economical strengthening solution.

To allow for potential seismic movements between the transformers and the condensers, Beca detailed a novel parallel cable solution rather than more traditional rigid bus. This required detailed analysis to ensure equal current sharing.

Beca provided a multidisciplinary team to successfully deliver a solution that was seismically fit and offered improved staff and plant safety during construction, operation and maintenance.

# SH35 MAREANUI REALIGNMENT

OPOTIKI

*Opus International Consultants Ltd for NZ Transport Agency*

The closure of State Highway 35 by a landslide required the NZ Transport Agency to realign the highway. Opus International Consultants designed and supervised the construction of the 1.2km realignment through steep and challenging terrain. The thin site soils overlaid unstable, slip-prone bedrock. This challenge together with steep terrain and dense bush required a 'design as we go' approach.

Geotechnical, contractual and budget risks were continually addressed using the principal's risk management system and the 'Last Planner' project management technique. Both proved effective in providing direction and a degree of certainty in an ever changing environment. These project techniques allowed the Agency to review the budgets and timeline for the project, and then provide vital information to the funder and stakeholders.

Another key element was close community involvement with the local iwi and Marae in selecting earthworks disposal sites. Spoil was delivered to the Maraenui beach for use in improving sea defences in front of the Marae. The spoil was also used to rejuvenate portions of the foreshore, reinstating the land to a productive state. A second disposal site on flood prone land at Hawaii resulted in improved land quality and utilization in a win-win situation for the project and the community.

***"This relationship allowed the NZ Transport Agency the opportunity to provide a positive benefit for the local community while still achieving value for money for the government."***

*- Nigel D'Ath, Journey Manager for NZ Transport Agency*



MERIT



# THREE 35 LINCOLN ROAD

## CHRISTCHURCH

### *Ruamoko Solutions Ltd for Cadaques Investments Ltd*

For the 'Three35' Lincoln Road commercial building project, Ruamoko Solutions introduced replaceable-links for steel Eccentrically Braced Frames (EBF's) into New Zealand. Based on 2010 Canadian research, the system utilises frames with shear links that can be replaced after a damaging earthquake. These shear links deform under severe seismic loading, reducing the peak load experienced by the building and absorbing seismic energy.

The recent Canterbury earthquake sequence has highlighted the market demand for seismic systems that minimise downtime associated with post-earthquake building repair. Developers are increasingly interested in pursuing new seismic systems and technologies that limit damage and reduce the impact of repairs following earthquakes. For such systems to compete with conventional seismic systems in the commercial market, many factors including: seismic performance, cost, erection time, materials, procurement, design and construction challenges must be considered.

As few guidelines or standard solutions were available for this emerging technology, Ruamoko Solutions developed a series of significant innovative solutions, particularly around link endplates and column baseplates to overcome significant challenges within the local market regarding fabrication and material sourcing associated with this new technology.

The design was peer-reviewed by BCD Group Ltd, and required close collaboration with Steel Construction New Zealand (SCNZ) who has since developed design guidelines based on this project. The successful construction of this project has paved the way for further projects to use this technology by helping to identify and resolve practical issues able to address the design and construction stages of EBFs with replaceable links.

*The outstanding feature of this award submission is the openness with which problems have been identified and solutions sought.*

# WILLIS CENTRAL

WELLINGTON

*Pacific Consultants for The Wellington Company*

Willis Central, based at 42-52 Willis Street (Wellington), is the new home for Telecom. The building capitalises on its central location incorporating a number of sustainable initiatives that facilitated five-star Green Star certification. The result is a building with an exceptional occupant environment that minimises consumption of resources, reduces undesirable emissions and enhances the ecology and urban fabric of Wellington.

The development comprises a refurbished existing building with new additional floors and tower, all connected to an impressive open atrium. Pacific Consultants were responsible for the detailed design and documentation of the mechanical HVAC, electrical, hydraulics and fire safety engineering systems plus the detailed services fit-out design for the building's key tenant, Telecom New Zealand.

Integrated chilled beams incorporate power and data cabling plus up and down lighting. The nature of the cohesive integrated service design with mostly exposed services, makes the deployment of any new technology to the desktops in the open plan office spaces, simple and efficient.

The fire smoke control system required specific design incorporating state of the art, Fire Dynamics Simulator (FDS) modelling of fire scenarios within the large open plan atrium and office spaces. Smoke is exhausted from the top of the atria via extract fans with dedicated opening louvers and mechanical supply providing make up air to the occupied floors and keeping escape paths clear during an emergency fire evacuation.



MERIT

# FINVA

# ALIS

FINALIST

AUCKLAND CITY RAIL LINK

BLENHEIM URBAN GROWTH PLANNING FOR EARTHQUAKE HAZARDS

CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 - ENVIRONMENTAL PROTECTION AUTHORITY

CHRISTCHURCH TRANSITIONAL CATHEDRAL

DECONSTRUCTION OF 91 HEREFORD STREET

DEVELOPMENT OF dTIMS MODULE FOR DEVELOPING OPTIMISED RENEWAL PLANS FOR POTABLE, WASTEWATER AND STORMWATER SYSTEMS

EASTERN SELWYN SEWERAGE SCHEME

GLOBAL CONSENT TO DISTURB CONTAMINATED LAND IN THE AUCKLAND REGION

HIGH PRODUCTIVITY MOTOR VEHICLES - INVESTIGATION, EVALUATION AND UPGRADING OF STATE HIGHWAYS TO IMPROVE FREIGHT EFFICIENCY

MAKETU WASTEWATER SCHEME

ROTORUA POLICE STATION

WELLINGTON ZOO



## AUCKLAND CITY RAIL LINK

AUCKLAND

*Aurecon for Auckland Transport*

With Auckland growth predicted to be more than 700,000 people over the next 30 years, the Auckland City Rail Link is a key project in an integrated transport programme to keep the city moving. The project consists of constructing an underground rail link that will connect Britomart Station in downtown Auckland and the existing western line near Mount Eden via the city centre to allow trains to pass through most Auckland stations every 5 to 10 minutes at peak.

Engineering Consultants, Aurecon, carried out the geotechnical investigation of the project. This involved investigating 76 different locations within the Auckland Central Business District's area of the proposed alignment for the rail link. Underground investigations pose a major health and safety risk when working in an environment containing complex and dense networks of buried services in the road and footpath areas. To strike one of those services would have a massive effect on the surrounding locals.

Aurecon developed non-traditional excavation methods to locate and clear services using a portal installed within the cleared zone, allowing geotechnical drilling contractors to undertake their investigations safely. As a result, no services were damaged and no interruption to key business services in the Auckland CBD.



## BLENHEIM URBAN GROWTH PLANNING FOR EARTHQUAKE HAZARDS

BLENHEIM

*Opus International Consultants Ltd for Marlborough District Council*

Inappropriate land use planning decisions have led to major damage to urban environments in New Zealand, as clearly evident in Christchurch. The Opus study included areas in Blenheim being considered for future development investigated earthquake hazards, the potential ground damage and the impact of the findings on future expansion, and inputs to the achievement of appropriate land use planning.

The study incorporated principles of resilience for future communities and sustainability in the use of resources for a longer strategic planning timeframe of urban planning in New Zealand. Importantly the potential impact on future land development was taken into consideration: residential, commercial and associated infrastructure and the consequent effects on the resilience of communities. The study considered mitigation measures that would be necessary, their practicality, and the impact on sustainability in the use of resources, in order to recommend appropriate land use zoning.

The recommendations of the robust study were embraced by the council, made public, and quickly won the confidence of the community. The outcomes of this study are of importance for New Zealand as it sets a clear demonstrated pathway for consideration of resilience by local authority planners as they examine land use planning as part of their urban growth strategies.



## CHRISTCHURCH SOUTHERN MOTORWAY STAGE 2 - EPA

CHRISTCHURCH

*GHD for NZ Transport Agency*

The Christchurch Southern Motorway Stage 2 project (CSM2) forms part of the Christchurch Southern Corridor and involves widening and upgrading of Main South Road to provide a four-lane median separated expressway and the construction of a 'greenfield' four-lane median separated motorway. Development of the 13km long CSM2 project will connect with the recently constructed Christchurch Southern Motorway Stage 1, forming a link from Rolleston and the south to Christchurch. This will significantly improve connection to the central business district, Lyttelton Port, and the city's industrial areas. GHD led the consultancy team (which included 8 sub-consultants) through the Environmental Protection Authority's (EPA) process to the completion of the investigation and reporting phase that successfully secured regulatory approvals for matters lodged with the EPA for determination. Through proactive, innovative and collaborative processes the team engaged with stakeholders and affected parties to achieve outstanding project outcomes. This included: visualisation to showcase an overview of the project, future proofing stormwater options to mitigate groundwater flooding, adopting a best for project approach to expertise engagement, working closely with advisory boards to steer the project through development and overcoming community and environmental considerations. There were no appeals to the Board of Inquiry decision, a rare and significant outcome that reflects the thorough reporting, investigation and consultation undertaken by the team during the investigation and reporting phase. This is the second project ever in the South Island that has required consenting through the EPA, the first for the NZ Transport Agency in the South Island.



## CHRISTCHURCH TRANSITIONAL CATHEDRAL

CHRISTCHURCH

*Beca, Holmes Fire & Holmes Consulting for the Church Property Trust*

The Transitional Cathedral, dubbed the 'Cardboard Cathedral' for its innovative use of cardboard materials, is a disaster relief architecture project and typifies the post-earthquake response of developing transitional solutions to help get Christchurch back on its feet. Designed by renowned architect Shigeru Ban, it was originally conceived as a temporary structure but the cathedral may now be permanent feature on the Christchurch skyline.

Simple in form but complex in shape, the building was constructed with novel building materials and designed by an international architect in a changing local design environment. With a complex funding model, pro-bono support and a very significant profile both locally, nationally, and internationally, this building design is deserving of the global attention it attracts.

The project was led by Beca Project Management, with design and engineering services provided by Holmes Consulting Group, Holmes Fire, Powell Fenwick, Warren and Mahoney and Shigeru Ban Architects. The construction was led by Naylor Love Construction with landscaping by HEB Ltd.

The new Transitional Cathedral is arguably the flagship of the Christchurch Rebuild project, being the first civic building to be completed and a signal that Christchurch is still the city of opportunity.



## DECONSTRUCTION OF 91 HEREFORD

CHRISTCHURCH

*Aurecon & Fletcher Construction for Telecom*

Following the 2011 Canterbury earthquake, the former Telecom exchange facility at 91 Hereford Street was damaged beyond economical repair requiring demolition. The proximity of the building to the current exchange building supporting the entire South Island phone network was a major demolition risk. Telecom appointed Aurecon as lead consultant for multi-disciplinary technical and project management services. A comprehensive risk register was developed identifying critical elements needing protective measures including: underground cable tunnel hosting every copper wire and fibre for Canterbury, an Orion substation, an artesian well and underground diesel tanks serving stand-by generators. A services schedule was developed to ensure that redundant services in No.91 were isolated and that essential power supplies for critical services supporting the ongoing operation of No.109 were reconfigured. One innovative feature was re-purposing some of the former 91 Hereford Street building, removing some of the complicated high-risk deconstruction that would otherwise have been encountered if a complete deconstruction was undertaken.

**“From afar this project would have appeared to be ‘just another damaged building demolition,’ yet for those involved it was a high-risk project requiring the utmost in engineering investigation and risk management to achieve the deconstruction without impacting on Telecom’s service delivery to customers.” – Jim Robb, Telecom Property Projects**

The project successfully achieved its objective of mitigating critical risks whilst transforming a damaged building into an outdoor area for public use.



## DEVELOPMENT OF dTIMS MODULE FOR DEVELOPING OPTIMISED RENEWAL PLANS FOR POTABLE, WASTEWATER AND STORMWATER SYSTEMS

NEW ZEALAND

*Opus International Consultants Ltd for Dunedin City Council*

The dTIMS 3 Waters Module is a decision support tool for water, wastewater and stormwater networks, developed by Opus International Consultants, IDS and Deighton Associates Ltd. It is being utilized by Dunedin City Council to develop long-term strategies for the operation, maintenance and renewal of their potable water, wastewater and stormwater system networks through identifying intervention strategies and determining the timing, frequency and treatment type to be implemented. Optimising intervention strategies based on minimizing life-cycle costs, as well as minimizing risks or maximizing service levels and interventions can be optimized for either one factor or a combination of all. It can also produce expenditure forecasts, works programmes and predictions of future condition, risk and service level profiles for various scenarios.

Dunedin City Council are now able to demonstrate good stewardship of the assets, changing the thinking horizon from the next 3-5 years: to investment strategies and performance outcomes covering the next 5-30 years, balance long term and short term funding priorities, undertake discussions with councillors about the impact of various investment strategies and demonstrate that long term plans are robust and appropriate.



## EASTERN SELWYN SEWERAGE SCHEME

CHRISTCHURCH

MWH New Zealand Ltd for Selwyn District Council

In 2007, MWH was commissioned to develop the Eastern Selwyn Sewerage Scheme (ESSS) to convey and treat wastewater flows for the projected population increases of the communities of Prebbleton, Lincoln, and Rolleston that had already seen two decades of significant growth. Following the major Canterbury earthquakes in 2010 and 2011, the towns experienced rapid growth above previous projections and there was an urgent need to bring forward and expand the programme to meet the new future requirements. It was vital to keep the existing system operating while the expansion was undertaken to ensure continuity of services to the local community. In addition, a way had to be found to meet the need for an expanded wastewater treatment plant without high infrastructure costs burdening ratepayers. This required a unique solution of innovative design and project management. The scheme MWH developed included significant infrastructure reuse- ensuring past investment was used to benefit the wider scheme; balancing of wastewater flows to minimise the size of the infrastructure installed; staging to minimise cost, while future-proofing the infrastructure to allow for expansion and projected needs. The use of solar-drying of sludge, the first application of this process in New Zealand, has proved to be very effective - significantly reducing the volume of sludge to be removed from the site and substantially decreasing operating costs.

MWH also expanded the project plans in a way which could relieve the Christchurch City Council's damaged infrastructure should the need arise. The solution developed for the ESSS is future-proofed, cost effective and able to meet the community's current and on-going needs.



## GLOBAL CONSENT TO DISTURB CONTAMINATED LAND IN THE AUCKLAND REGION

AUCKLAND

GHD for Chorus

Chorus's roll out of ultra-fast broadband throughout New Zealand involved installation of fibre optic ducting down nearly every urban street and road in New Zealand. Much of this work is within road reserve plus limited work undertaken on private property to provide customer connections. In January 2012, the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, 2012 (soil NES) was enacted. This legislation obligated Chorus to identify and manage risks associated with contaminated land where trenching works disturb such land. Given the scale of Chorus' projects for the Auckland region alone, it was recommended to apply for a NES global consent for the disturbance of contaminated land. In order to support the consent application and requirements of the NES, engineering consultants GHD, developed a simplified process identifying potential contaminated sites, while providing risk mitigation measures equal with the level of risk posed by the potential contaminants. This is the first global consent under the Soil NES to be approved by Auckland Council across all legacy council and district plan areas and likely one of the first global consents under the soil NES to be granted in New Zealand. For this work, Chorus is considered industry leaders for contaminated land management with linear infrastructure including contaminated land risks. They have improved management of risks associated with their work, and are now leading industry collaboration on contaminated site identification.

FINALIST



## HIGH PRODUCTIVITY MOTOR VEHICLES INVESTIGATION, EVALUATION AND UP-GRADING OF STATE HIGHWAYS TO IMPROVE FREIGHT EFFICIENCY

NEW ZEALAND

*Opus International Consultants for NZ Transport Agency*

The introduction of HPMV's in May 2010 has, subject to the granting of a permit for a prescribed route, enabled Vehicle Operators to use vehicles that are heavier and /or longer than traditional. The \$45m HPMV Bridge Improvement Programme was developed to review and where appropriate, strengthen bridges on routes determined as a priority for these vehicles. Detailed bridge evaluation for HPMV loading has been driven mainly by the need to confirm that restrictive bridges on these routes actually need strengthening. Earlier screening and assessments were based on data not been derived in accordance with modern standards and practices. The latest evaluation work led by Opus has therefore offered the opportunity for large potential cost savings by removing the requirement for physical strengthening works. An innovative risk-based approach to the reassessment and strengthening of those bridges on investment routes has seen the different NZTA Regional Bridge consultants working closely together to pool their resources and engineering knowledge. Better value solutions have been developed in a nationally consistent manner. Originally 159 bridges were identified as HPMV-restrictive. This risk-based approach revealed that only around one third have actually requiring physical strengthening. It has resulted in a substantial cost saving in the programme, coupled with a significant reduction in the amount of physical works required. HPMV routes can now be opened earlier.



## MAKETU WASTEWATER SCHEME

MAKETU

*URS for Western Bay of Plenty District Council*

Western Bay of Plenty District Council's driver for this project was to find an environmental, cultural, social and financially sustainable wastewater solution to address the existing onsite effluent disposal systems in the Maketu and Little Waihi communities. URS and the Council worked together with the contractor to deliver the project outcomes.

For years, Council has been investigating options to address the ageing and poor performance of the existing onsite wastewater management systems in the Maketu and Little Waihi. The removal of treated wastewater from the two estuaries with their Kaimoana resources had been a key community objective for many years and the completion of this project has substantially improve public health and the overall health of the harbours.

The project is unique in that it was the first wastewater treatment facility to treat primarily grinder pump sewage and to use slow rate sub-surface drip irrigation in to fine grained soils to avoid the need and cost for UV treatment for bacteria and viruses. The treated effluent is to a high standard for land disposal. Vermicomposting is used to treat the biosolids to reduce nitrogen loading to the site. The project was completed approximately \$1m under budget and within the timelines required. Western Bay of Plenty District Council and it's ratepayers are very proud of these assets and the contribution they make to the communities and the wider district as a whole.



## ROTORUA POLICE STATION

ROTORUA

*Spiire NZ & Opus International Consultants Ltd for Leuschke Group*

The recently completed Rotorua Police Station has been designed as an Importance Level (IL) 4 structure, serving post-disaster function and remaining fully functional as critical infrastructure following a disaster such as a major seismic event.

The design incorporates low damage, self-centering PRESSS (PREcast Seismic Structural Systems) technology, adopted as an alternative to a more conventional reinforced concrete frame structure at the recommendation of Spiire. The design incorporates post-tensioned steel tendons clamping rocking concrete shear walls to the foundations to resist earthquake forces, while remaining very stiff under serviceability loadings.

Some of the challenges of this project included the potential of liquefaction of the site soils, significant ground settlement, potential geothermal gas leakage into the building and a high level of detailing associated with the PRESSS shear walls to accommodate seismic movement within the building without causing damage to the superstructure.

Close collaboration and interaction between the structural designers (Spiire) and the geotechnical designers (Opus) enabled the designers to use performance based design for all elements of the soil-foundation-superstructure system and satisfy the requirements of the NZ Building Code for the IL4 building.



## WELLINGTON ZOO

WELLINGTON

*Jacobs New Zealand Ltd for Wellington Zoo*

Jacobs SKM, in conjunction with Studio Hansen Roberts, were challenged with creating designs and using products that were sustainable to upgrade the Malayan Sun Bear Exhibit and the Sumatran Tiger Exhibit, especially as these critically endangered animals are directly affected by deforestation. The new facility provides adequate space for the animals and allows visitors to safely view, and be educated on the habitat of the species. The space has interactive information panels, large high viewing platforms and large glass panels to provide a full view of the animals in their natural habitat. The Malayan Sun Bear exhibits a purpose built new home, complete with climbing frames built from recycled gum trees. The facility has an operational waterfall and pond within centimetres of the viewing area and large mounds to more accurately reflect the bears' natural home. The sun bear holding den was constructed using insulated block work, to reduce the energy usage of the building and maintain a comfortable environment for the sun bears and reducing costs, in line with the zoo's sustainability objective. The Sumatran Tiger facility has had a major redevelopment providing new viewing panes and viewing decks so it is now possible to get within a whisker of this amazing big cat. The viewing shelter structures were designed to reduce the visual impact of connections. Cantilever columns were used to reduce the load transfer at the knee joints which allowed connections to remain concealed. The new Asia Precinct provides a spacious, state-of-the-art home for two of Wellington Zoo's most charismatic animals and accommodates the three main user groups; animals, staff and visitors well.

ROTORUA ENERGY EVENTS CENTRE – 9<sup>TH</sup> AUGUST 2014



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