# glass hammer

issue 1

# BUILDING THE GREEN WAY

It is becoming increasingly important, world-wide, for the construction industry to reach higher standards of environmental sustainability.

Naylor Love understands that sustainability encompasses both the construction process and environmentally sustainable design (ESD). It knows this requires that the economic, social and environmental costs during both construction and the lifetime of the building be minimised.

BRANZ lists the following features in environmentally sustainable design:

- minimising waste during construction
- use of sustainable materials
- use of safe and healthy materials
- energy conservation and efficiency
- material durability.

The Green Building Council, a world-wide organisation, has produced a matrix to rate ESD features in eight environmental categories:

- management
- indoor environmental quality
- energy
- transport
- water
- materials
- land use and ecology
- emissions.

The Green Building Council rates buildings against their compliance with the principles of ESD. A 5-star rating represents excellence in sustainability.

sustainable DESIGN&CONSTRUCTION

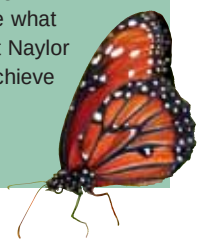
>>> NAYLOR LOVE IS A MEMBER OF NEW ZEALAND GREEN BUILDING COUNCIL

### Butterfly House, Otago Museum

If butterflies can be given the perfect built environment to live in, then so can we.

Naylor Love has recently completed the tropical garden which houses butterflies, fish and turtles. Visitors can walk under a waterfall or towering plants and view the exotic butterflies fluttering by. The temperature is maintained at 28ºC and 90% humidity in the three-level, 17 metre high building.

These conditions may not be what people would like to work in, but Naylor Love does understand how to achieve any desired environment.



### Naylor Love and sustainability

Naylor Love has been building for 98 years, a period historians may refer to as the 'oil age'.

Over this time, an abundance of cheap energy has completely changed our attitudes to transport, consumption and waste to the extent that we have irreversibly altered major ecosystems and appear to have affected climate patterns – all within a few generations.

The construction industry is currently reflecting on what it can do to halt the trends. At Naylor Love we are taking these issues seriously and have accepted the challenge of sustainability. We have looked critically at what can be drawn from our past experience and what we need to do to be able to meet the challenges of green building and to improve our own performance around sustainability.

*Glass Hammer* is the first of a series in which we will be outlining our progress. I hope you will find it interesting and informative.

We review some projects built over the past 15 years which included leading edge heating and ventilating systems designed to provide good working environments and energy efficiency.

We outline our role in the Snell's Beach School project where, as the design-build contractor, we are responsible for providing a '5-star' result.

Our community responsibilities are recognised with our involvement in environmental action projects such as the re-forestation of islands in Lake Wakatipu.

Last but not least, we congratulate Annie Day, an Auckland project manager, on becoming Naylor Love's first Green Star Accredited Professional.

Trevor Kempton, Managing Director

# PRACTISING WHAT WE PREACH

### Waste management, Naylor Love Central

Dealing with construction waste and environmental damage on Naylor Love sites is a journey which has just begun.

Queenstown is New Zealand's fastest growing community and at the same time is a tourist mecca famous for its natural landscapes. Landfill management is critical in the region, so the Central division had every reason to tackle the problem early on.

Peter Taylor, operations manager, describes how they deal with the issue, both on site and in the office: "Waste types are separated at source. Reinforcing steel is separated and picked up by scrap dealers. Organic materials are taken to specialised landfill sites. Concrete waste from demolition is turned into backfill at recycling sites. Much more surplus material than normal is stored for later use, and more demolition items are offered to dealers before dumping. This is because landfill charges dramatically change the economics around re-use. In the office, paper, cardboard, glass and plastic are put in recycle bins."

Naylor Love Central is well on the way, and is providing a model for other divisions to follow.

### Naylor Love Environmental Policy

As part of its environmental policy, Naylor Love recognises its responsibility to:

- minimise the impact of its activities on the environment
- influence its clients and the public through the structures it builds, the way it builds them, and the way it operates its business
- continually improve its environmental performance by being responsive to client, stakeholder and community expectations and by benchmarking itself against industry best practice.

### Naylor Love Waste Management Policy

As part of its waste management policy, Naylor Love recognises its responsibility to:

- take advantage of all opportunities for the re-use and recycling of construction materials
- think of waste as a resource, with disposal the last possible resort
- minimise waste through good site management
- minimise the impact of waste management practices on the environment.

### △ Mail centre a green sustainable workplace

Completed in 2006 by Naylor Love, the New Zealand Post Mail Centre at Te Rapa, Hamilton, is a green building which won a New Zealand Master Builders' Gold Reserve Award, a recognition which gives Naylor Love much pride. It is one of three green sustainable complexes recently constructed by New Zealand Post.

The client, Carey Oldfield, a member of the Green Building Council, describes the new 'green' mail centres:

"They feature long-life, flexible, sustainable and user-friendly development with an appropriate balance between capital investment and reduced operating costs. As working environments they provide good air quality, thermal comfort, natural day lighting, good acoustics and outside eco-awareness. Each offers bright, green, friendly workspaces for our people and minimal impact on the community and the environment."

### Sustainable construction at Whanganui UCOL

Lockwood Naylor Ltd (a joint venture) is currently relocating the Whanganui Universal College of Learning polytechnic in Wanganui to one campus. This involves construction of a large three-storey teaching block, and strengthening and upgrading a heritage building,

Naylor Love and the client team, while looking for ways in which the project could be accelerated, demonstrated that green building can also be fast building. A significant time saving was achieved by substituting the traditional Gibraltar board wall linings with Strandboard.

Strandboard is made from compressed wood shavings. A renewable resource, it eliminated the need for joint stopping and was finished with a clear sealer rather than a multi-coat paint system. The result is an extremely tough and durable lining which on a whole-of-life basis will result in less accidental damage in high impact areas and much less frequent re-finishing. Strandboard may cost a little more, but speedier construction and a lower whole-of-life cost means it won hands down.

### Latter Day Saints Church, Otara

Annie Day, Naylor Love's Auckland project manager and accredited Green Star Building Professional, has been applying her talents to the construction of a church for the Latter Day Saints in Otara.

The church and Naylor Love, while in the process of value engineering, changed the contract to include an enviro-sand filter, a building management system to control mechanical, lighting and underfloor heating, and provision for more grassed. areas and plants. This goes to show that sustainable design is just good business!

Annie reviewed the project against the green star rating criteria and identified several ESD opportunities which could be brought into the client's future developments:

- improving energy efficiency and reduction of construction waste through design changes
- monitoring of carbon dioxide levels, electric lighting levels, volatile organic compounds, and formaldehyde minimisation in the indoor environment
- changes in the provision of car parking, and provision of cyclist and commuter facilities
- more efficient water use, both within the building and in the landscape
- use of more locally produced, sustainable and low environmental impact materials
- emissions reduction, e.g. HVAC refrigerants.

### Queenstown Reservoir – low environmental impact

Walk up the road to Queenstown's main water supply reservoir, and you wonder if you are on the right track. You don't see the reservoir until you almost bang into it because it blends so well into the landscape. In 1996, Naylor Love won a tender to design and build a 9000m$^3$ reservoir with low environmental impact. The project won an ACENZ Silver Award for engineering and construction excellence.

Justin Calder, divisional manager of Naylor Love Central, describes how they achieved their aim: "To minimise the impact of earthworks on the steeply sloping site, the reservoir platform was retained by polyethylene mesh reinforcement. The reservoir was constructed as two post-tensioned trapezoidal cells which hugged the contours of the hill. Painted dark green, the reservoir matched the existing Douglas fir plantation which screened it from the road, and the site was planted on completion."

The Queenstown Reservoir was one of Naylor Love's early environmental successes.

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The last 15 years has seen institutional clients in particular searching for ways to improve working environments and minimise lifetime operating costs, of which the largest single component is normally heating and ventilating. From around 1990 Naylor Love has worked with clients such as University of Otago and Canterbury University, and constructed buildings which have led the way in commissioning innovative design to achieve these goals.

### ▽A building based on intelligent thinking

Such was the description given to the Mathematics, Statistics and Computer Science building at the University of Canterbury, built by Naylor Love in 1997.

The building design took advantage of natural heating and cooling systems by enabling a flow of air to move through each room and out into the atrium during the day, with natural refreshing overnight. Additional cooling was provided by pumping groundwater from an artesian well into water coils in the air handling unit. Beyond the atrium, conditioned air was ducted through the voided precast floor system eliminating the need for an extensive separate ducting system and saving the space needed for this. These features were significant in the building taking out the NZIA premier design award in 2000.

### Outdoors indoors

Several mature trees are growing in the central atrium of the Commerce building, built by Naylor Love in 1992 at the University of Otago. Students can walk out of lectures and sit and talk beneath the trees without going outside. A space-frame roof above the atrium provides the indoor/outdoor feel on a grand scale.

> Green construction can reduce staff health complaints by 20-25% and reduce energy costs of a typical 4,000m$^2$ office building by 56% **NZ CONSTRUCTION CLIENT'S GROUP**

The perimeter of the atrium is formed by balcony walkways and lecture theatre walls with large panels of louvres which open automatically to supply fresh air as required. These louvres are one element of a sophisticated, fully computerised climate control system, a leading edge development at that time.

### △Energy conservation in 'Student Library'

By the late 1990s the University of Otago had outgrown its 1960s library. In 2003 the Information Services Building, constructed by Naylor Love, was opened in its place. Two of the three wings of the existing library were demolished but, to save costs, the third was gutted and strengthened. A new three-storey building was added. Concrete from the demolished wings was crushed and re-used as hardfill without its removal from site, and reinforcing steel, stripped of concrete, was recycled. It was the first time this had been done in the region.

There are many other environmentally friendly features. One feature of the building is the long curved limestone wall that wends its way through the length of the building. Behind this wall is a 300mm thick concrete wall, not only the backbone of the building, but also a massive heat sink. This works in conjunction with high insulation glass to minimise temperature extremes by limiting direct solar gain during the day and releasing stored heat at night. Little work is left to be done by the computerised climate control system. Innovative light shelves drive daylight into every corner of the building, minimising artificial lighting levels in daytime hours.

Some opportunities arose during construction to substitute imported components with locally available resources. The original design asked for decorative pillars made of green marble imported from Italy. Naylor Love suggested that green-coloured polished concrete, produced in Dunedin, would look just as good – and the university agreed. The hollow pillars were also used as ducts for heating.

Walk into the ISB in Dunedin, and you will see hundreds of students working, socialising and eating, but you won't be deafened by them. The building is very student-friendly with very low levels of sound transmission in large open spaces achieved by careful selection of materials and integration of elements.

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In projects like Snells Beach School and Wanganui Hospital, Naylor Love works from the outset with the architects and engineers through the design process to provide an additional component of practical expertise.

### Green schools

The NZ Ministry of Education has wholeheartedly embraced ESD. It has put the challenge directly in the hands of its contractors and provided commercial incentives around achieving defined environmental milestones.

Naylor Love Auckland won a design and construct contract in mid-2007 to build a new, environmentally-friendly Snells Beach School with design elements reflecting the local community.

It commissioned innovative ESD specialists to help with sustainable building design. Annie Day, the project manager, is excited at the challenge.

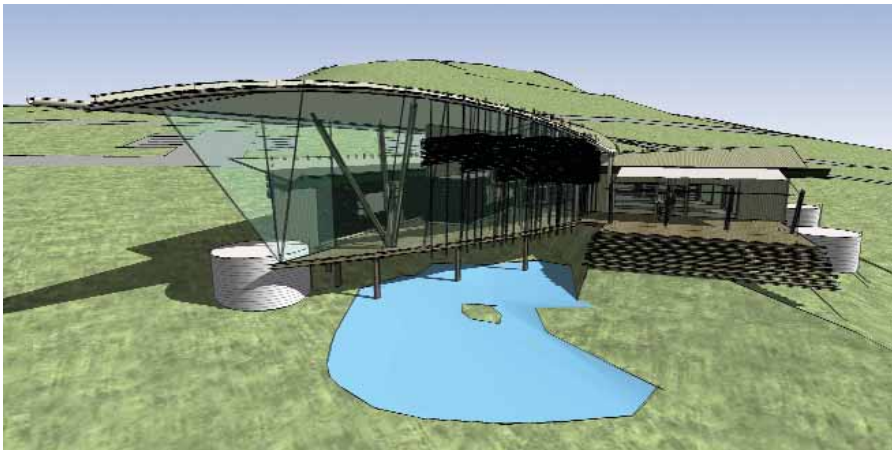
She commented: "Naylor Love will be setting the precedent for schools. We will achieve our goal of 5-star rating from the Green Building Council."

# COMMUNITY ENVIRONMENTAL ACTION

▷ Equus asinus at Quarantine Island

▽ Perspective drawing of the proposed sanctuary visitor centre at Orokonui

Naylor Love has been involved in several community environmental initiatives over the years. In 2001 and succeeding years, Naylor Love has sponsored the Wakatipu Islands Reforestation Trust, and been closely involved with the Otago Natural History Trust which is setting up the Orokonui Ecosanctuary. This year, it is working with the St Martins Community Council to restore a heritage building on Quarantine Island in Otago Harbour.



## Pigeon Island

Paddle across the northern end of Lake Wakatipu to Pigeon Island and the first thing you notice is the chorus of bird song. Wekas come to inspect your kayak as you pull it up on the beach, and tui and bellbird are everywhere. But it hasn't always been this way. A disastrous fire in 1995 destroyed much of the regenerating native bush, home to the endangered mohua (yellowhead) and weka recently introduced to the island.

The Wakatipu Islands Reforestation Trust was set up in 2001 to replant the burned out area and nearby Pig Island, and to upgrade the public hut and track system.

Naylor Love Central is not only a major sponsor of this project, but it provides labour for planting 1800 native trees and shrubs. 'We are pleased to be involved in putting some biomass back into the district rather than our usual role as consumers of wood products.'

## Orokonui Ecosanctuary

Imagine a valley just north of Dunedin where kiwi and tuatara will roam freely, saddlebacks will once again be seen, and a reserve and wildlife sanctuary, protected by a predator-free fence, will be used for education, tourism, conservation and research.

For several years Naylor Love has had input into the concept of the Orokonui Ecosanctuary, hosting the Otago Natural History Trust meetings at the Naylor Love office in Dunedin, and providing pre-construction advice in conjunction with architect Tim Heath of Architectural Ecology. Naylor Love has now been appointed the project managers for the new visitor centre. The centre (dubbed 'Piwakawaka' because it suggests a fantail) will feature the best in environmentally sustainable features, including solar heat and power, energy and water conservation, and waste water treatment. Construction timber will come from site or from sustainable sources.

Naylor Love is working with Architectural Ecology to develop the design in detail. It will reflect the conservation philosophy of the ecosanctuary whilst also saving on construction and running costs.

## Quarantine Island

In the centre of Otago Harbour is Quarantine Island where, as the name suggests, sick passengers from the early ships were dropped off until they recovered or died.

Mostly just the cemetery and heaps of bricks are left from those days, but one very dilapidated old wooden building, once the married couple quarters, is still there on the hillside.

After discussions between the New Zealand Historic Places Trust's heritage architect, the sole island resident Kathy Morrison, project manager for the St Martins Community Council (which administers the island) and Naylor Love, restoration of the building will take place in 2008. As much as possible will be saved in its original form.

The award-winning Belmont Lifestyle Village on the North Shore maximises sustainability and reduces costs with rainwater catchment for re-use in the laundry, insulation in excess of code requirements, energy efficient lighting and the use of commonly available, sustainable building materials.