GROUNDCOVER

INVESTIGATING AN ECOLOGICAL FIELD-ARCHITECTURE

Henry Velvin

Cover image: (Fig: 1) Site, Waitetuna valley in the Aorangi Ranges
with the site at Nga Potoki and the mouth of the Waitetuna River
to the bottom left

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Contents

01. Abstract

01.1. Acknowledgements

02. Introduction

03. Theoretical framework, scope

04. Design-research methodology

05. Literature review:

05.1. Sustainability

05.2. Landscape ecology

05.3. Conservation architecture and eco-tourism (glamping)

05.4. Site specificity (global-local)

06. Case studies

06.1. Backcountry/ DoC (Department of Conservation) hut,

06.2. Zealandia, Jazmax

06.3. Marie Short House, Glenn Murcutt

06.4. Urban Spring, Bionic Landscape architects

07. Site

08. Design phase one

08.1. Introduction - outline of stages

08.2. Applications in design research

08.3 Design Phase one

09. Design phase two

10. Design phase three

11. Discussion

12. Conclusion

13. Works Cited

14. Figures list

01.

01. Abstract

With many traditional conservation approaches becoming outdated and inefficient this project looks at the role of architecture in facilitating forward thinking, system based conservation aimed at high levels of self-organization. Through the consolidation of architecture, with concerns relating to ecological conservation, landscape ecology and landscape architecture new approaches to the development of New Zealand's conservation estate are explored. Adopting the backcountry (DoC) hut as an anti-precident, the existing apathetic approach to the development and care of New Zealand's conservation estate is critiqued through design research. This thesis looks at the possibility of integrating a system of structures into the landscape at Nga Potiki reserve (South Wairarapa, New Zealand) which, through both their architecture, and programme, actively advance the restoration and invigoration of the site's ecologies. With the aim of expanding public ecological literacy the structures provide habitation, and importantly, the opportunity for visitors to engage with and understand the significance of the forces that drive natural ecologies. In doing so it aims to investigate the possibility of assimilating ecological conservation into architectural built form.

Opposite page: (Fig: 2) Approaching the site, the fishing village Ngawi with the geological remains of Maori gardens faintly visible in the foreground as scarifications on the coastal plateau

01.1. Acknowledgments

First and foremost thank you to my supervisors Simon Twose and Natasha Perkins for their guidance, support and for giving up their time throughout the year. I would also like to thank Victoria University for making available the funding and resources which made the project possible, the Department of Conservation for their input and invaluable feedback, Haami Te Whaiti for giving up his time and providing the critical point of view of the landholders. Lastly thank you to my family and to Hannah for all their support.

Right: (Fig: 3) Site, the arid coastal plateau littered with boulders fallen from the steep slopes of the Aorangi Ranges

02.

02. Introduction

This project looks at the role of architecture in the development of new approaches to ecological conservation and the extent to which it can facilitate public engagement. At the same time it develops an architectural system appropriate to a specific ecological environment. As the effects of climate change and the rapid increase in global population continue to grow, initiatives aimed at the restoration and preservation of native ecologies are not only becoming increasingly important, but increasingly difficult to fund. The pressing needs of vast, and usually urban, human populations are an inescapable priority in architectural and infrastructural developments whereas the fragile ecosystems that provide a diversity of life to all corners of the planet go by the wayside. A fundamental part of this problem is a lack of public ecological literacy; many people, particularly in urban environments, are not afforded the opportunity to experience and gain insight into their local, unique and endangered ecologies.

In order to ensure a viable future for our conservation estate, we must rethink the relationship it has to its architecture and therefore its inhabitants. We must assimilate ecological conservation and educational experience into the built form. As many traditional conservation approaches become outdated and inefficient, this project looks at the role of architecture in facilitating forward-thinking, system-based conservation approaches aimed at high levels of public involvement and self-organization.

More specifically this thesis explores the possibility of integrating a system of structures into the landscape at *Nga Potiki Reserve (South Wairarapa)* which, through both their architecture and programme, play an active role in the restoration and invigoration of the site's ecologies. Additionally the structures provide habitation, and importantly, the opportunity for visitors to engage with the forces that drive natural ecologies.

Left: (Fig: 4) Site, water pools in the depression under a fallen boulder providing a life source for plants and animals which can be scarce in these coastal environments

PREMISE

BACKGROUND

CONTEXT

Above: (Fig: 5) Flow diagram showing the structure of the thesis content
Opposite page: (Fig: 6) Structure one from design phase three

This thesis presents itself as the summary documentation of the design research carried out with the intention of investigating possible approaches to tackling these issues. It is structured with four major components: The **premise**, including the introduction, theoretical framework, scope and methodology; The **background**, including the literature review and case studies; The **context**, including the cultural and environmental research into existing site conditions; The **design**, including three design phases, each focused on a specific area of investigation and their critical discussion and conclusions.

DESIGN

03.

03. Theoretical Framework:

Public awareness is arguably the most significant factor limiting the development of conservation initiatives. As a city Wellington is uniquely fortunate in its proximity to rich natural environments, many of which benefit from protection under a conservation land classification. With the constant struggle to preserve these resources only becoming more challenging, approaches to their development and future management requires critical attention. At present the architecture that exists within New Zealand's conservation lands reflects an uncompromisingly passive approach to design which favours minimal intervention, and this has a severely restricting impact on any possible benefits this 'potential architecture' could have. By adopting a method which contests this highly standardised formula, this thesis aims to investigate alternative ways of approaching the architecture of New Zealand's conservation estates.

In order to challenge the way we approach relationships between built form and natural landscapes, this design research proposition intends to explore the benefits of unifying disparate areas of knowledge; namely architecture, landscape architecture, landscape ecology and ecological conservation. Consequently there is a vast realm of knowledge and research, much of it highly specialised, that is implicated in this investigation. The scope of literature subject to inquiry is therefore limited to a number of key texts which deal with broader concerns, providing a global context within which the ideas being explored are situated. As well as this, texts are chosen for their relevance to a

range of select areas of knowledge and their disposition towards interdisciplinary approaches. Foremost, the overarching notion of sustainability, an ideal now implicit in all aspects of life and one which is unrivalled in its potential to dictate the future of architecture and environmental design, is a recurring theme in the selected texts. In addition to this fundamental aspect of the investigation, there is an interchange between the four significant fields of interest referred to earlier.

Although this investigation looks to multiple disciplines for reference, its scope is limited by the scale and specificity of the project. It employs the design of a number of small interventions, embedded within, and essential to a wider-reaching system. Essential to any proposition focused on conservation is an in-depth understanding of the natural ecologies of the site. This is paired with an equally important understanding of the cultural conditions of, and proposed for, the site.

The objective is to produce an architecture that promotes and facilitates engagement with the site's ecologies which is at the same time sensitive to the ecologies, and responds appropriately to the severe conditions posed by the site. Self-organisation is a significant factor. If the architectural proposition fails to attract and engage people appropriately, then no matter how ecologically sound it is it will fail in its purpose. When conservation initiatives of any kind deny the role performed by people in all environments they are invariably doomed to fail. An obvious illustration of this is the attention given to a small number of flagship species

Left page: (Fig: 7) Overlaid site plan showing the integration of design and landscape-morphology

of endangered fauna and/ or flora that have caught the public's attention and appealed to their imagination. Having said this there are many different ways to appeal to public imagination and encourage involvement, thereby increasing public ecological literacy, and architecture has a role to play here.

As this research is concerned with some of the limitations and potentials that currently inform architectural thinking, naturally it looks to a broad range of research and practice. This is used to inform a shift away from the way we currently think about, and approach, the relationship between architecture and landscape in New Zealand's undeveloped environments. Critical to the success of the investigation is the pursuit of a greater congruity between pertinent disciplines; architecture, landscape architecture, landscape ecology and ecological conservation. These are all equally implicated and within this project are inextricably linked.

The theoretical investigations, explored indepth through the literature review and case studies, are focused around four major areas:

- Sustainability
- The Anthropocene
- Landscape Ecology- Conservation
- Passivity in Architecture

SUSTAINABILITY

This approach must ultimately be sought through *built* and *programmatic* interventions that infiltrate existing ecologies and instigate change. Like all ethically responsible architecture these interventions must be active not only environmentally but educationally, culturally, economically and ecologically. Above all they must be creative in the way they approach the relationship between built form and natural ecologies and have a progressive approach towards conservation. The implications of this investigation will be two-fold; it aims to provide insight into the role of architecture in facilitating new approaches to conservation as well as investigating methods of integrating opportunities to increase public ecological literacy.

Left: (Fig: 8) Relationship diagram showing links between individual professions

THE ANTHROPOCENE

It has long been accepted that the adverse effects of our way of life have impacted upon every inch of our planet's surface. Certainly no place in this country is left unaffected by human intervention to some degree. The vast majority of this impact has contributed to the degradation and/or destruction of our high-functioning, diverse, unique and all-to-fragile ecologies. As such we are living in an age which many define by our own physical impact on the natural world in which we live – the anthropocene age.

Accepting this reality is critical, the future success of conservation depends on the adoption of methods which make the most out of a dire situation and move away from unsustainable micro-management and purist ideals within conservation.

LANDSCAPE ECOLOGY-CONSERVATION

With many traditional conservation approaches becoming outdated and inefficient it is critical that new attitudes and methods are explored. Among other things, approaches that isolate individual species (for either eradication or preservation) can be problematic, expensive, inefficient and unproductive. Forward-thinking, system-based approaches aimed at high levels of self-organization need to be adopted. *“Ecological restoration’ is defined as management that aims to restore particular biotec communities to a condition more like that of a selected time period in the past’(Atkinson, 3).*

PASSIVE ARCHITECTURE

The historic tendencies toward passivity, based on the idea of minimal intervention equals minimal impact, have instilled ideals which severely limit the potential to explore new approaches to conservation architecture in New Zealand. This long held ‘hands off’ approach has seen the generation of building archetypes which fail to engage with their environments and all-to-often fail to facilitate human engagement with the environment.

This project aims to explore an understanding of architecture as system and process as opposed to architecture as object. The effect of a building's life-cycle inherently has a far-reaching impact on the surrounding ecologies. The development of infrastructure causes displacing of soil, removal of existing species, altering of wind patterns, changing of water movement both above and below ground, altering of ground temperature etc. Through a more in-depth awareness of environmental systems and the ramifications of interfering with them, a more fully integrated design can be achieved.

Above:

Top: (Fig: 9) Typical example of a the DoC hut typology: Mid Robinson Hut built 1969

Bottom: (Fig: 10) Early concept drawing illustrating design moves away from formal autonomy and introversion

Left:

Top: (Fig: 11) Muhlenbeckia Astonii planted at the edge of Nga Potiki Reserve as part of a recovery plan

Bottom: (Fig: 112) Trap warning sign at entrance to reserve

04. Design Research Methodology

'Research allows the architectural object to escape the bounds of an autonomous formalism, redefining space as an intelligent landscape—or ecology—of interaction and immersion and buildings as adaptive networked organizations that couple infrastructural, structural, circulatory, programmatic, environmental, informational, cultural, economic, historical, or political systems in tightly interconnected but distributed formations:' (Furjan 65)

Through an iterative, design-led research inquiry this thesis aims to uncover techniques for increasing the ecological functionality and educational capacity of conservation architecture. This process begins with the identification of a number of constituents which limit New Zealand's current and long-held approach to the architecture of its conservation estates. An approach which limits it's ability to both engage with the landscape and facilitate an engagement between its inhabitants and the landscape.

Within the cultural and programmatic parameters of this proposition the design of architectural interventions will be developed with a critical approach to the traditional roles performed by the architecture of conservation-based programmes. A design method is adopted which reinterprets the archetypal 'sanctuary' and deconstructs it into a system comprised of physically separate shelters. This shift is aimed at increasing the interrelation between the interventions and the ecologies, both natural and cultural, within which they are positioned. The network of structures, which are in themselves flexible and dynamic, become an active layer, participating in the present natural ecological systems.

This methodology uses contemporary discourse including the pertinent works of Fabiola Lopez-Duran and Nikki Moore and Benedict Singleton which take an extremely critical view of established trends within architecture that sit within the borders of environmentalism and sustainability to instigate a shift away from the current normalised and somewhat superficial approaches to environmentalism in design.

Built Form

The parameters that exist in a majority of the built manifestations of conservation architecture, in particular the DoC hut typology, and that are being critically challenged in this design research investigation are classified as follows.

- Formal autonomy
- Introversion
- Standardisation
- Ecological inactivity

Formal autonomy - defines the condition relevant to nearly all backcountry huts and other conservation facilities; that is, their tendency towards a compact, distinct and singular form.

Introversion - defines the enclosed nature of these buildings and their failure to address the surrounding environment both spatially and functionally.

Standardisation - defines the mass application of the same established designs to numerous situations with little regard for environmental or cultural specificity.

Ecological inactivity - defines the failure of these buildings to address or engage with the surrounding ecological systems.

Approaches to Landscape and Ecological Conservation

Existing problems within current approaches to environmental conservation include:

- *Purism*
- *Species isolation*
- *Micro management*
- *Public disengagement*

Purism - The pursuit of an unattainable 'pure' natural state often based on a historic environmental ideal that has long since been altered by both natural and man-made forces.

Species isolation - inherently problematic because artificially increasing or decreasing species numbers fails to acknowledge the wider ecological implications.

Micro management - Schemes where large amounts of ongoing management is required.

Public disengagement - Disregard for the importance of generating public interest.

left: (Fig: 13) Flow Diagram of the design methodology

05.

05. Literature Review

05.1 NATURE, ARCHITECTURE AND SUSTAINABILITY

It is hard to deny the simple imperative that we should aim for a culture of environmental sustainability. It is also easier to pay lip service to this often repeated ideal than it is to put it into practice. Contemporary proponents of sustainability quite justifiably hold the view that, to put it simply, we have no choice. This apparently incontrovertible imperative has led to a condition in which all concerns that deal with environmentalism or 'nature' in architecture now present themselves under the veil of 'sustainability'. This affiliation between the notions of sustainability and nature-in-architecture sees them linked inevitably in many ways. In their paper *Snakes in Utopia: A Brief History of Sustainability* Edwards and DuPlessis suggest that the term 'sustainability' has simply taken the place of 'nature,' and its implications within the profession. They propose that there is a clear and unbroken lineage of theory, beginning with John Ruskin, William Morris and Richard Lethaby and continuing today with the many contemporary proponents of sustainability. (9)

As indicated by Edwards and Duplessis, theories aimed at surmising a relationship between 'architecture' and nature exist in a long history of architectural discourse. Currently the majority of these fall within the purview of sustainability. In their paper *[Ut]opiates Rethinking Nature* Fabiola Lopez-Duran and Nikki Moore present a controversial and contemporary insight into the current approaches to dealing with architecture and nature. Denouncing sustainability as an ideology both in and

outside the field of architecture, it critiques the '*propagation of problematic utopian solutions.*' Drawing from a historic lineage of thought, in which they cite a number of prominent 18th and 19th century naturalists, they proposes a complete re-evaluation of what they suggest is currently a modernist, and fundamentally utopian, approach to tackling the pressing issues relating to climate change through architecture.

Advocating the need for a shift in the way we consider the relationship we have to our environments, Lopez-Duran and Moore assert the idea that change occurs through antagonism; '*while Le Corbusier, like modern proponents of sustainability, sought to construct environments to induce manageable change, the lineage from Buffon to Lamarck to Darwin reminds us that it is not through utopian visions of uniform populations, but by antagonism, that change occurs*' (48). Although this view seems radical their intention is not to do away with sustainability altogether but rather to challenge complacency in favour of more antagonistic design experimentation. There is potential to adopt a similar attitude in the way we design both the architecture and the programme of contemporary conservation projects. Like the approaches of '*Le Corbusier...[and]...modern proponents of sustainability*' the normative approaches to conservation can be problematic in their reliance on purest visions and need for micro-management.

Opposite page: (Fig: 14) Cover image from *Anthropocene nights* by Benedict Singleton and Jon Ardern

Like Duran and Moore, an article by Jon Ardern and Benedict Singleton takes a critical stance against sustainability as status quo. In their paper *Anthropocene Nights* they too oppose the autocratic role of the designer (69). The article cites a number of recent projects (in art and landscape architecture) which, rather than aiming to 'redress the current tranche of crisis', aim instead to dramatise it (70) and draw attention to the problems and shift the way people see them. Despite the avant-garde nature of the projects the article sheds some light on the need for the re-evaluation of sustainability as a design trend which, for all its good intentions has become a way of making ourselves feel better about failing to really deal with the effects of climate change. The author's profess to be tired of the 'litany of demands' (69) that, despite their importance, plague architecture and the related professions, preventing the development of alternative approaches. The article shows us what a catalyst project with the goal of illustrating this harsh reality might look like and indicates the possibility of redirecting efforts that are confined to a potentially futile uphill battle, towards new ways of thinking.

05.2 LANDSCAPE ECOLOGY AND CONSERVATION

As previously stated, it is evident that these modernist and somewhat utopian ideals are manifest in the notions of sustainability and environmentalism in architecture. This

scenario is not however limited to architecture, it can be seen too in the interrelated fields of landscape architecture, landscape ecology and ecological conservation. Similar to these utopian approaches to design the difficulties of micro-management and the autocratic role of the designer are paramount to conservation concerns within these fields. The notion of ecological 'self-organisation', in contrast with some level of continual management, and the role of human intervention or a governing force have long been acknowledged as problems inherent in these areas of knowledge and practice.

This being the case, approaches toward environmentalism which deny an active role for the 'human aspect' within natural ecologies, and pursue a purist vision, akin to the 'utopias' of the modernists, are commonplace. As Conan and Kress state '*Present day environmentalism in landscape architecture recommends that humans not interfere with plants at all...* [They go on to exemplify the contradiction within such views]... *and we certainly wish at the same time, to preserve much of wild nature, and use all sorts of cultivated plants in daily life.*' (3) Despite this current approach during the 1980's trends within landscape architecture did begin to acknowledge the role of humans as an integral part of nature's evolutionary dynamics. (Conan, 6) It become apparent that pursuing self-organisation and acknowledging the role of humans were both important factors to take into consideration.

It is this sentiment which is of the utmost importance. Ian McHarg, one of most significant contributors to the development of environmentalism in landscape architecture during the 1950's, played a major role in establishing what is termed by Conan as 'critical environmentalism,' a quasi-movement focused on the '*critical reassessment of humankind's relationship to nature*' (5) This was a critical early contribution to the pursuit of less anthropocentric and more ecologically holistic design methodologies.

The extent of positive environmental influence that architecture (as it understood currently) is capable of, is bound by the physical limitations that seem to define it; the economies of scale, materials, structure and spatial composition all work to confine and define architecture and its ascribed programme. Consequently environmentalism in *architecture* is generally measured by how small its negative impact is, rather than how big its positive one is. By comparison landscape architecture is characteristically predisposed to dealing with transient phenomena; ecological and geological processes functioning on grand scales. '*Landscape architecture has ecological thinking at the core of its legacy*' (Mozingo, 46). The introduction of this mode of environmental thinking into the confines of architecture is a difficult proposition but one that is worthwhile exploring.

Although significantly overlooked in architecture, particularly in those buildings currently occupying New Zealand's conservation estates, accounting for the extended life cycle of any designed environment is critical. For the

most part architecture is understood as static object; once construction is completed the building is fixed, moved and changed only through slow deterioration. Contrary to this, and not surprisingly, projects that deal with extended time frames are more common within landscape architecture. Even more so the acknowledgment of this evolution of time is central to ecological conservation efforts. Focusing on landscape projects which are heavily plant-based, *Landscapes Over Time: The Maintenance Imperative* (Van Valkenburgh and Saunders) discusses the dynamic, evolutionary and unpredictable aspects of designing with and within natural ecologies, although predicting outcomes as far as tens even hundreds of years in the future can be problematic. The article stresses the importance of including a 'maintenance condition' into project contracts and emphasizes the need for ongoing evaluation. This is integral to establishing the successes and weaknesses of individual projects so that information can be obtained and disseminated. This time-scale imperative within landscape architecture has begun to challenge the tenet within modernism to treat architecture as an isolated, bounded form or space, experienced by a detached, contemplative observer. This occurs by focusing on the construction of aesthetic experiences bound to, and enmeshed in, their specific cultural and ecological context. (Meyer, 188)

In support for the acceptance of an inevitable global ecology, Tuhus-Dubrow addresses problems with contemporary attitudes towards conservation and the issues inherent in eco-purist ideals. With a simple case study the article illustrates the complications surrounding ecological conservation and supports the acceptance of the inevitable, and ever-increasing global spread of species. It explains that although certain foreign species may be objectionable on one level, on another they may in fact be beneficial to particular aspects of established ecologies. An example is given in which a pernicious exotic weed becomes abundant, visually objectionable and apparently a problem, however an extremely rare, though unspectacular native bird begins to favour the weed as a nesting habitat. This scenario exemplifies some of the contradictions and controversies inherent to conservation and advocates in most cases a rational, scientifically grounded approach.

This point brings to light one of the most problematic complications within conservation theory; that motives shift between human ideals and scientific imperatives. These can often align, however, and frequently it is the uninformed whims of people that determine conservation priorities. As Dubrow states, these are *'expressions of human preference rather than imperatives that flow directly from science.'* (131) There is however a further complication, which is that human preference, regardless of its scientific credibility, will always be the deciding factor. The problem lies in the distinction between preference and imperative, they do not always conflict nor do they necessarily align.

Part of this problem is of course due to the difficulties that exist around generating and/ or obtaining the scientific grounds on which to base design and conservation action. Exemplifying the need for information sharing and inter-professional collaboration there has been an increase in the number of 'design science' landscape architecture firms in recent years. As described by Arvidson in *Deeper Shade of Green*, these are firms which employ professionals from a wide variety of areas, including; biology, horticulture, landscape architecture and architecture etc (46). Such firms adopt a design process aimed at removing any disparities between the 'design' and the 'science' of generating landscapes. Although there are varying areas of expertise they are all viewed as indispensable and inter-reliant. One marked result of this approach is a dissolution of the notion of the aforementioned dictatorial 'designer' critiqued by Lopez-Duran and Moore, and Arden and Singleton. This approach is testament to the fact that successful designs which propose to deal critically with ecological elements rely on sound scientific principals and in such scenarios architecture and landscape architecture cannot succeed as autonomous disciplines.

05.3 ECO-TOURISM AND CONSERVATION ARCHITECTURE

It seems inevitable that the architectural programmes which lend themselves to this type of environmental- design philosophy often revolve around 'ecotourism.' This is a phenomenon that (both economically and environmentally) capitalises on people's desire for experiencing a kind of 'natural' or 'pure' condition, and in addition their desire to contribute to the health or preservation of these environments. It seems that for the majority of people with an interest in such things, the primary motivation for their involvement with nature stems from a desire for the experience of a particular 'wild' condition in contrast to the ubiquitous urban and suburban environments we live in. New Zealand's tourism industry, and moreover its 'national identity' seem to be based around this phenomenon to some degree.

The role of architecture here is both critical and complex. The architecture of New Zealand's conservation estates and its untamed wilderness and wildlife sanctuaries is all informed and defined by the way it relates to its surroundings. These buildings are related directly to the attitude we have to the environments they inhabit. In the case of these natural environments it is a well-intended 'hands off' approach exemplified by the ubiquitous backcountry or DoC hut.

One significant factor in determining architecture's resistance toward significant engagement with the environment is the predominantly European cultural

predilection for the exclusion of 'nature' in almost every form from breaching the boundaries of built form. In his article *Bugs, Bats and Animal Estates: The Architectural Territories of Wild Beasts* Ben Campkin discusses some critical methods of utilising nature as a design tool and the cultural preconceptions about modern architecture. He presents a number of architectural case studies which have the primary goal of actively engaging with natural ecosystems and altering the way they operate.

05.4 PURSUIT OF LOCALISED ARCHITECTURE

In an increasingly globalized and over-populated world the intrigue of 'isolated' locations is growing. This increasingly raises the question of which are the qualities of these locations that are of real value, and what might be the role of their contemporary architecture. This desire to experience remoteness, and how it can be facilitated by architecture is explored in issue of AD dealing with architecture in the world's most geographically isolated regions. The discussion touches on issues of not only physical isolation, but along with it, political, economic and cultural isolation. With the threats posed by globalization the impending extinction of these places is imminent. Given the ever present preconceptions which revere New Zealand as a unique, clean, green paradise, there is both an obligation to and benefit from careful consideration of the development of New Zealand's. 'off the radar' places.

06.

o6. Case Studies

In order to provide a manifest context within which this research is positioned, four case studies have been selected and presented here, each one presenting a different aspect of ecologically-driven architectural design. These are classified as; **Passivity, Purism, Ecological response and Ecological integration**:

- **Passivity** - New Zealand's infamous and idiosyncratic backcountry or *DoC hut* is critiqued as the architectural manifestation of a long held attitude towards the buildings of New Zealand's spectacular landscapes, one of apathy, passivity and reluctance.
- **Purism** - Zealandia is investigated here as it, like many sanctuaries and conservation parks, represents a problematic condition of contemporary environmentalism; the reliance of conservation initiatives on continual management and physical isolation.
- **Ecological response** - Glenn Murcutt's Marie Short House presents an architecture which considers its ecological context to a degree much higher than most. Its primary function is to mediate between its occupants and its environment.
- **Ecological integration** - The project presents a clear example of design which is concerned with habitation and human experience, whilst at the same time addressing and engaging with the wider environmental systems. It does this in a way that invites contemplation, interaction and appreciation of the hydrological substratum, and allows engagement with it on a human level.

Opposite page: (Fig: 15) Interior detail from Glenn Murcutt's Marie Short House

Left: from top: (Fig: 16) DoC hut, Zealandia Building, Marie Short house, Urban Spring

o6.1. PASSIVITY - BACKCOUNTRY (DOC) HUT

Analysing New Zealand's backcountry hut phenomenon is well described in other places e.g. *Shelter from the storm* (Barnett, et al) so rather than a full treatise on the archetype, the aim here is to highlight its subsidence into a standardised and stagnant solution, its dominance within a certain culture and its failings as both environmental architecture and icon.

In 2012 DoC had 'close to 1000 back country huts on its records' (Barnett, 15). As well as these, there are of course countless others adopting similar situations all across New Zealand. In such a vast array of individual buildings the usual variables such as materials, size, layout, programme can differ greatly from building to building, however in a vast majority of the buildings a formula is invariably used which consistently produces outcomes of an enclosed, introverted, singular, and uncompromisingly utilitarian nature. The result of this is that a very rigid typology exists, one which is so well established in the national psyche that any significant change in construction, planning or form has been resisted for nearly a century.

The utilitarian nature of the buildings seems to limit design developments to the variations in material and services based around safety, economy and to a degree, environmental concerns. There is very little evidence of development of formal and/or spatial conditions.

Some of the most common and basic manifestations of the DoC hut can be attributed to a predecessor which bares exceptional resemblance to its contemporaries but for one differing factor; the building is clad in canvas. (Fig 19) Shows

a 1930 drawing of a 'framed tent' ; an '8FT x 10FT' (2.4M X 3M) fabric clad, timber framed structure, with timber flooring and a corrugated-iron external fireplace; complete with sleeping cot and table. Profled metal cladding and/or timber may have come to replace the canvas but this archetypal antecedent would serve as the 'blueprint' for hundreds of huts to follow.

And such is the romance surrounding that 'It's hard to think of anything more romantic than a rusty corrugated iron hut set beneath a backdrop of snowy mountains among the billowing tussocks of the high country.' (Brown,29)

Left: (Fig: 17) Elevations of a 2008, two bedroom backcountry hut from the DoC Hut Procurement Manual

Above: (Fig:18) Axonometric drawing of a typical DoC hut

From left
 (Fig: 19) 'tent frame hut' drawing 1930
 (Fig: 20) Slaty Creek hut built 1952
 (Fig: 21) Bobs Hut built 1958

From left
 (Fig: 22) Top Waitaha Hut built 1968
 (Fig: 23) Mid Robinson Hut built 1969
 (Fig: 24) Purity Hut built 2006

From left
 (Fig: 25) Pfeifer Biv built 2008
 (Fig: 26) Zekes Hut 2008
 All images this page (Barnett et al)

06.2. PURISM - ZEALANDIA (JAZMAX)

Without denying the extremely important role that the sanctuaries and native wildlife centres play in the conservation of New Zealand's natural environments this section aims to critically investigate the long established approaches to conservation that they embody. Essential to standard conservation approaches is the need to establish an 'island effect' by isolating a specific area from any uncontrolled outside influence, thereby generating a manageable environment within which individual species can be introduced or expelled, encouraged or disallowed, monitored, controlled, cared for and of course observed.

Although these types of environments are indispensable for retaining and protecting populations of critically endangered species and are therefore indispensable, they present an approach which has particular flaws relating to long-term and-large scale environmental concerns.

The primary flaw in such approaches is the explicit need for high levels of human management. This reliance means that these environments evolve under what are essentially artificial conditions, they therefore run the risk of collapse if any or all of the controlled factors fail to perform.

Although considering the role of humans is essential in conservation the primary objective is self-organization. This means the development of natural ecologies in parallel with human ecologies rather than controlled by them.

The cultural or human aspects here are manifest as either observation (the visitors) of management (the

conservationists). Even the engagement between visitors and the environment that this arrangement does facilitate is controlled and ultimately artificial preventing any direct or meaningful relationship.

The architectural aspect of this approach is typically manifest in the form of an auxiliary visitor centre. This arrangement aids the notion that 'nature' is a commodity that is somehow separate from reality.

This proposal aims to challenge the need for complete separation in favour of a more open, self-sustaining system which is integrated with its surrounding context and can therefore have a positive impact.

Right: (Fig: 27) The visitor center at Zealandia, designed by Jazmax architects

Clockwise from top left
 (Fig: 28) View of Zealandia wildlife sanctuary valley looking north with Wellington harbour in background
 (Fig: 29) View of Zealandia visitor centre from above showing relationship to fence line
 (Fig: 30) View of Zealandia visitor centre showing relationship to fence line
 (Fig: 31) View from visitor centre cafe looking up the valley,
 (Fig: 32) 'pest exclusion fence' at Zealandia
 (Fig: 33) Zealandia visitor centre
 All images this page: <http://www.flickr.com/photos/zealandia>

06.3. ECOLOGICAL RESPONSE - MARIE SHORT HOUSE (GLENN MURCUTT)

Arguably one of contemporary architecture's most committed, environmentally minded architects Glenn Murcutt exhibits an approach which illustrates both the successes and failings of a typically modernist approach to environmentalism in architecture. His work is considered by many as the apotheosis of recent sustainable, regionally specific and ecologically attuned architecture. These attributes are notably present in the houses of his early years of notoriety, beginning with the Marie Short house. The houses of this period all occupy rural or semi-rural locations and present a similar physical and visual relationship with the landscape. They are of a similar condensed, formal autonomy to New Zealand's DoC huts.

This physical and visual separation from their environment attests to attitudes within modern architecture that see landscape as the background on which architecture is simply placed. In Murcutt's houses this notion is however a very deliberate design move. The Marie Short house is elevated just under a meter off the ground supported by a modular arrangement of post and beam frames, achieving as little possible physical contact with the land as possible. Having said this, Murcutt's buildings are praised for being highly ecologically attuned, they are designed to respond to the very specific environmental forces that they are exposed to.

Unlike the DoC hut typology which is typically inward looking, and closed off from the environment, the Marie Short house and the majority of Murcutt's houses open up

to the environment. Services and storage are confined to central cores which allow the living spaces to occupy the perimeter of the building. The post and beam construction allows the exterior walls freedom from any structural requirement, permitting them to be made of light, transparent and non-static elements, acting '*as a diaphragm filtering the outside rather than a barrier to it*' (Drew, 84). The walls incorporate an exterior surface of metal and glass louvres, an intermediate layer of insect screens, and an interior layer of aluminium blinds.

As well as their ecological functionality Murcutt's buildings are acknowledged for embodying a uniquely Australian cultural identity, and exemplify regional specificity in modernist domestic architecture.

Despite this ecological sensitivity the attitude toward the environment is ultimately one of extreme passivity, the tentative connection to the ground fails to engage beyond the level of human convenience.

Right: (Fig: 34) The Marie Short House designed by Glenn Murcutt

floor plan, 1981 extensions

- Clockwise from top left
- (Fig: 35) Photograph showing bolted construction, modular structural bays and separation from the ground. (Beck and Cooper,50)
- (Fig: 36) Photograph showing the detail and composition of the exterior walls. (Farrelly, 62)
- (Fig: 37) Photograph showing transparency of exterior walls (Gushesh et al, 50)
- (Fig: 38) Floor plan post 1981 alterations (Beck and Cooper 195)

06.4 ECOLOGICAL INTEGRATION - URBAN SPRING (BIONIC LANDSCAPE ARCHITECTS)

A San Francisco based landscape architect has tapped into an underground spring which emerges in his backyard, using it as natural irrigation to fuel an urban marshland. Although this project is entirely urban and responds to this context it demonstrates a number of attributes which can provide precedent for this project. Critically it illustrates the application of the environmentally-focused methodologies of a landscape architecture firm, which are typically concerned with large scale planning, operating at an experiential scale.

The project presents a clear example of design which is concerned with habitation and human experience, whilst at the same time addressing and engaging with the wider environmental systems. It does this in a way that invites contemplation, interaction and appreciation of the hydrological substratum, and allows the engagement with it on a human level.

The design intentionally communicates the ecological necessity of water and demonstrates the dynamics of a high-functioning micro-ecology, including the growth of a diverse range of plant species which in turn support a layer of animal life that would otherwise be scarcely present in the urban setting.

Although the same outcome could arguably be achieved with a mains supported irrigation system, the direct link engagement between the larger natural hydrological systems generates a self-sustaining ecology that operates without the micro management of a typical garden. The

success of the ecologies is directly related to the natural flows of the spring, creating an environment which although contrived begins to move away from the artificial conditions present in most designed environments.

Although the project has carefully considered the spatial design of the garden and the experience of the hydrological systems, it is not concerned with form or architectural interiority which is of critical concern to this thesis. Applying this approach of environmental system-based design is further complicated when applied to an architectural project.

Right: (Fig:39) Plan of *Urban Spring* designed by Bionic landscape architects

- Clockwise from top left:
- (Fig: 40) Site plan showing location within a densely suburban area of San Francisco
 - (Fig: 41) Photograph showing foliage benefitting from the tapped aquifer,
 - (Fig: 42) Photograph showing the architecturalisation of hydrodynamics
 - (Fig: 43) Aerial photograph showing synthesis between the constructed and natural elements
 - (Fig: 44) Diagram comparing the urban spring to a typical section in San Francisco

All images this page: <http://www.asla.org/2012awards/598.html>

07.

07. Site

Certainly no place in this country, and probably the world, remains unaffected by human intervention of some form or other, and as we are fully aware, the vast majority of this impact has contributed to the degradation and/ or destruction of our high functioning, diverse, vibrant and all-to-fragile ecologies. We are living in an age which is defined by our physical impact on the world in which we live; *'In recent years in particular, the question of how we are dealing with "second hand nature," or "cultivated landscape," is once again under stronger scientific and social scrutiny'*. (Witzgall et al, 6) The increasingly popular term used to define our current epoch: "anthropocene", and its relative implications attest to the fact that in all cases we are dealing with "second-hand nature."

The site at Nga Potiki, though geologically young, has the country's longest history of human settlement. Dating back over 800 years it was first inhabited by early Maori who initiated drastic change in the landscape through extensive horticultural production. *'At that time forests extended almost to the sea.'* (Rangitane, 3) Since then the compounding effects of further use by people, introduced species, and a naturally harsh climate have assured continual change and degradation of aspects typical of the pre-human ecology of the site.

Despite the inhospitable and severe nature of the site, its appeal remains because of its extremes, not in spite of them.

Left: (Fig: 45) Site, manuka scrub inhabiting the alluvial fan at Nga Potiki

(Fig: 46) Diagram depicting the constituents and tensions between the natural 'ecologies' which contribute to the site and the cultural ones

Situated at the southernmost tip of the north island, Nga Potiki Reserve sits on a narrow and inhospitable coastal margin. Trapped between towering greywacke slopes to the north and the vast Pacific Ocean with its bitter southerlies to the south, it is hard to believe this harsh piece of coastline was once one of the most populated parts of the country. The unique and significant geography, history and ecology of the site provide a unique opportunity to develop a meaningful approach to conservation architecture.

(Fig: 47) Site location map (NTS) showing proximity to Wellington and approach to site

5 KM

41°36'11.88"S latitude 175°19'32.91"E longitude

Above: (Fig: 48) Early site study analysing the fundamental ecological, geological, and climactic conditions

Opposite page: (Fig: 49) Site map locating specific features significant to the site's ecology

Wind rose diagram based on data collected near White Rock which is located 7 km north-east of the site shows that both ssw and nnw contribute wind of high velocity and most frequently. The strong southerly winds are most often considerably colder than the northerlies. Because the coast line is exposed to the south, it is frequently battered by crashing waves and dramatic weather events.

Variances of wind patterns between specific locations are significant due largely to shelter and channelling caused by the mountains. Although the coastal plateau is largely flat and exposed to weather from the south, there are areas where trees, rocks and landforms have developed providing shelter for flora, fauna and potential habitation.

The extreme exposure of the site as well as stock grazing has prevented a lot of plants from growing up and as such the majority of flora consists of low-lying grasses and shrubs as well as some coastal variants of typically larger inland species evolved to cope with the severe environment.

Contributory hydrology: although annual rainfall is low due to the coastal location of the site there are a number of different hydrological systems contributing water to the coastal plateau.

An enclosed but substantial catchment area supplies water to the apex of a greywacke alluvial fan which then distributes it evenly over a large surface area, depositing it finally in the soil at the foot of the fan.

The Waitetuna stream is one of a number of valley streams transporting water from the Aorangi Ranges to the Wairarapa coast. Like many of these rivers the catchment area is large and steeply formed, meaning the river is prone to a substantial increase in its flow rate during heavy rainfall.

The steep faces of the ranges which overlook the coastal plateau also collect water in steep catchments and deposit it at their footings.

Opposite page:

Below left: (Fig: 50) Manuka has an extremely strong holding root base allowing it to tolerate the battering winds. The shaping of the trees is evidence to the severity of the prevailing southerlies.

Middle: (Fig: 51) A divaricate, small leaved coprosma grows in the shelter of a rock.

Right: (Fig: 52) Small leaved coprosmas inhabit the sheltered voids on the leeward side of fallen rock formations.

Far right: (Fig: 53) Wind rose diagram

This page:

(Fig: 54) Study of hydrological dynamics particular to the site

Because the coastal plateau is a thin margin that runs *NE-SW* and is enclosed by overbearing mountain ranges to the *NW* and the expanse of the Pacific Ocean to the *SE* ,it receives full sun from morning to early afternoon year round. In winter however the sun sets behind the mountains mid to late afternoon.

Apart from the mountain ranges the coastal plateau itself is a somewhat arid environment with a limited number of features available to provide shelter from the sun. In addition to the low rainfall and high winds this often results in dry soil conditions, making it difficult for many species to thrive. Instead only the particularly hardy species which have evolved to cope in such conditions inhabit the plateau, finding the shade and water which gathers around fallen rocks.

Summer solstice
20th December

Autumn equinox
20th March

Winter solstice
20th June

Spring equinox
20th September

Although seemingly desolate and to a degree uninhabitable there is a vast array of native and introduce species which make up the unique ecology of the coastal plateau. All specific species occupy their niches within the system and overlap in impact upon the success of one another. Understanding these dynamics and thinking critically about the role of the human aspect is essential to ensuring the health of the ecosystems.

Within the overall ecology of the site there are three different distinct conditions identified for the purpose of developing a number of different design responses.

- 1 Area of rock and soil deposition below steep, eroding greywacke shingle face, rocky terrain, greater diversity of flora.
- 2 Low lying coastal plains, raised seabed with a layer of gravel soil from the mountains on top, tussock and coastal scrub.
- 3 Shallow, mostly inactive alluvial fan of greywacke, manuka monoculture.

This page: (Fig: 58) Three terrestrial zones identified as having distinctly different ecological and geological dynamics

Opposite page: (Fig: 59) Photographic study of site features relating to three identified ecologically terrestrial zones

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Habitats of Native Flora

Within the broader reaches of the site there are three zones identified in the *Wairarapa Coastal Strategy* as specific habitats suited to the numerous native plant species. Environmental conditions between these habitat types can vary greatly and plants which may thrive in one may struggle or utterly fail to succeed in another.

- ▶ Zone One: Hilly coastal places and terraces
- ▶ Zone Two: Bluffs, escarpments and terrace faces
- ▶ Zone Three: Shingle or rocky shore

Below: (Fig: 60) Map locating “hilly coastal places and terraces” at Nga Potiki

Opposite page:

top: (Fig: 61) Map locating “Bluffs escarpments and terrace faces” at Nga Potiki.

bottom (Fig: 62) Map locating “Shingle or rocky shore” at Nga Potiki.

Zone One: Hilly coastal places and terraces

tauhinu	<i>Ozothamnus (Cassinia) leptophyllus</i>	taupata	<i>Coprosma repens</i>
coastal shrub daisy	<i>Olearia solandri</i>	kanuka	<i>Kunzia ericoides</i>
corokia	<i>Corokia cotoneaster</i>	kaikomako	<i>Pennantia corymbosa</i>
koromiko	<i>Hebe stricta</i>	akeake	<i>Dodonea viscosa</i>
toetoe	<i>Cortaderia toetoe</i>	five finger, whauwhaupaku	<i>Pseudopanax arboreus</i>
small leaved coprosmas	<i>Coprosma rhamnoides</i>	kohuhu	<i>Pittosporum tenuifolium</i>
	<i>Coprosma propinqua</i>	mahoe	<i>Melicytus ramiflorus</i>
	<i>Coprosma virescens</i>	ngaio	<i>Myoporum laetum</i>
	<i>Coprosma crassifolia</i>	karaka	<i>Corynocarpus laevigatus</i>
manuka	<i>Leptospermum scoparium</i>	cabbage tree	<i>Cordyline australis</i>
akiraho	<i>Olearia paniculata</i>	fierce lancewood	<i>Pseudopanax ferox</i>
mapou	<i>Myrsine australis</i>	lancewood	<i>Pseudopanax crassifolius</i>
broadleaf, kapuka	<i>Griselinia littoralis</i>	titoki	<i>Alectryon excelsus</i>
		<i>Wairarapa Coastal Strategy Group, (p23)</i>

Zone Two: Bluffs, escarpments and terrace faces

spaniard	<i>Aciphylla squarrosa</i>	toetoe	<i>Cortaderia toetoe</i> and
silver tussock	<i>Poa cita</i>		<i>Cortaderia fulvida</i>
reinga lily	<i>Arthropodium cirratum</i>	akiraho	<i>Olearia paniculata</i>
NZ linen flax, rauhuia	<i>Linum monogynum</i>	mapou	<i>Myrsine australis</i>
small leaved pohuehue	<i>Muehlenbeckia complexa</i>	broadleaf, kapuka	<i>Griselinia littoralis</i>
prostrate kowhai	<i>Sophora prostrata</i>	kanuka	<i>Kunzia ericoides</i>
coastal flax	<i>Phormium cookianum</i>		
tauhinu	<i>Ozothamnus (Cassinia)</i>		
	<i>leptophyllus</i>		
coastal shrub daisy	<i>Olearia solandri</i>		
rangiora	<i>Brachyglottis greyii</i>		
corokia	<i>Corokia cotoneaster</i>		
koromiko	<i>Hebe stricta</i>		

Wairarapa Coastal Strategy Group, (p21)

Zone Three: Shingle or rocky shore

prostrate sand daphne	<i>Pimelea prostrata</i>
clematis, pikiarero	<i>Clematis forsteri</i>
shore bindweed	<i>Calystegia soldanella</i>
NZ spinach	<i>Tetragonia tetragonoides</i>
sea spurge	<i>Euphorbia glauca</i>
knobby clubrush	<i>Isolepis nodosa</i>
sand tussock	<i>Austrofestuca littoralis</i>
small leaved pohuehue	<i>Muehlenbeckia complexa</i>
thick-leaved mahoe	<i>Melicytus crassifolius</i>
shrubby tororaro	<i>Muehlenbeckia astonii</i>

Wairarapa Coastal Strategy Group, (p20)

Native flora: Examples from Site

(Fig: 63) *Brachyglottis greyii*

(Fig: 64) *Pittosporum crassifolium*

(Karo)

(Fig: 65)

Coprosma virescens

(Small leaved coprosma)

(Fig: 66) *Coprosma rigida*

(Small leaved coprosma)

(Fig: 67) *Carmichaelia australis*

Native broom

(Fig:68) *Coprosma propinqua*

(small leaved coprosma)

(Fig: 69) *Polystichum richardii*
(Black Shield Fern)

(Fig: 70) *Pratia angulata*
(Panakeke)

(Fig: 71) Small leaved coprosma with *Ozothamnus leptophyllus* (tauhinu) in back ground with coastal flax and tussocks

(Fig: 72) *Pyrrosia elaeagnifolia*
(Leather leaf fern)

(Fig: 73) *Muehlenbeckia astonii*
(shrubby tororaro)

(Fig: 74) *Pennantia corymbosa* (Kaikamako)

Morphology and Geological Dynamics

Digital and physical reproductions of the site at a tangible scale allow a greater understanding of the landscape's morphology and dynamics, exposing features which are otherwise inaccessible through first hand experience. Patterns in the surface geology caused by runoff and erosion are visible, a clearer understanding of slope gradients and the variations in surface geology is gained.

Top: (Fig: 75) Site map - location key

Above: (Fig: 76) Development from digital site data, produced via photo grammetry into scaled physical site model

Right:(Fig: 77) Photograph of a 1: 5000 scale model of the steep shingle scree eroding onto the coastal planes below

A detailed black and white architectural sketch of a complex building structure, possibly a multi-story residential or institutional building. The drawing uses perspective, showing multiple levels, terraces, and a series of interconnected volumes. The lines are dark and expressive, with some areas filled in with cross-hatching to indicate depth and shadow. The overall style is that of a hand-drawn architectural study or conceptual drawing.

08.

o8.1 Introduction to Design

Design research was carried out in three primary phases:

Phase one focused on deconstructing the existing properties of the backcountry hut typology; Introversion, autonomy, standardisation and separation from the landscape were the parameters explored. Although the other parameters and the case studies introduced earlier influenced this design

phase to a degree, it was the primary intention to develop a paradoxical counterpart to the buildings which are currently the unsatisfactory standard for the architecture of New Zealand's conservation estates and natural landscapes.

Developing on features established in phase one, phase two focused on the tectonic relationship between the buildings' components and their relationship to their physical environment.

Phase three, the final phase of design focused on the integration of the design interventions into the ecological systems as well developing a more critical approach to programme, site, materials, planning and construction.

These phases are presented in chronological order and each explores a different avenue and subsequently builds upon the previous to generate a final outcome.

Right: (Fig: 78) Early concept drawing, design phase one.

Above: (Fig: 79) Diagram showing design iteration process

o8.2. Applications in Design Research

The amalgamation of information gathered from literature, case studies, site and context analysis provides a framework through which research through design can be employed. There is however, a difficulty in the application of this framework, in architecture and landscape architecture there has long been a *'disconnection between site analysis and design expression or in other words, between environmental values and form generation.'* (Meyer, 189). This difficulty reinforces the need for an iterative and exploratory design process.

Right: (Fig: 8o) Diagrammatic representation, showing different layers of environmental information and how they relate to and inform design intervention

- Rocky tidal zone
- Steep terrace face, loose, rocky build-up formed by continual erosion
- Tussock planes, heavily grazed, finer grain rocky soil
- Flat scrub planes, large grain rock formations, large variation in plant species
- Loose schist scree fan, manuka scrub
- Rocky river, partially eroding banks, manuka/ kanuka, ferns

08.3. Design Phase One

This design phase focused on conceptual design propositions that are counter to the apathy and ambivalence displayed by the DoC hut typology, investigating possible ways of designing architecture to respond to and engage with its physical surroundings.

Aiming to challenge the existing properties of the backcountry hut typology; Introversion, autonomy, standardisation and separation from the landscape, this phase employs an approach which takes the utilitarian structure, deconstructs its tectonics and shifts the way it relates to its environment.

Above: (Fig: 81) Early concept drawing, design phase one.

Right: (Fig: 82) Diagram showing tectonic division of the basic hut unit into two components, shifting the physical and spatial relationship between built form and landscape

Flexibility

After developing a design formula which aims to generate a design which can be re-configured to suit the specific topography of the site, the formula is applied to two more iterations to explore different ways that structure might achieve flexibility and the ability to change and adapt to its environment.

While the foundation and module elements remained constants, the steel frames which determined their relationship were designed to achieve three basic functions:

- Flexibility through re-conFiguration
- Flexibility through multiplication
- Flexibility through adaptation

Glass house module

Service module

Sleeping module

Left (Fig: 83) Frame functions

Above: (Fig: 84) Diagram showing conditions presented by each component

Right: (Fig: 85) Modules- Auxiliary to the flexible frames, interchangeable modular units house various programmes

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Above: (Fig: 86) Key, location site maps.

Right: (Fig: 87) Site plans showing proposed locations for design phase one

1.

2.

Flexibility Through Re-configuration

The first method of achieving a flexibility within the built form involved designing a re-configurable function into the framing component, allowing a partially modular or standardised design to adapt to the specific topography of locations within the broader site. The frames which support the module can be inverted to respond to the severity of the landscape gradient.

Top: (Fig: 88) Location map
 Above: (Fig: 89) Matrix of images from design development

Above: (Fig: 90) Sketch models, matrix showing two formats vertical (above) and horizontal (below) and the progressive states of component assembly.

Right: (Fig: 91) View east towards coast, rendered impression of structure with the landscape component imbedded in the hill side and the elevated module

Flexibility Through Multiplication

In order for the building to be capable of responding to changes in site and programme the frames are designed to allow growth and reduction through modular multiplication. Like the previous iteration the frames are designed to elevate the modules, creating an inbetween space, providing shelter from the weather extremes.

Top: (Fig: 92) Location map

Above : (Fig: 93) Matrix of images from design development

Above: (Fig: 94) Sketch models, matrix showing the progressive states of assembly

Right: (Fig: 95) View south-west towards coast, rendered impression of structure with the repeated glass house modules

Flexibility Through Adaptation

Like the first iteration this design allows for modular frames to be applied on a range of inclines whilst retaining the ability to accommodate the same modular units. The frames are designed with a hinge at the pinned joint relying on the fixed ground connections for stability.

Top: (Fig: 96) Location map

Above : (Fig: 97) Matrix of images from design development.

Above: (Fig: 98) Sketch models, matrix showing the progressive states of assembly

Right: (Fig: 99) View north east towards mountains, rendered longitudinal perspective section showing relationship with ground

DESIGN PHASE ONE DISCUSSION

This design phase involved focusing primarily on articulating a flexibility within the built form, and using it to generate an adaptability within the buildings, allowing them to subtly react to the landscape morphology but retain a level of modulation allowing for efficient production and dispersal of multiple units.

Although the frames do begin to achieve a kind of flexibility, much of what this design formula offers is spatial. The way these buildings are designed shifts focus away from internal experience and directs it toward a condition that is between interior and exterior and between built form and landscape.

The idea of flexibility, and the design moves that aimed to achieve it, were successful in developing a mechanism to shift the way the building relates to, and operates within, the landscape. More so than any practical outcomes pertaining to a building's ability to move and adapt in the landscape, these initial design moves presented a tectonic response, a way of approaching formal and spatial design in the landscape, and a basis from which the following phases of design could develop.

A significant issue with this approach is the usefulness of the spaces provided. Although it is the aim to generate space that engages with the landscape, in such an extreme environment their inheritability will be simply dependant on the weather.

exposed edges

disappear edges (reflective)

This page (Fig: 100) Early sketches exploring the Different aspects of design phase one concepts

09.

Microfilm
Sax

09. Design Phase Two

Developing on the work in design phase one, the second design phase focuses on continuing a critical approach to the treatment of ground surface and the relationship between built form and landscape morphology.

A series of formal and spatial experiments further explore the relationship between elevated and subterranean occupation that was developed in phase one. These investigations are further developed into a more highly resolved design solution, with the addition of ecological considerations and a more critical response to the site's specific geological conditions.

Above: (Fig: 101) Early concept sketch from design phase two
Opposite page (Fig: 102) Early sketch model investigating the treatment of ground surface

GROUND INTERVENTION

MODULE FORM

RELATIONSHIP

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A further and more indepth analysis of the site resulted in the introduction of a specific location, and the implications of designing within its physical bounds focused the following designs on achieving a higher level of integration.

Apposite page (Fig: 103) Photographic matrix showing five sketch model investigations looking at form and landscape intervention

Above: (Fig: 104) Site location Maps and piont cloud data showing terrain and rock locations

Left: (Fig: 105) 3D mesh - Digital reconstruction of the site and the scree slope above

Above: (Fig: 106) Design process development

Right: (Fig: 107) Axonometric drawings showing the composition of the buildings components

HYDROLOGICAL INTEGRATION

Engaging with the site’s hydrological dynamics is adopted as a critical method of ecological integration. At this phase of design a focus on the collection, use and ecological re-entry of water, and how it can be developed to operate around the temporary and permanent components of the building was developed.

Collected water used in flush toilet system, resulting black water to be managed on site

Collected water used in standard grey water producing facilities, hand basin, shower, kitchen sink etc, resulting grey water to be managed on site

Primary storage unit for collected water

Ecological re-entry of treated blackwater into existing ecology for final stage of treatment via transpiration

Aerobic treatment of waste waters

Roof top rainwater collection via temporary unit to supply internal auxiliary water holding tank

Roof top rainwater collection via preeminent canopy to supply primary water holding tank

Overflow and supply link between primary and auxiliary water holding tanks

Internal auxiliary water holding tank

Primary water holding tank (gabion construction)

Right: (Fig: 108) Axonometric drawing showing integrated water collection use and ecological re-entry

DESIGN PHASE TWO DISCUSSION

Phase two presented the first critical look at engaging the architecture with ecological dynamics. The introduction of gabion cage construction replacing concrete was the major outcome from this phase, developed as an alternative to the concrete construction of the designs in phase one.

The decision to introduce structural framing elements into the landscape component was done as an attempt to develop a higher level of engagement with ecological dynamics. However they failed to maintain the integrity of the design intention, losing the clarity of the relationship between the structures primary elements. Both the spatial and formal qualities present in phase one were compromised, initiating the shift into design phase three.

Temporality is looked at critically and considered in both literal terms, and in terms of how buildings are perceived. At the beginning of this design phase proposals were confined to a distinctly permanent component (the concrete base) and distinctly temporal ones (the module and frames). These interventions continued to explore flexibility and the potential for evolutionary change and the ability for infrastructure to adapt to environment changes.

Right: (Fig: 109) View north east, rendered impression of building situated among the rocks at the base of the shingle scree

A black and white photograph of a textured surface, possibly wood or stone, with a large blue '10.' overlaid on the right side. The texture is composed of vertical, wavy lines that create a sense of depth and movement. The lighting is dramatic, with strong highlights and deep shadows. The blue text '10.' is positioned in the upper right quadrant of the image.

10.

10. Design Phase Three

Design phase three, the final design phase presents the continual development of outcomes from the previous two phases. In addition it develops a more critical response to ecology and a higher level of all round development. The outcome is comprised of three specific structures (identified as: **'structure one'**, **'structure two'** and **'structure three'**) including, a primary structure and two satellite structures. The primary structure, providing a dual programme, serving both the habitation for site visitors and the focal point of the plant cultivation and development, was the main focus of this design phase and the additional structures allowed for the development of isolated programmes within the network. An outlying structure was designed with a double bed and ensuite and a shade house/filtering biotope for plant cultivation.

Above: (Fig 110) Sketch plan of structure three from design phase three

Opposite page: (Fig 111) Plan view of a topographical model showing the morphology of a scree slope which is a major focus of the ecological response in design phase three

- Proposed layer of constructed pathways
- Existing layer of worn pathways
- Proposed built interventions

Above: (Fig: 112) Key, map and building locations
 Spread: (Fig: 113) Site plan showing the locations of the design outcomes from phase three

2.

3.

Three structures

One - Primary structure

Two - Shade house and filtering biotope

Three - Satellite shelter

STRUCTURE ONE

STRUCTURE TWO

STRUCTURE THREE

STRUCTURE ONE

Opposite page:

Top: (Fig: 114) Key to structure one, two and three

Bottom: (Fig: 115) Sketch plans showing development from phase two and the conceptual planing of different aspects to the design

Right: (Fig: 116) Sketch plan overlay showing how the design responds to the surrounding terrain

The steep surface and relative impervious quality of the rocks causes water to flow across the surface and sub surface of the scree slope

Section of gabion pathway designed to collect and transport water collected from the surface and sub surface

Although greywacke is reasonably impervious the loose structure of the scree slope allows most of the water to penetrate before ultimately ending up at the foot of the scree. This dynamic causes instability in the scree and is responsible for continual soil displacement and deposition

At this point in the pathway the water supply is 'close' allowing gravitational equalisation to fill the tank without the assistance of a pump to elevate the water

Primary water storage tank - elevated to allow use without the assistance of a pump

(Fig: 117) Perspective landscape section showing shingle scree with building and water collection system

(Fig: 118) Ground Level Plan

1: 100

Bottom left: (Fig: 119): Key: Structure one
axonometric drawing

(Fig: 120) First floor Plan

1: 100

- A. Primary water reservoir
- B. Gabion pathway, to top of scree with built in water supply channel.
- C. Timber walkway
- D. Oxidised steel exterior skin
- E. Plant cultivation workroom
- F. Service room
- G. Gabion cage foundation structure
- H. Kitchen
- I. Sleeping
- J. Living
- K. Gabion cage panel cladding
- L. Interior cladding- 150 mm x 16mm accoya timber boards throughout
- M. Structural mild steel tee section 254 x 343 x 46 mm
- N. Structural posts - square hollow section 120 x 20x 9mm Hot dip galv' epoxy primed. coat

- A. Primary water reservoir
- B. Luvered roof to to workroom
- C. Timber walkway
- D. Oxidised steel Exterior skin
- E. Plant Cultivation workroom
- F. Gabion access ramp
- G. Gabion cage foundation structure
- H. Kitchen
- I. Sleeping
- J. Living
- K. Gabion cage Panel cladding
- L. interior cladding- 150 mm x 16mm accoya timber boards throughout
- M. Structural mild steel tee section 254 x 343 x 46 mm
- N. Structural posts - square hollow section 120 x 20x 9mm Hot dip galv' epoxy primed. coat

(Fig: 124) Perspective landscape section locating detail sections of water collection system

Opposite page (Fig: 125) Detail section through water collecting pathway showing direct rain water only (bottom) and surface run off and sub surface collection (top)

Water collecting pathways are assembled out of modular elements and can be positioned at varied depths relative to the ground surface. Positioning the membrane above ground level avoids the collection of surface and sub surface ground water. In this case surface water is allowed to pass beneath the membrane lay and continue as it naturally would .

Positioning the gabion element with the membrane layer below ground level allows the membrane to collect a certain amount of the surface and subsurface water running down the face of the scree slope.

Water collected by the membrane layer

Rain water

Wire mesh

Greywacke gabion fill

Rain water filters through upper gabion infill and collects on membrane layer

Wire reinforced bituminous membrane

Subsurface water filters through lower gabion infill returning to natural hydrological systems

Allows subsurface run or to pass through the lower gabion and continue

Phase Three Hydrological Integration

Expanding significantly on the hydrological integration explored at the end of phase two the collection of water, its use, treatment and re-entry into the environment are critical to developing a system which requires low maintenance.

Water is collected, used and aerobically treated before re-entry providing not only irrigation but large amounts of nutrients from black water which, if not used in this way can pose significant health problems and high maintenance disposal.

(Fig: 126) Plan showing water systems, including supply from collection pathways, storage, use, treatment and ecological re-entry

Passive solar hot water heating	.....
Supply from surface water collection	.....
Plant room irrigation	.....
Insulated hot water storage	.....
Auxiliary holding tank	.....
Plant room basin	.....
Kitchen basin	.....
Bathroom basin	.....
Shower with hot water input from solar	.....
Micro flush composting toilet	.....
Primary holding tank	.....
Black water aerobic treatment unit	.....
Grey water treatment unit	.....
Ecological re-entry via aerobic grey water dispersal units	.....

(Fig: 127) Diagram showing water systems, including supply from collection pathways, storage, heating, use, treatment and ecological re-entry

Gabion Construction

The use of gabion construction techniques presents itself as an extremely efficient way of producing a variety of architectural and landscape elements. The abundance of loose greywacke rocks which make up the various scree slopes and alluvial fans are in fact the only abundant material which exists on the site. The benefits of designing with this material and form of construction

- Economic.
- Cages are modular, light and compact.
- Majority of material available on site.
- Interventions are reversible, very little is introduced to the site and nothing is removed, only shifted.
- Construction allows protection and potential for habitation by flora and fauna.
- Can be designed to be active within ecologies due to permeability to water, light and organic matter.

Left: (Fig: 128) Structure one, detail location Key

Above right: (Fig: 129) The greywacke gravel from site to be used in the gabions

Structural mild steel tee section 254 x 343 x 46 mm	.....
4 mm stainless steel T316 stiffeners positioned every third horizontal and vertical cage wire	.....
Stainless steel T316 bracket - 6 mm plate	.....
4 mm stainless steel T316 stiffeners positioned every third horizontal and vertical cage wire	.....
Locally sourced greywacke rock infill 12- 16 mm diameter	.....
4 mm stainless steel T316 gabion wires to join mesh panels at all twelve edges and bent at ends to prevent unravelling	.....
4 mm Stainless steel T316 welded mesh with 96 mm apertures	.....

Left: (Fig: 130) Exploded assembly drawing showing the components of the gabion cage panels

Above: (Fig: 131) Voids between rocks create ideal habitats for native lizards and insects as well accumulating soil and providing a structure for native climbing and divaricate shrubs

Gabion - Module Junction

Bolted joints allow for components to be assembled on site and deconstructed with ease in case of the need for repair, replacement or removal.

The use of varying types of ferrous and nonferrous metals would require careful detailing and the inclusion of nonreactive buffers such as nylon washers to avoid damaging corrosion.

Oxidised steel plate acts as a sacrificial skin baring the brunt of the harsh climatic conditions, weathering and continuous corrosion creates a visual cue to the severity of the environmental conditions.

Left: (Fig: 132) Detail location key
Right: (Fig: 133) Exploded axonometric showing construction of the junction between the gabion foundation structure and the module
Far right: (Fig: 134) Detail section at 1:20

10mm hcf stainless steel hollow bolt	.....
Primary structure - square hollow section 100 x 100 x 9mm Hot dip galv' epoxy primed. coat	.....
Exterior cladding - 5mm perforated oxidised steel plate	.....
50 x200 accoya joists	.....
Cladding support structure pressed C-section	.....
Hot dip galv' epoxy primed L bracket	.....
9mm plate Hot dip galv' epoxy primed	.....
Structural posts - square hollow section 120 x 20x 9mm Hot dip galv' epoxy primed	.....
Gabion basket filled withgreywacke rocks from site	.....
Concrete foundation	.....

Landscape Space

The elevation of the interior volume above the ground surface generates a sheltered space, providing protection from the sun wind and rain. The building functions as an ecological catalyst, altering its environment. People animals and plants all benefit from the shelter provided.

The focus here is directed toward those works of landscape architecture that represent a new type of practice, one that makes the natural world – its ecological and geological processes, its rapid phenomena, and its invisible substructure- more evident, visibly legible, and meaningful to those who live, work and play in the landscape.’ (Meyer, 188)

Above: (Fig: 135) View location key

Right: (1.) (Fig: 136) View south toward the coast showing the space sheltered beneath the elevated building.

Far right: (2) (Fig:137) View east showing the pathway continuing beneath the elevated building.

1.

2.

Experience - Exterior/ Interior

From the exterior the rust coloured crystalline form implies a unity of space but as the building is entered there is a more gradual progression from exterior to interior. The transition from exterior to interior space is mediated by the work room. Partially open to the elements the room is enclosed by the perforated exterior shell only and has a louvred roof, allowing in low light during the winter and keeping the space cool and sheltered from the wind in summer.

Above: (Fig: 138) View location key

Right: (1.) (Fig: 139) Interior view looking through communal space

Far right: (2.) (Fig: 140) View looking through work space

1.

2.

Ecological Catalyst - Environmental Icon

The building sits, seemingly both at odds and in tune with its environment. It is an unashamedly contrived object protruding from a very pure and wild landscape. At the same time it has become an integral part of it, accommodating the unique and somewhat unusual plants, animals and people that inhabit the coastal plateau providing structure, shelter, protection irrigation and even nutrients.

The building's form is articulated as an extension of the meandering pathways, pushed and pulled, negotiating and engaging with the surrounding geology. The building aims to achieve a condition where infrastructure can act as an ecological catalyst and at the same time articulate and give form to environmental ideals.

Right: (Fig: 141) View location key

Spread: (Fig: 142) Panoramic view, showing how the building sits in the landscape with the gabion structures disseminating away from the building

STRUCTURE TWO: SHADE HOUSE/ FILTERING BIOTOPE

Water is collected from the aquifer, above the limits of usual stock grazing, meaning inflow will contain a low amount of nutrients from effluent. Over eutrophication therefore is prevented so the growth of algae which can choke plants shouldn't present a major problem. This should significantly limit the amount of maintenance required.

The constructed wetland is used to aid the cultivation of coastal wetland natives as well as clean the harvested water and provide conditions to promote ecological growth.

knobby clubrush

oioi

sea rush

Glen Murray tussock

small leaved pohuehue

swamp sedge

pukio

giant umbrella sedge, upoko tangata

raupo

swamp coprosma

toetoe

manuka

saltmarsh ribbonwood

swamp flax, harakeke

five finger, whauwhaupaku

cabbage tree

(Wairarapa Coastal Strategy Group, p22)

Isolepis nodosa

Leptocarpus similis

Juncus maritimus

Carex flagellifera

Muehlenbeckia complexa

swamp sedge *Carex virgata*

Carex secta

Cyperus ustulatus

Typha orientalis

Coprosma tenuicaulis

Cortaderia toetoe

Leptospermum scoparium

Plagianthus divaricatus

Phormium tenax

Pseudopanax arboreus

Cordyline australis

Seedlings sourced from local stock cultivated
are away from harmful fauna transplanted
to constructed wetland when big enough to
cope

Above Left: (Fig: 143) Key, Exploded axonometric

Right: (Fig: 144) Diagram showing ecological integration and benefits of the cleansing biotope and shade house

(Fig: 145) Ground Level Plan

1: 100

Water Filtration/ Plant Cultivation

Acting as an extension of the existing hydrological dynamics, the biotope diverts a small amount of water that would otherwise flow directly to the water table. Using it as a self maintaining system for irrigating coastal natives which typically inhabit saturated soils and wetlands. Additionally the plants contribute the first stage of filtration allowing for programmes associated with services for human occupation.

Above: (Fig: 146) View location key

Right: (Fig: 147) Exterior view looking North into the manuka forest

Far right: (Fig: 148) View south looking through shade house towards the sea

Next Page: (3.) (Fig: 149) Exterior view south looking towards the sea

1.

2.

3. (Fig:149) Exterior view south looking towards the sea

- A. Elevated water reservoir
- B. Wind mill powered water bore
- C. Elevated unit foot print
- D. gabion cage pathways
- E. WC
- F. Kitchenette
- G. Storage
- H. Gabion foundation structure

(Fig:150) Ground Level Plan

1: 100

(Fig: 151) First floor Plan

1: 100

- A. Elevated water reservoir
- B. Wind mill powered water bore
- C. Galvanized perforated exterior skin
- D. gabion cage pathways
- E. WC
- F. Kitchenette
- G. Storage
- H. Gabion foundation structure
- I. Interior cladding- 150 mmx 16mm accoya timber board
- J. Structural posts - square hollow section 120 x 20x 9mm Hot dip galv' epoxy primed

(Fig: 151) Section AA.

1: 50

Isolated Inhabitation

Designed to test the design formula presented in the previous structure with a focus directed more towards an isolated experience for the occupants, facilitating a close engagement with the environment. This structure employs the same design approach, adopting the gabion landscape element supporting a lightweight unit elevated above the ground surface.

Above: (Fig: 152) View location key

Right: (Fig: 153) Interior view looking south west towards the coast

Far right: (Fig: 153) View looking north east towards the ranges

1.

2.

Clad in perforated galvanized steel shell the angular geometries
reference the harsh landscape, at the same time acknowledge the
contrived nature of architecture, making no attempt to conceal its self.

Spread: (Fig: 154) 3. Panoramic view, showing how the building
sits in the landscape with the gabion structures disseminating
away from the building

11.

11. Discussion

New Zealand's backcountry huts have long been the default buildings fortunate enough to grace New Zealand's most spectacular and vulnerable landscapes with the appeal of their utilitarian indifference. These buildings, though presenting no problem in and of themselves have become ubiquitous, considered the only option when it comes to introducing buildings in to our conservation estate. These buildings, which are systematically distributed throughout the 'backcountry', fail to engage with their environments on any advantageous level.

There is a real need to push the architecture of New Zealand's conservation estate in a direction that engages more critically with ecological conservation. The difficulty lies in breaking down existing expectations of what the role of architecture in our conservation estate is. In light of this it is the intention of this project to explore the possibility of assimilating ecological conservation into architectural built form. Proposing a kind of architecture that not only accommodates and encourages forward-thinking, system-based approaches to conservation, but also performs as an active and dynamic agent in the ecologies.

This use of the DoC hut as a quotidian norm from which to impel a reactionary design process aimed at generating a critical ecological approach to architecture, has both benefits and limitations. As a typology, the DoC hut served well as an 'anti precedent', but was limited as a source of design impetus. Adopting this approach did, however, allow a certain amount of freedom in the design process and meant that design investigations could adopt the

landscape and the ecologies of the site as their primary determinant. In addition, the identification of specific qualities attributed to the DoC hut: **formal autonomy, introversion, standardisation, ecological inactivity**, which were critiqued through this design research, provided a set of parameters from which comparisons could be drawn. The result is a set of design outcomes which are quantifiable in their successes and failures.

Right: (Fig: 155) Approach from the west

In an attempt to move away from the compact and singular nature of the hut typology a design move in which the 'building' was conceived as a composition of two primary components was adopted. This provided a critical divergence away from the established understanding of how a building 'should' relate to its environment. Additionally it allowed for the distribution of programmatic functions between the two components. This allowed for both the 'architectural' and the 'landscape' elements to operate on an interdependent level, they are reliant on one another but independent in their functions and are able to operate without either one restricting the other, the design focus now on how they relate to each other formally, spatially and functionally. At the third phase of design the 'landscape' component had been developed into a responsive and integrated intervention. Constructed out of the abundant greywacke shingle, it is as much a manipulation of the environment as it is an annexation. Collecting, storing, cleaning and transporting water, it functions as an extension of the landscape's dynamics and is occupied and conceived as a built intervention.

Intending to challenge the formal autonomy that typifies the DoC hut typology, the architectural components initiated a reconsideration of architectural constraints and steered the project further towards ways of thinking more akin to landscape ecology. The difficulty of formalising these ideas pertaining to ecological dynamics was present throughout the thesis and certainly not unique to this project; *'for a designer, one conundrum presented by the*

environmental movement was the disconnection between site analysis and design expression or' in other words, between environmental values and form generation.' (Meyer, 189). The adoption of the gabion cage at the end of the second design phase, and its wholehearted adoption in phase three, freed up the tensions between the environmental and architectural scales. The most significant of its many benefits was that it possessed the qualities required of both, the far-reaching and ecologically integrated landscape intervention, as well as enabling the more architectural elements to engage with ecological dynamics on a more human scale.

In line with this pursuit of a heightened integration between architecture and ecology, the modernist inclination to treat architecture as an isolated, bounded form or space that is to be experienced by a detached, contemplative observer (Meyer, 188), is critiqued through these designs. This is achieved to a degree by shifting the buildings' role from fulfilling the mere requirements of habitation to engaging with the hydrological and ecological dynamics. The buildings' design begins to focus on system and process as much as form and space. However, the buildings possess a distinct aesthetic quality, and can certainly be perceived as formally articulated and contrived 'objects.' Although dealing with system and process they are unquestionably objects and as Mozingo states, there is no sense in ignoring this (46). One of the most important roles of these design propositions is to elevate public awareness and interest in ecological conservation. With regard to this, making the form and infrastructure of ecological conservation projects 'iconic' could be more beneficial than the practical outcomes of any isolated attempt at conservation. *'Iconic designs, characterised by notable aesthetic quality resonate over decades, even centuries... they manifest and promote environmental change'* (Mozingo, 46). The buildings therefore have the potential to elevate the cultural 'value' of the site. And if one wants to consider architecture as a tool for ecological conservation this aspect is one of the most essential considerations.

This combination of an environmentally 'sensitive' approach, and a 'bold' formal statement sees the building, through its engagement with the environment, aim to formally articulate the ecological dynamics of the site and illustrate their importance. It is an attempt to *'make the ecological planning process visible to those who came to visit the site?'* (Meyer, 189). The built and natural together are able to express their own significance and provide the opportunity for visitors to engage with the forces that drive natural ecologies. Public awareness and ecological literacy are enhanced with the goal of normalising ecological thinking.

It is hard to deny the benefits arising from the standardization presented in the DoC hut typology. They are economic, efficient and can be easily and sustainably produced. These attributes, however, seem due mostly to a reduction in design innovation rather than being a rest from it. In opposition to this, approaches which champion the individualisation of architecture, benefit from the potential to be highly responsive. Each approach is seemingly unable to achieve what the other does. However, like Murcutt's Marie Short House a middle ground can be achieved if these conditions are not conceived as dualistic opposites, but instead as tools used to develop any part of a design. This idea of having components which are both modular and site-responsive was a primary focus of the first design phase. The flexible frames designed in phase one present a good example of architectural components that can be manufactured as modular components with the inherent ability to respond to changes in site conditions.

Engaging with ecological dynamics on a beneficial level proved to be one of the most difficult aspects to this design proposition. Phase three saw the development the water collection systems and the attempt to Integrate them into the architecture. The buildings are dispersed and linked via interconnected infrastructural service and pathways, in an effort to '*give form to dynamic processes and fluctuating systems.*' (Meyer, 189) It is hard to predetermine the success of integrating a system like this. At this stage it remains a conceptual proposition. In order for this to become a viable solution detailed development and a higher level of

consideration in all areas namely architecture, landscape architecture, landscape ecology, ecological conservation and engineering.

This is why the collaboration of disciplines is essential. Any future projects aiming to deal architecture, ecology and conservation in similar ways to this can only benefit from the unifying of these disparate areas of knowledge. There is of course no limit to the amount of ecological data that could be attained and usefully applied to architectural projects, particularly ones dealing deliberately with environmental conservation, but the greater the understanding of the natural ecologies of the site the more successful an intervention will be. This proposition is difficult to employ within an independent architectural thesis but as illustrated in Arvidsons article, *A Deeper Shade of Green* it is an approach that will be essential in the future of the professional industry(s).

Ways Forward

In order to further substantiate this piece of design research, the critical next phase would involve the highly detailed design and prototyping of both the water collection systems and gabion construction methods. Developing their potential to operate on a self-sustaining level and integrate into a highly self-organized ecological system is paramount. The success and integrity of the designs, as being truly ecologically active architecture, hinges on the success of these features. Although the concepts from which they are derived may in and of themselves contribute towards new ways of thinking, as Conan states: *'the practical conclusion is simple, the impact of environmentalism upon landscape architecture is not to be found in discourse but rather in design processes and in design aesthetics –that is, in the work itself.'* (7) This sentiment applies equally to architecture, expressing the importance of a shift toward design-research.

12.

12. Conclusion

As the effects of climate change increase, population continues to grow and urban and suburban populations expand, the pressure on New Zealand's as yet uncompromised environments mounts. It is essential that the future care and development of what is one of New Zealand's most valuable resources is carefully and critically considered. This project presents just one example of how we can begin to change the way we approach the Development of New Zealand's conservation estate. Through an understanding that architecture is as much system and process as it is object and space, and through its consolidation with ecological conservation, developments can move toward an ecological field-architecture.

Left: (Fig: 156) Structure one,
design phase three. View south as a
southerly front approaches

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Figures List

(Fig: 1) Site, Waitetuna vally in the Aorangi Ranges with the site at Nga Potoki and the mouth of the Waitetuna River to the bottom left.

Google earth. Nga Potiki, Wairarapa coast New Zealand <http://www.earth.google.com> [11 June, 2013].

(Fig: 2) Approaching the site, the fishing Village Ngawi with the geological remains of Maori Gardens faintly visible in the foreground as scarifications on the coastal plateau.

Google earth. Ngawi, Wairarapa coast New Zealand <http://www.earth.google.com> [11 June, 2013].

(Fig: 3) Site, the arid coastal plateau littered with boulders fallen from the steep slopes Aorangi ranges.

Author's own image

(Fig: 4) Site, Water pools in the depression under a fallen boulder providing a life source for plants and animals which can be scarce in these coastal environments.

Author's own image

(Fig: 5) Flow Diagram depicting the structure of the thesis content

Author's own image

(Fig: 6) image from final design presented in design phase three

Author's own image

(Fig: 7) Overlaid site plan showing the integration of design and landscape-morphology

Background content: Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

Overlay: Author's own image

(Fig: 8) Relationship diagram showing links between individual professions

Author's own image

(Fig: 9) Typical example of a the DoC hut typology: Mid Robinson Hut built 1969.

Barnett et al (p 239)

(Fig: 10) Early concept drawing illustrating design moves away from formal autonomy and introversion.

Author's own image

(Fig: 11) Muhlenbeckia Astonii planted at the edge of Napotiki Reserve as part of a recovery plan.

Author's own image

(Fig: 12) Trap warning sign at entrance to reserve.

Author's own image

(Fig: 13) Flow Diagram of the design methodology

Author's Own Image

(Fig: 14) Cover image from *Anthropocene nights* by Benedict Singleton and Jon Ardern,

Singleton, Benedict and Jon Ardern, (P, 66)

(Fig: 15) Interior detail from Glenn Murcutt's Marie Short House

(Farrelly, 62)

(Fig: 16) thumb nails -

DOC hut - Author's own image

Zealandia Building (Jazmax) - Author's own image

Marie Short house (Glenn Murcutt), - Author's own image

Urban spring (Bionic architects) - <http://www.asla.org/2012awards/598.html>

(Fig: 17) Elevations of a 2008, two bedroom backcountry hut

The Department of Conservation Hut Procurement Manual Part A July 2008 V3.0 (p 19)

(Fig: 18) Axonometric drawing of a standard DoC hut

Author's own image

(Fig: 19) 'tent frame hut' drawing 1930,

Barnett et al (p 201)

(Fig: 20) Slaty Creek hut built 1952

Barnett et al (p 207)

(Fig: 21) Bobs Hut built 1958

Barnett et al (p 243)

(Fig: 22) Top Waitaha Hut built 1968

Barnett et al (p 239)

(Fig: 23) Mid Robinson Hut built 1969

Barnett et al (p 239)

(Fig: 24) Purity Hut built 2006
Barnett et al (p 286)

(Fig: 25) Pfeifer Biv built 2008
Barnett et al (p 288)

(Fig: 26) Zekes Hut 2008
Barnett et al (p 297)

(Fig: 27) The visitor center at Zealandia, designed by Jazmax architects
Author's Own Image

(Fig: 28) View of Zealandia wildlife sanctuary valley looking north with wellington harbour in background,
<http://www.flickr.com/photos/zealandia>

(Fig: 29) View of Zealandia visitor centre form above showing relationship to fence line,
<http://www.flickr.com/photos/zealandia>

(Fig: 30) View of Zealandia visitor centre showing relationship to fence line,
<http://www.flickr.com/photos/zealandia>

(Fig: 31) View from visitor centre cafe looking up the valley,
<http://www.flickr.com/photos/zealandia>

(Fig: 32) 'pest exclusion fence' at Zealandia,
<http://www.flickr.com/photos/zealandia>

(Fig: 33) Zealandia visitor centre.
<http://www.flickr.com/photos/zealandia>

Fig: 34) The *Marie Short House* designed by Glenn Murcutt
Author's Own Image

Fig: 35) Photograph Showing bolted construction, modular structural bays and separation from the ground.
Beck and Cooper, (p 50),

(Fig: 36) Photograph showing the detail and composition of the exterior walls.
(Farrelly (p 62)

(Fig: 37) Photograph showing transparency of exterior walls
Gushesh et al, (p 50),

(Fig: 38) Floor plan post 1981 alterations
Beck and Cooper (p 195)

(Fig: 39) Plan of *Urban Spring* Designed by Bionic landscape architects
<http://www.asla.org/2012awards/598.html>

(Fig: 40) Site plan Showing location within a densely suburban area of San Francisco
<http://www.asla.org/2012awards/598.html>

(Fig: 41) Photograph showing foliage benefitting from the tapped

aquifer
<http://www.asla.org/2012awards/598.html>

(Fig: 42) Photograph showing the architecturalisation of hydrodynamics
<http://www.asla.org/2012awards/598.html>

(Fig: 43) Aerial photograph showing synthesis between the constructed and natural elements
<http://www.asla.org/2012awards/598.html>

(Fig: 44) Diagram comparing the urban spring to a typical section in San Francisco
<http://www.asla.org/2012awards/598.html>

(Fig: 45) Site, Manuka scrub inhabiting the alluvial fan at Nga Potiki.
Author's own image

(Fig: 46) Diagram depicting the constituents and tensions between the natural 'ecologies' which contribute to the site and the cultural ones
Author's own image

(Fig: 47) Site location map (NTS) showing proximity to Wellington and approach to site
Base Image: <http://www.earth.google.com> [17 January, 2014].

(Fig: 48) Early site study analysing the fundamental ecological, geological, and climactic conditions
Author's own image

(Fig: 49) Site map locating specific features significant to the site's ecology
South Wairarapa coast New Zealand <http://www.earth.google.com> [108 August, 2013].

(Fig: 50) Manuka has an extremely strong holding root base allowing it to tolerate the battering winds. The shaping of the trees is evidence to the severity of the prevailing southerlies.
Author's own image

(Fig: 51) A divaricate, small leaved coprosma grows in the shelter of a rock.
Author's own image

(Fig: 52) Small leaved coprosmas inhabit the sheltered voids on the leeward side of fallen rock formations.
Author's own image

(Fig: 53): Wind rose diagram
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay data from: *<http://www.surf-forecast.com/charts/Whiterock/wind/statistics/march>*

(Fig: 54) Study of hydrological dynamics particular to the site.
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 55) Series of sun studies analysing seasonal variations.
Author's own image

(Fig: 56) Sun path diagram
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 57) Location map identifying specific areas where particular flora and fauna are located
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 58) Three terrestrial zones identified as having distinctly different ecological and geological dynamics.
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 59) Photographic study of site features relating to three identified ecologically terrestrial zones
All photographs: Author's own image
(Fig: 60) Map locating "hilly coastal places and terraces" at Nga Potiki
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 61) Map Locating "Bluffs escarpments and terrace faces" at Nga Potiki.
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 62) Map locating "Shingle or rocky shore" at Nga pPotiki.
Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*
Overlay: *Author's own image*

(Fig: 63) *Brachyglottis Greyii* (Rangiora)
Author's own image

(Fig: 64) *Pittosporum Crassifolium* (Karo)
Author's own image

(Fig: 65) *Coprosma vircsens*
(Small leaved coprosma)
Author's own image

(Fig: 66) *Coprosma Rigida* (Small leaved coprosma)
Author's own image

(Fig: 67) *Carmichaelia Australis* (Native broom)
Author's own image

(Fig: 68) *Coprosma Propinqua* (small leaved coprosma)
Author's own image

(Fig: 69) *Polystichum Richardii* (Black Shield Fern)
Author's own image

(Fig: 70) *Pratia Angulata*
Author's own image

(Fig: 71) Small leaved coprosma with Ozothamnus leptophyllus (tauhinu) in back ground with coastal flax and tussocks

Author's own image

(Fig: 72) Pyrrosia Elaeagnifolia

Author's own image

(Fig: 73) Muehlenbeckia astonii (shrubby tororaro)

Author's own image

(Fig: 74) Pernantia Corymbosa (Kakamako)

Author's own image

(Fig: 75) Site map - location key

Author's own image

(Fig: 76) development of digital recording of site into physical model

Author's own image

(Fig: 77) Photograph of a 1: 5000 scale model of the steep shingle scree eroding onto the coastal planes below

Author's own image

(Fig: 78) Early concept drawing, design phase one.

Author's own image

(Fig: 79) Diagram showing design iteration process

Author's own image

(Fig: 80) Diagrammatic representation, showing different layers of environmental information and how they relate to and inform design intervention.

Background Maps and topographical data content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*

(Fig: 81) Early concept drawing, design phase one.

Author's own image

(Fig: 82) Diagram showing tectonic division of the basic hut unit into two components, shifting the physical and spatial relationship between built form and landscape

Author's own image

(Fig: 83) Frame functions

Author's own image

(Fig: 84) Diagram showing conditions presented by each component

Author's own image

(Fig: 85) Modules- Auxiliary to the flexible frames, interchangeable modular units house various programmes

Author's own image

(Fig: 86) Key, location site maps.

Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*

Overlay: *Author's own image*

(Fig: 87) Site plans showing proposed locations for design phase one

Background content: *Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].*

Overlay: *Author's own image*

(Fig: 88) Location map

Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

(Fig: 89) Matrix of images from design development

Author's own image

(Fig: 90) Sketch models, matrix showing two formats vertical (above) and horizontal (below) and the progressive states of component assembly.

All images : Author's own image

(Fig: 91) View east towards coast, rendered impression of structure with the landscape component imbedded in the hill side and the elevated module

Author's own image

(Fig: 92) Location map

Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

(Fig: 93) Matrix of images from design development

All images : Author's own image

(Fig: 94) Sketch models, matrix showing the progressives states of assembly

All images : Author's own image

(Fig: 95) View south-west towards coast, rendered impression of structure with the repeated glass house modules

Author's own image

(Fig: 96) Location map

Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

(Fig: 97) Matrix of images from design development.

Author's own image

(Fig: 98) Sketch models, matrix showing the progressives states of assembly

All images : Author's own image

(Fig: 99) View north east towards mountains, rendered longitudinal perspective section showing relationship with ground

Author's own image

(Fig: 100) Early sketches exploring the Different aspects of design phase one concepts

Author's own image

(Fig: 101) Early concept sketch from design phase two

Author's own image

(Fig: 102) Early sketch model investigating the treatment of ground surface

Author's own image

(Fig: 103) Photographic matrix showing five sketch model investigations looking at form and landscape intervention

Author's own image

(Fig: 104) Site location Maps

Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

(Fig: 105) 3D mesh - Digital reconstruction of the site and the scree slope above

Author's own image

(Fig: 106)

Author's own image

(Fig: 107) Axonometric drawings showing the- composition of the buildings components

Author's own image

(Fig: 108) Axonometric drawing showing integrated water collection - use - and ecological re-entry

Author's own image

(Fig: 109) View north east, rendered impression of building situated among the rocks at the base of the shingle scree

Author's own image

(Fig: 110) Sketch plan from design phase three

Author's own image

(Fig: 111) Plan view of a topographical model showing the morphology of a scree slope which is a major focus of the ecological response in design phase three

Author's own image

(Fig: 112) Key, map and building locations

Background content: Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

Overlay: Author's own image

(Fig: 113) Site plan showing the locations of the design outcomes from phase three

Background content: Google earth Nga Potiki, Wairarapa coast New Zealand. <http://www.earth.google.com> [11 June, 2013].

Overlay: Author's own image

(Fig: 114) Key to structure one, two and three

Author's own image

(Fig: 115) Sketch plans showing development from phase two and the conceptual planing of different aspects to the design

Author's own image

(Fig: 116) Sketch plan overlay showing how the design responds to the surrounding terrain

Author's own image

(Fig: 117) Perspective landscape section showing shingle scree with building and water collection system
Author's own image

(Fig: 118) Structure one, Ground Level Plan 1: 100
Author's own image

(Fig: 119): Key: Structure one, axonometric drawing
Author's own image

(Fig: 120) Structure one, First floor Plan 1:100
Author's own image

(Fig: 121) Structure one, section A. 1: 50
Author's own image

(Fig: 122) Structure one, section B. 1: 50
Author's own image

(Fig: 123) Structure one, section C. 1: 50
Author's own image

(Fig: 124) Perspective landscape section locating detail sections of water collection system
Author's own image

(Fig: 125) Detail section through water collecting pathway showing direct rain water only (bottom) and surface run off and sub surface collection (top)
Author's own image

(Fig: 126) Plan showing water systems, including supply from collection pathways, storage, use, treatment and ecological re-entry
Author's own image

(Fig: 127) Diagram showing water systems, including supply from collection pathways, storage, heating, use, treatment and ecological
Author's own image

(Fig: 128) Structure one, Detail location Key
Author's own image

(Fig: 129) The greywacke gravel from site to be used in the gabions
Author's own image

(Fig: 130) Exploded assembly drawing showing the components of the gabion cage panels which
Author's own image

(Fig: 131) Voids between rocks create ideal habitats for native lizards and insects as well accumulating soil and providing a structure for native climber and divaricate shrubs
Author's own image

(Fig: 132) Structure one, detail location key
Author's own image

(Fig: 133) Structure one, exploded axonometric showing construction of the junction between the gabion foundation structure and the module
Author's own image

(Fig: 134) Structure one, detail section at 1:20
Author's own image

Fig: 135) Structure one, view location key
Author's own image

(Fig: 136) Structure one, view south toward the coast showing the space sheltered beneath the elevated building.
Author's own image

(Fig: 137) Structure one, view east showing the pathway continuing beneath the elevated building.
Author's own image

(Fig: 138) Structure one, view location key
Author's own image

(Fig: 139) Structure one, interior view looking through communal space
Author's own image

(Fig: 140) Structure one,, view looking through work space
Author's own image

(Fig: 141) Structure one, view location key
Author's own image

(Fig: 142) Structure one, panoramic view, showing how the building sits in the landscape with the gabion structures disseminating away fro the building

Author’s own image

(Fig: 143) Structure two exploded axonometric

Author’s own image

(Fig: 144) Structure two, diagram showing ecological integration and benefits of the cleansing biotope and shade house

Author’s own image

(Fig: 145) Structure two, ground Level Plan 1: 100

Author’s own image

(Fig: 146) Structure two,view location key

Author’s own image

(Fig: 147) Structure two, exterior view looking North into the manuka forest

Author’s own image

(Fig: 148) Structure two, view south looking through shade house towards the sea

Author’s own image

(Fig: 149) Structure three, exterior view south looking towards the sea

Author’s own image

(Fig:150) Structure three, ground Level Plan 1: 100

Author’s own image

(Fig:151) Structure three, first floor level plan 1: 100

Author’s own image

(Fig: 151) Structure three, section AA 1: 50

Author’s own image

(Fig: 152) View location key

Author’s own image

(Fig: 153) Interior view looking south west towards the coast

Author’s own image

(Fig: 153) View south looking through shade house towards the sea

Author’s own image

(Fig: 154) 3. Panoramic view, showing how the building sits in the landscape with the gabion structures disseminating away from the building

Author’s own image

(Fig: 155) Approach from the west

Author’s own image

(Fig: 156) Structure one, design phase three. View south as a southerly front approaches.

Author’s own image