AURA OF THE PAST
The Rehabilitation of Puhipuhi Mercury Mine

By
Nicola Jackson

A 120-point thesis
Submitted to the Victoria University of Wellington
in partial fulfilment of the requirements for the degree of Master of Architecture (Professional)

Victoria University of Wellington
School of Architecture

2016
ACKNOWLEDGEMENTS

After 5 incredible years I have learnt so much from staff and peers at this University.

Firstly, I would like to thank my supervisor Fabricio.

Secondly, my incredible friends; Alicia, moving to Wellington together and tackling the same degree was one of the toughest yet most enjoyable decisions. Anka, Ellie, Jared, Kate and Matt, meeting you guys at Uni and going through this journey with you all has been an inspirational and supportive experience.

Michael, thank you for all that you do for me, You have all become like family to me and I don’t know how I would have gotten through these years without you all. I love the memories we have created together. They are something I will never forget.

Lastly, I would like to thank my amazing family; My parents, Maurice Jackson and Leonie McGee. Your phone calls, care packages, and both financial and emotional support has allowed me to get this far. My brother, Daniel, for your calming personality and stress less distractions.

This thesis would not have been possible without all of you.
“The difference between a mere image and a work of art lies partly in its endurance of existence but also of meaning”

- Nigel Coates
For my Parents

Maurice and Leonie
PUHIPUHI MERCURY MINE: TOXICITY MUSEUM

FIG. 1-Final design solution
Through the development of the case site ‘Puhipuhi Mercury Mines’ this design led thesis presents the fusion of ruins with new design, aiming to rehabilitate the site and its history.

The delicate nature of the site’s past and its remaining relics present the potential to curate a history. The method of integrating old and new design to reestablish value is explored.

Puhipuhi mine has a negative reputation today. Documented memories focus on the mine's industrial downfall and remaining areas of contamination. This has dampened its prospects.

The case site has remained dormant since its closure in 1945 (Butcher). With political controversy surrounding the site, and with natural growth dominating the remains, it has become virtually inaccessible. The challenge presented by the characteristics of the site poses the following research question:

‘How can the fusion of old and new architecture add value to a forgotten and contaminated historic site as a means to preserve its history and rehabilitate it for current day use?’

Abandoned elements which lay dormant in our landscape have the opportunity to be valued as iconic elements in New Zealand's history, yet we are hesitant to seek appreciation for the narratives of their past and as a result we are presented with the possibility of historic loss.

The site’s processing plant presents a need to preserve its architectural heritage and document its history as a means to remediate the damage of contamination and the devalue that has generated since the closure of the program. Attention is needed to establish it as the beautiful landscape, intriguing remains and educational opportunity that it has the potential to become.

Through the establishment of age, historic and use values, new programmes are constructed: a toxicity museum and laboratory.
CONTENTS

Acknowledgements

Abstract

Introduction

Methodology

1.0 FUSIONS OF RUINS AND CONTEMPORARY ARCHITECTURE

1.1 Rehabilitation of a site and its history

1.2 Duty of Value
   Age Value
   Historical Value
   Use Value

2.0 SITE ANALYSIS

2.1 Puhipuhi mercury mine analysis
   Past
   Present
   Future

3.0 DESIGN BRIEF

3.1 Aims for the Whangarei region

3.2 Programmatic Requirements

3.3 Site Assets

3.4 Visibility <5yrs

3.5 Visibility <10yrs
1.0 INTRODUCTION

This thesis proposes to rehabilitate a site and its history by reintroducing value through the method of fusing old and contemporary architecture.

The objective is to fuse new architecture with the mercury mine's remaining relics to accentuate value and therefore rehabilitate the site. This is to be achieved by visually documenting memories to acknowledge historic value, curating abandoned relics to expose age value and introducing the new programmes, a museum and laboratory, to establish use value.

1.1 Introduction

Our attention falls on rehabilitating a site along with its history that has been degraded, forgotten and is succumbing to decay. As humans we look to the past to understand the present day conditions (Riegl, 78), therefore the loss of a historic site presents us with no reference around the development of the area. We strive to conserve as a way of furthering the physical representation of a history. Conservation, as a way to commemorate or redeem, requires sentiment; something of value presents an emotional and physical attraction that establishes its worth, which we seek to maintain (Brandi, 234).

This thesis aims to establish value as a means to design on a site deemed damaged, physically and emotionally. Alois Riegl in ‘The Modern Cult of Monuments: Its Essence and Its Development’ presents modern conservation with a testimony to value through varying stages, with ‘age value’, ‘historic value’ and ‘use value’ being of significance to the scope of this thesis.
1.1.1 Age Value

To be captivated by an object’s outer shell is to bare witness to its age value. Its current visual state is what we aim to preserve and highlight. We value time as the creator of age where, in relation to architecture, a stronger connection with viewers is created as it has had time to assume its own character.

Age value exists in the present moment; it sits in contrast to the modern as it details the imperfections of its journey (Riegl). For age value to be present the object has to provide the elements of history, the traces of its origin and the journey that it has been on.

This value captivates an audience’s intrigue and inspires an initial emotion response, although the superficial perception that comes with it does not maintain this interest. The intriguing qualities of decaying relics achieve only short term gasps. It is the genuine documentation of history that holds a connection (Matero,76).

Without age value an object may cease to exist. Its physical attributes, its artistic qualities, enable a fascination that alludes to art, becoming the motivation for display.

1.1.2 Historical Value

The pleasure that comes from viewing an object is not solely reliant on the aesthetics. An intellectual reflection develops on the allure of knowledge (Riegl,78).

The historic value lends itself to educational tendencies. Its focus is that of the documented history; it provides the chain of development that has established its current state, its age value (Riegl,75).
Authentic documentation of history is of upmost importance. Its disregard can often present falsified evidence that can result in a fragmented history (Brandi). The documented memories create a narrative that, in time, can be added to by the introduction of a new use.

1.1.3 Use Value

Use value is the valuing of a function, where we identify more than aesthetics and history. We seek to make use of architecture, to give it a purpose that in itself is cherished (Riegl, 79). As soon as we deem something non-functional or unusable we are left with the options of reformatting, reusing or abandoning. Use value is constantly sought, as once it is lost, unlike age value and historic value, can be found again (Longstreth, 9). Practical considerations of use to a preexisting form can complete a work but still sits secondary to age and historic value (Brandi).

For use value to be prominent appreciation is needed, and therefore, an audience. Without a supportive use to the age and historic values of a site, its rehabilitation is hindered.

1.2 Case Site

Whilst degraded and delicate, the imperfections of an abandoned site have an allure to their aesthetics, an intrigue to their history and the opportunity for use. These facilitate a shift towards rehabilitation.

As it sits abandoned, the Puhipuhi Mercury Mine site is a deteriorating memory. In recent years it has been exposed to public debate due to the potential discovery of gold veins in its vicinity (Butcher) and the
release of contamination test results in 2015 (Christie).

Over half a century since its closure, untouched by human activity and veiled from view, the site sits hidden amongst dense bush, slowly succumbing to the organic decay. The site's relics have reached the tipping point of age. As time proceeds, the past becomes less attainable. The site presents a need for intervention before its history is lost. The allure of the site's deteriorating forms present an intrigue to history that has a potential to fuse with new forms to highlight its values and rehabilitate the site.

Due to the release of positive contamination results in 2015 the cleaning of the site became an important element in the construction of this document.
METHODOLOGY

Design Approach

This design led thesis establishes preliminary design through ‘design triggers’, design ideas that are taken from the analysed regional growth strategy and precedents. These present graphical ideas that are tested on the case site and are later applied in Chapter 7. Chapter 4 establishes the design language that is also applied in Chapter 7. The developed design chapter cultivates the final design solution.

Chapter 1: Rehabilitating a Site and its History
Here we establish the theorised context of Value and its importance to deem something worthy of conservation. It looks towards the method of integrating ruins with new design to highlight value as a means to rehabilitate a site and its history. It introduces the application of this problem to the case site and the aims/objectives for the overall thesis.

Chapter 2: Site Analysis - Establishing Value
This chapter analyses the case site ‘Puhipuhi Mercury Mines’. It examines the value of the sites rich history, its current state and its potential. Additional analysis of the regions growth strategy is graphically evaluated as design triggers that are later explored in the developed design phase.

Chapter 3: Design Brief
This chapter outlines the requirements for the entire thesis. Through a design brief it defines what is required for the case site to successfully overcome the problem in the aim to rehabilitate a site and its history.

Chapter 4: Literature analysis & Design Response
This chapter reviews approaches to re establish; Age Value, Historic Value and Use Value. It evaluates literature and
design precedents and in response are analysed graphically as design triggers to later apply to the Puhipuhi site in Chapter 7.

Chapter 5: Programme Analysis
Through the analysis of Whangarei District growth strategy the museum programme is introduced. It examines the ‘Museum’ and evaluates the traditional ideals of the programme. With the release of contamination results the laboratory programme arose. This chapter analyses existing Museum and Laboratory precedents and graphically analyses ideas that can be applied to the case site that is later applied to the developed design phases.

Chapter 6: The Machine
This chapter is the start of the design phase. It graphically analyses the sites contamination results and the use of limestone as a neutralising agent. The application to clean the site whilst still accommodating for the target audience is explored graphically and through model making. This results in a design language. Elements of this design language are graphically extruded for later design phases.

Chapter 7: Developed Design
Through the collaboration of the design triggers and the refined design language from ‘Chapter 4’ this chapter develops the design solution further with on site testing. This chapter results in the final design solution.

Chapter 8: Aura of the Past
Reviews the potential loss of the ‘Puhipuhi Mercury Mine’ site and its history due to the neglect of value and how the fusion of the sites current relics along with the proposed intervention can rehabilitate it. It concludes the solution accompanied by developed imagery and critically reflects on the progression to the results.
FIG. 2-Preliminary emotive response to site
SITE LOCATION

FIG. 3.
Chapter 02

2.1 Introduction

This chapter explores the case site ‘Puhipuhi Mercury Mine’ by analysing its past, present and future with the aim of discovering the values and potential that the site holds. These values will initiate the integration of a new form with the remaining relics to rehabilitate the site and its history.

As it sits abandoned, a scar on our landscape, the ‘Puhipuhi Mercury Mine’ site requires attention. In recent years it has been exposed to public debate due to the potential discovery of gold veins in its vicinity and the release of test results for positive contamination. The site presents a need for intervention before its history is lost. The allure of the site's deteriorating forms presents an intrigue to history that has a potential for a new use.

2.2 Geographical description

2.2.1 Whangarei

Puhipuhi is located in the Whangarei region near the top of the North Island. The region is known for its sub-tropical climate, blessed landscape and captivating history (Whangareinz, 'Climate').

It holds many sites rich in history and culture, though these are not readily known (Whangarei District Council). These various sites hide in the background, as their appreciation has been lost. The region seeks the documentation of its history.
SITE CONTEXT

FIG. 4.

10 Minutes to site.
2.2.2 Site overview: Puhipuhi

The Puhipuhi area is a small rural settlement within the Whangarei region, located 30km from the main city. The area is known for its vast farmland, dense forest and mineral resources (Puhipuhi Mining Action Group). This thesis focuses on the Puhipuhi Mercury Mines abandoned processing site currently controlled by DOC; a 5ha operation area, situated 10 minutes drive from state SH1.

The mineral industry is an essential part of the Whangarei economy, therefore has acquired various mine sites throughout its history, the case site Puhipuhi Mercury mines being evident of that (Whangarei District Council, Part B). Mercury mining is one of the most damaging mineral explorations in terms of possible rehabilitation, but the site remnants hold a history that needs to be told (Whangarei District Council). The mine site today sits abandoned with a veiled history, its current state contaminated by its past. Though damaged, the Puhipuhi mine site presents captivating aesthetics that allude to a respectful and stimulating representation of its history.
PROCESSING PLANT LOCATION

FIG. 5.

Case site's location within mine facilities boundaries
PROCESSING SITE SECTION

FIG. 6.
Slope of site
MINING OPERATIONS PLAN

FIG. 7.

Development area location within the mining operations, 1979
2.3 History (Butcher)

1892
• Indication of Mercury discovered

1910
• Area is taken over by Whangarei cinnabar company and a small treatment plant is built

1910-1921
• Succession of companies attempt underground mining operations

1921-1925
• Low prospects of enough mercury for large scale mine

1927
• Enough mercury found to continue mining

1928 & 1931
• Passages extended. No Mercury found. Work ceased

1934 (JAN)
• Fire destroys all buildings and processing plant

1939
• Final phase. Mr W.S Miller and Mr J. Armstead take over
• Open cast mining begins
• Their company, NZ Mercury Mine Ltd build a comprehensive treatment plant comprising of; crushers, ore bins, rotatory kilns, condensing plant, auxiliary buildings and workshops, developed road and tram lines and a dam built for water supply

1945
• Mine forced to close due to Mercury market collapse after WWII

2009 - 2015
• Various mineral exploration permits granted to De Grey mining limited.
Images referenced to FIG. 7.

FIG. 8-12. Processing Plant

FIG. 9-12. Processing Plant: Unknown building and water tanks

FIG. 10-6. Quarry site in the 1970’s. No longer exists
FIG. 11-2. The locomotive for mine operations

FIG. 12-9. The original furnace

FIG. 13-11. Collapsed mining houses
PLAN OF ORIGINAL BUILDING

FIG. 14.
1 Crushers. Associated building no longer exists.

2 Kiln House. Furnace remains. Associated building no longer exists.

All other forms and their functions are unknown and no longer exist.
A. Exhauster Fan
B. Tanks. 3m diameter, 3m long
C. Towers. 12m high, 3m diameter
D. Exchange. 3.6m x 0.8m, 1.5m high
E. Pipe battery. Ten low concrete troughs, each 1.2 x 3.6m and 0.7m apart
F. Water tanks. Two open-topped water tanks. 5m diameter, approx. 1m high
G. Cooling trough and pipes. Re-enforced metal trough, rectangular. 5m wide x 10m long
H. Furnace. 3m x 2.5m x 4m high
I. Conveyor belt system
J. Mechanical structure
K. Channel. Concrete channel set into ground, c. 1m wide x 6m long
L. Handrail. Metal handrail, related to concrete channel

DEVELOPMENT AREA
36m x 60m

RUINS LOCATION PLAN

FIG. 15.
PRESENT

2.4 Present conditions:

2.4.1 Site assets

The former industrial site today is a testimony to its history with the presence of remaining relics and 5ha of the historic fabric comprising 32.5ha of the Waikiore conservation area (Butcher).

Elements of the processing plant are still present, though decayed. Not all buildings still stand. There is little documentation of the function of these previous forms, only seen in historic photographs - see FIG.8.-13, and sketched plans by Maria Butcher in ‘Puhipuhi Mercury Mine history and site description’- see appendix 1.

All elements remain in the position of their operation, though require varying quantities of growth removal in order to distinguish each form. The distinction of the individual forms enables the viewer to develop a visual of the processing site's operational methods and highlights their age value. This offers educational potential.
The development for the new integrated form is to be constrained within the dense
bush and bound to an area of 36m x 60m.
VIEWING POINTS

Emphasise view points through new intervention
FIG. 19-A. Exhauster fan remains

FIG. 20-B. Four deteriorating cooling towers

FIG. 21-B. Natural growth inside cooling tower
FIG. 22-C. Cooling trough and pipes remains

FIG. 23-C. Conveyor belt system and mechanical structure

FIG. 24-D. First of two water tank remains
FIG. 25-D. Second of two water tank remains

FIG. 26-E. Furnace + Concrete channel set in ground remnants

FIG. 27-E. Furnace remains
MERCURY LEVELS ON SITE

Locations of air and soil contamination tests on the Puhipuhi Mercury Mine processing site.

FIG. 28.
CURRENT CONTAMINATION

2.4.2 Test Results

Due to the sites industrial history, the site is challenged with mercury contamination; in February 2015 contamination test results for the site were released.

The contamination in the air is well below the safe levels for human occupation, but the contamination of the ground sediments are well above the safe limits with the area around the exchange the highest. The contamination beyond the processing site is minimal to non-existent, excluding the main dam and surrounding streams. Mercury is incredibly soluble in water therefore water sources are the main reason for the contaminations spread (Gionfriddo).

Mercury is a toxic and cumulative poison. The longer you are in contact with it, the more damaging it is therefore contact with the ground is to be minimised (Stanislaus). Building the intervention above the ground will allow safe occupational use of the proposed form whilst site clean up method can operate below. The introduction of an on site testing facility would be beneficial for this development.
SITE ACCESS ANALYSIS

FIG. 29.

The original site access is no longer used due to the dense overgrowth. The department of conservation only use path 2 for site access. Due to contamination uncertainty this path will remain as the main entry for the proposal.
2.5 Future conditions

2.5.1 Council plans

As of 2013 protests began around the council’s proposal to reactivate the site as a gold mining operation. The concern being the disruption of the soil and therefore spread of the contamination (Mining Action Group, SH1 - blockade).

Three exploration permits have been granted to De Grey Mining Ltd for a 61 square kilometre area (Mining Action Group, Claims area) which the Puhipuhi Mining Action Group fight to revoke. The Group, whilst against the potential mining in the area, offer ongoing solutions to the central and local government.

With its blessed landscape and rich history there is an incentive for the development of walking and cycling to the area, which intends a more sustainable economic growth than that of mining (Kirk).

Puhipuhi is located in an area linked to the earlier years of Whangarei’s rural and industrial growth (Whangarei District Council, 72). We seek to develop a sense of place by preserving the history of the area. All current remnants abandoned on site are to remain and act as the main display for new use. The fusion of old and new presents a future for the site which is detrimental to Whangarei’s historic identity.
Memorialise the industrial history of the mine by placing in forms that represent the buildings that no longer exist
2.5.2 District Growth Strategy Analysis

In 2010, through collaboration of the council and the community, a long-term growth development strategy was formed to guide the future of the region. This analysis refines the potential for the Puhipuhi site through the economic, society and environmental issues within the region and takes design ideas that are later applied in Chapter 7: Developed Design (Whangarei District Council).

Whangarei District Growth Strategy (Whangarei District Council)

Economy
Analysis:
• Employment Low
• Tourism has high economic growth at low risk
• Program requirement for skilled labour
• Amenity led development needs a high level of easy public access

Design Trigger:
• Tourism programmatic focus
• Need to develop site access

Society
Analysis:
• Tourism relies on sense of place
• Whangarei doesn’t make use of its many great attributes

Design Trigger:
• Enhance the natural and historical attributes of the site and its area
DENSE BUSH

The processing site is hidden by native bush. Maintain the dense bush around the processing site and highlight the environment through design.
Environment
Analysis:
• Flooding: high risk, 2.5 - 3m annually
• People come to and stay in Northland due to the environment
• Landscape creates sense of place and needs to be protected
• Information on contaminated sites within the district is limited
• Vegetation has mental and physical health benefits and can enhance economic productivity

Design Trigger:
• Consideration in design of flood prone area
• Self-sustained rainwater supply and storage
• Maintain the landscape and highlight the environment in design
• Use landscape and remains as a tourism highlight. Make use of age and historic value.
• Clean up site
• Contain design within tested area
• Present contamination awareness methods through the use value i.e. Museum/ Gallery/ Learning centre
• Self-sustained design with reuse of possible wastes and by-products
• Vegetation growth through clean up methods or vertical farm

2.6 Opportunities

A new intervention accentuating the site's remaining relics would make use of an abandoned site. Though the contamination on site requires attention it adds an additional investigatory layer to the design. The aesthetic age value of the current forms create the potential for educational opportunities through the curation of the unconventional forms that would add a historical rarity that heightens the areas intrigue.
FIG. 32-Maintain overgrowth inside cylinders. Use the remains as a feature of tourism, contrived from the economy and environment analysis.

FIG. 33-Make use of the site vertically. Contain the development within the confines as contrived from the environment analysis.

FIG. 34-Boardwalk entry to design. For easy access and the viewing of the natural and historic attributes. Contrived from the economy and environmental analysis.
DESIGN TRIGGERS

Investigate further in developed design phases
3.1 Introduction

This chapter defines the aims and objectives of the thesis and addresses the investigation into Whangarei’s District Growth Strategy [analysed in Chap 2].

3.2 Context statement

Establish a framework for rehabilitating the Puhipuhi Mine site and its history. The development will strive to:

- Document disregarded memories to re establish the ‘Historic Values’ of the site
- Collaborate the sites assets with the introduced intervention to highlight the ‘Age Value’
- Seek visibility through programmatic and narrative opportunities to re establish ‘Use Value’
- Establish a method of decontamination for the case site and a future self-sustained design
- Cater to the sites social, economic and environmental needs
3.3 Aims for the Whangarei region: Social, Economic, Environmental

The introduced intervention is to;

Social
• Establish a sense of place for community growth
• Establish an intervention that promotes social interaction

Economical
• Enhance Tourism
• Create employment opportunities

Environmental
• Establish a unique program: educational facility for contamination awareness
• Rehabilitate landscape as a draw card for the area
• Seek visibility through programmatic and narrative opportunities
• Establishment of a future self-sustained design

3.4 Programmatic requirements and occupation: area size, occupants

The development aims to establish a successful intervention on the grounds of the abandoned Puhipuhi Mercury Mine processing site that comprises approximately 3.5% of the 5ha mining operation area (Butcher).

From the programmatic opportunities of a tourist attraction, anticipation of a target audience is sought.

3.4.1 Programmatic opportunities

Toxicity museum
Accompanied amenities of a museum;
• Cafe
• Permanent Exhibitions
• Flexible Exhibitions

Laboratory
• Regular on site toxicity testing
3.4.2 Audience Marketing

Intentions for targeted occupants for the intended program:

Tourists
- Intriguing history
- Psychological thrill
- Visual attraction

Schools
- Education amenities
- Visual attraction
- Interactive

Families
- Education amenities
- Cafe
- Visual attraction

Individuals
- Visual attraction
- Education

Senior citizens
- Convenience
- Leisure time activities
- Cafe

3.5 Site assets

These relics are to fuse in with the proposed form. The new intervention will not alter the existing forms; - see FIG.15.

- Exhauster/ Fan
- Two Tank
- Four Towers
- The Exchange
- Pipe Battery. Ten low concrete troughs
- Two open topped water tanks
- Cooling troughs and pipes
- Furnace
- Conveyor belt system
- Mechanical structure
- Concrete channel set in ground
- Metal handrail and Concrete chute
3.6 Immediate future: Visibility <5yrs

The aims set up the base for the development and its future opportunities. After establishing the new intervention, these are the predicted visible outcomes:
• Rehabilitation of a site and awareness of its history
• Preserved remains
• Walking tracks
• Elimination of proposed gold mining
• Employment increase

3.6.1 Response

The immediate future will see extended additions that are beyond the scope of this thesis.

3.7 Future: Visibility <10yrs

• Extension
• Cycle tracks
• Complete self-sustainment
• Sustainable support to surrounding farmlands
• Uncontaminated site: Safe exterior use
• Uncontaminated water sources
• Campsite

Regional aims
• Jobs increase
• Tourism increase
• Community growth

3.7.1 Response

Towards the future the intervention size strives at an increase furthering the regional aims.

3.8 Conclusion

Through past, present and future analysis of the site, the resulted design themes emerged:

• The Narrative
• Identity
• Repurpose

The following chapter explores resolution of the aims through the design themes.
Chapter 01

LITERATURE REVIEW
FIG. 39 - Reclaimed timber for the Nishi building entrance way

FIG. 40 - Art exhibition on Inujima Island

FIG. 41 - Warehouse 17C entrance
4.0 DESIGN THEMES

4.1 Introduction

This chapter expresses three design themes which emerged from the Chapter Two analyses. Each theme is theoretically analysed and supported by precedents. Each precedent explores how age, historic and use value have been emphasized and their methods tested graphically on the case site.

Theme One: The Narrative
This theme arose as a means to memorialise the site's history through a narrative. With literature reviews and the relevant case study of the 'Nishi building entrance way', design triggers for memory documentation are applied on the case site.

Theme Two: Repurposing the site
There is an incentive to reactivate the site with an alternate use than its currently abandoned fate, as analysed in Chapter Two. The precedent analysis of Inujima presents the similar standards before intervention as that of the mercury mine operations area and so is graphically tested on the case site.

Theme Three: Identity
With consideration of Whangarei’s District Growth Strategy, this theme arose from the social and economic needs of the region. Investigation into regional identity and the precedent Warehouse 17C are graphically tested on the Puhupuhi case site. This theme aims at providing the Puhupuhi region with a sense of place.
4.2 The Narrative

Articulating the chronicles of the site’s past is essential for the rehabilitation of historic value. A visual representation of a narrative concretizes the documentation of a memory, where the monument captivates an audience to assume their own response to the history.

Over time, a site accumulates layers of history that develops it into its current state. The progression of its journey is the narrative that we seek to preserve.

Jennifer Hill, Australian architect and heritage consultant, proposes that any attempt to alter design is an addition to the history, where the approach to change acts as a layer of the narrative. This process of multiplicity layering (Hill) is explored through the discussion of the narrative that is approached from a variety of views:

British architect and designer, Nigel Coates’ approach towards architecture collaborates parallels between the current physical condition and its sequence of events. He presents the idea of the elements not being predetermined, where the ability to design with a space and its history allows it to shift into an unpredictable and innovative state (Coates).

In ‘Design as Narrative’, Assistant Professor for interior design at Central Michigan University, Cathy Ganoe’s perception of the narrative’s contribution expands upon Coates ideas and looks beyond the intervention’s depiction of the narrative. She states that the intervention should present an occurrence at a particular time but still be open to change (Ganoe).
Humans seek to find meaning within their place of inheritance. Those who propose change become in control of the interpretation of the past and so the environment becomes the vehicle of historic language (Scott). This view is explored by Fred Scott, interior architecture specialist, in ‘Altering Architecture’. His perception of the narrative focuses more on the designers portrayal of an original event rather than the event itself.

“As the past is a foreign country, introducing new life into an old building is in many ways like translation, the carrying over of the host building from one age to another”
- (Scott, 79).

Scott states that architecture has the quality to carry out an illusion. You see what it is the designer wants you to see (Scott). This design approach alters the perception on a singular occurrence where the facts are disregarded and design is depicted through memories.

Architecture and planning Professor, Eleni Bastea, explores architecture through memory as a reflection of souls in her publication ‘Memory and Architecture’. She states that the process is about finding common ground with the audience and those that the memory entails, which sets the foundation for future dialogues. She presents the act of designing through memories as a retrieval process with the ability to adapt to the contemporary, not necessarily a documentary (Bastea).

The memory of the Puhipuhi site has fallen to its industrial downfall and contamination. Its current
state is in desperate need of an intervention that controls the narrative of the site. Coates approach of unpredicted design is compelling and possible with the standards of the Puhipuhi mercury mine site. The delicate nature of the forms are not known. We may attempt to fuse the relics with new forms but due to their age they may not adapt where the design then shifts to unpredicted territory that cannot be foreseen in the scope of this thesis.

The operation's remaining materials, in their current deteriorating state, have endured enough time to present a story and so their age can be halted for display purposes. The forms have reached the peak of their historic narrative. They can continue to extend their age value but their history will be lost to deterioration, therefore Ganoe's view on presenting an occurrence at a particular time is required and would enable the opportunity to continue changing without being lost.

The positive aspect of the site and its history has been lost and so moving forward requires both a factual representation and memorialised memories. Sole reliance on memory as a means of design, as stated by Bastea, would not improve the case site, as negative memories is one of the reasons the site remains abandoned. The proposal requires a representation of facts and memories to create common ground with the audience. Proposing the new intervention through the remaining relics creates a pathway that can guide occupants through a history supported by the aesthetics of the remains. This produces an educational reflection rather than a damaged one.
The past, present and future analysed conditions construct a narrative that fits within the constraints of the program. As we aspire to generate preexisted emotions in a delicate manner, one must take into consideration the mark that is being left on the site and its influence on the layering of its future dialogues. Scott's idea of the designer displaying what it is they want the audience to see automatically generates as everyone has their own take on design. He focuses more on the aesthetic style of the designer where historic portrayal is also required to rehabilitate the case site. Physical representation of a narrative may present the same story between designers but individually we have our own design language that allows us to leave our mark on a history that binds our identity into the narratives fabrication.
4.2.1 Precedent: Nishi building entrance way

March Studio, an Australian design firm, work through their design process in an intriguing way that effectively generates a unique outcome.

“Let the location inform the materials, and then let the materials inform the design.”
- Hotel hotel blog

Their progression of creation is neither random nor searched for. It is developed through the site, as seen in the Nishi building.

The entrance way of the Nishi building presents an installation that reflects the historic narrative in a new way. Reclaimed wooden elements from the site's previous layer have been reused. 2150 pieces of wood were used for the organised chaos (Jobson).

Rather than preserving the pre-historic layer, the new designer has manipulated the history, adapting to the contemporary as explained by Bastea in 'Memory and Architecture'. This approach towards historic conservation can present personal expression and create a unique chapter for future historic layers.
4.2.2 Conservation Methods

**Age Value**
The Age Value of the Nishi Building has been manipulated as we see its authentic self through a contrived arrangement of the rustic boards. The structured imperfection sit in contrast with the contemporary intervention surrounding it. This encasement highlights its artistic qualities that inform its age value.

**Historic Value**
This site was the location of old homes and a basketball court (Jobson). Though these have been removed their essence is in the reclaimed boards. The historic value of the site has become unrecognizable but offers an expressive and intriguing representation. This presents the audience with a physical form that they can connect with and educates them on the past.

**Use Value**
The current site today displays mixed use building and an apartment complex, this entrance way is used by all programmes (Jobson). This new use is fresh and responds to todays economy.

**Design triggers**
- Reclaimed material reuse
- Material used in its raw natural state
- Sustainable
- Let the site and remaining relics guide the form
- Sculptural
DESIGN TRIGGERS

Investigate further in developed design phases
**IDENTITY**

4.3 Sense of Place

Designing through the process of maintaining the region’s rich history adds to the characteristics of its identity. Identity is generated to strengthen the region’s character and establish a sense of place (Hauge). All too often new developments lack this attribute (Whangarei District Council).

Establishing a sense of place enriches a community; a place requires a point of difference from other regions for the marketability of a unique experience. For people to develop emotions towards a place, they must first have something to connect to, something that induces a relationship.

Jared D. Bowers and Gerard Corsane, in ‘Sense of place in sustainable tourism’, state that everyone develops an individual sense of place on the same space or site dependant on their prior connection and life experiences. They state that this causes a layered sense of place. From this layering certain attributes are shared and these common attachments are what we attempt to market for a unique identity (Bowers).

Lyn Leader-Elliott in ‘Cultural landscapes and Sense of place’, approaches the idea of sense of place from a community and tourism perspective. She states that the marketability is developed around a destination experience, where a tourist programme promotes a space or a site’s specific characteristics to achieve this (Leader-Elliott).
Stephanie K. Hawke in ‘Heritage and Sense of place’, explores heritage as a means to articulate identity. She states that identity develops on the “continuation of timeless values” where the history of the site is to be retained (Hawke, 243). A site continues to age therefore its identity adapts. All reviewed ideas on sense of place indicate its flexibility to change over time.

Puhipuhi requires a positive impact to prevent it being used as a transitory space, something fresh and alluring that highlights the distinctive features of the region.

The main characteristics of the site are its industrial history, supported by the remaining relics, and the current contamination. These are to be accentuated to support the use value in establishing a place of destination. A modern reinterpretation of the site's industrial design language would shift the site into contemporary territory. This would pay tribute to the site's remains and its history, and establish a rare aesthetic identity.

The contamination plays a huge role in the site's current sense of place, as it is the reputation that it currently upholds, and it therefore remains abandoned. The site seeks an investigation into how contamination can be used to create a rare experience - see Chap 6.
WAREHOUSE 17C

4.3.1 Precedent: Warehouse 17c

Warehouse 17c is an interior design project in an old slaughterhouse in Madrid. It was initiated to reactivate the building and for the program of flexible spaces for varied use (Singhi).

Rather than a processed design, focus has been set to the material and the intention for a minimal intervention. It aims to maintain the beauty of a derelict building whilst exploring its atmospheric capabilities, with the introduction of modern materials and techniques. All new materials are true to their initial form. Nothing is cut or altered; it is all standard dimension (Singhi).

Though challenging to design to the constraints of the pre-existing form, being able to see the previous layer of history is enticing.
FIG. 50-Collaboration of old and new construction. Glass placed in front of bricks for minimal intervention

FIG. 51-Reconstructed Warehouse 17c interior. Sleek contrast between glass and historic materials
4.3.2 Conservation Methods

**Age Value**
The age value of this precedent is prominent. The scars on the building have been encased and put on display as the main aesthetic for the interior. New construction has been used to highlight the age of the building and attempts to enhance its prospects. This successfully creates aesthetic intrigue whilst still being able to distinguish its historic identity.

**Historic Value**
The historic value is seen through the deterioration of the building. The minimal intervention allows the viewer to see the interior in its raw form. The walls can be seen in varying degrees of deterioration where this intriguing state presents an aesthetic insight into its historic layers that identifies its sense of place.

**Use Value**
Warehouse 17c makes up a small portion of an overall building. Its rehabilitation isn't steered towards any specific programme but strives towards a unique adaptive space (Singhi). Large open spaces leave it open for interpretation. Though it achieves use value by serving a purpose, the age and historic value are the dominant means of bringing in an audience.

**Design triggers**
- Minimal intervention to relics
- Glass as support for towers; structurally sound whilst still be able to view the raw rusted metal and interior plant growth
- Development around pre existing form
- Raw spatial experience
- Industrial materials
DESIGN TRIGGERS

Investigate further in developed design phases
CURATION

4.4 Repurposing

When something becomes abandoned it requires use value for reactivation. Hill states that when buildings have reached a period of decline any intervention is often viewed in a positive light (Hill). Dobson, in his thesis ‘Forgotten world,’ argues that if there is a placement of any intervention, and not one that considers preservation, the history will be lost (Dobson).

When historic connections are formed the space is considered important and allows the area to flourish.

“It is therefore a designer’s role and responsibility to create a designed environment that encourages a positive connection to a place”
- Dobson, 26

Dobson believes that the ability to curate the past, by collaborating objects and artefacts, successfully unfolds a narrative and presents the audience with a ‘sense of place’ (Dobson).

Hurell, in his thesis ‘Stalker: Archives of decay’, reinforces the idea that only a specific kind of intervention is appropriate. It may be seen as an improvement but it has the potential to reinterpret, rather than improve, a site's reputation. He states that history can be lost through the presence of decay but it is also common that the introduction of a new interventions can decrease its heritage preservation (Hurell).
Applying any intervention to an abandoned site neglects the importance of conserving a history. The proposal of a new intervention with historic disregard can have the same effects as a history lost to decay. Hill's proposal on the case site would result in the loss of a visual history of mercury mining in New Zealand, that this thesis seeks to save.

Dobson and Hurell make a strong argument towards an appropriate intervention that maintains heritage. Due to the large proportion of loss of the original forms of the processing operations on the case site, the remaining relics on their own are not adequate enough to supply the historic knowledge required for historic preservation. Therefore additional architecture is proposed in support of the conservation of the remaining relics.

This theme calls for the repurposement of a site. The Puhipuhi site has reached a period of decline where it needs to be reactivated by shifting the past into a more considerable future. The strategic display of the remaining relics as a curation would enable a positive and intriguing historic connection to future audiences.
4.4.1 Precedent: Inujima Island

Inujima is a small island off the coast of Okayama, Japan, in the Seto Inland Sea (Japan guide). Originally it operated as a copper refinery in the 19th century but due to the plummet of copper prices in the early 20th century it prematurely closed.

In 2010, the island reopened as the ‘Inujima art project’ which preserves and reuses the remains of the copper refinery. The art project exhibits the remains of the refinery as artwork as well as the addition of galleries, permanent and flexible. Main architect Horoshi Sambuichi uses existing material such as the smokestacks and Karami bricks from the refinery for reinvented architecture, with a focus on natural energies to reduce the impact on the environment (Benesse).

The rehabilitation of Inujima is developed through the concept of industrial modernism, where the sense of modernizing something is not necessarily focused on high tech solutions. It presents the idea of using heritage and the consideration of all existing materials as regenerable resources (Arcspace).

In most parts the design relies on self-sufficiency through solar energy, geo-thermal and other natural resources. The large existing chimneys visible from all areas produce natural ventilation through the stack effect, allowing for cheaper heating and cooling systems for the large indoor space. The waste water from the toilet facilities travels through a water purification system where it then is utilized for the growth of on site vegetation, such as fruit trees available to the visitors. The local material source, slag bricks, – see Fig. 59, is produced by the waste of the refinery. The use of natural resources presents a constant growth of design through the natural cycle and geography change (Benesse).
FIG. 58-(Top) Inujina remains overview
FIG. 59-Brick wall remains
4.4.2 Conservation Methods

**Age Value**
The age of the Inujima site is shown through its industrial remains. Its artistic qualities create a fascination that Sambuichi has used as art. The method of using previous elements from the past programme and placing them back in their original position is an intriguing means of display that present not only the art but also the historic reference that gives the viewer a visual insight into the past.

**Historic Value**
The historic presence of the copper mine still remains, dominating the site with its chimney stacks and brick walls. The abandoned mines chain of development is seen through not only the curating of remains but also through the placement of windows, doors and stairs into their original position presenting an art installation. The sole curation of the remains allows the viewer to witness the toll time has had on the site whilst the placement of elements back into their original position gives the viewer a better insight into the history of the site and the establishment of the current state.

**Use Value**
The practical consideration taken into developing an abandoned industrial copper mine into gallery spaces through the use of exhibiting the current remains creates an interesting tourist attraction that is unique to the site. The value of this use fuses the remains with new ideas and presents an attraction that differs itself from the regular ideology of a gallery. The curation of remains as an interpretation of reuse is an aesthetically pleasing way to educate an audience on the past.

**Design triggers**
- Fusion of art and architecture; both a container for and an integral part of the exhibition (Benesse)
- Designed to revitalise the economy between environment and art
- Re-use of waste water for vegetation growth source
- Program: exhibition/gallery, café, store and accompanied amenities
- Permanent and flexible exhibitions
FIG. 60-Exhibitions used from recycled materials from original mine operations
Design Triggers

Investigate further in design phases

FIG. 61. All relics to be the main exhibition.
- One permanent exhibition
- Two flexible exhibitions

Structure or ground indication of original forms that are no longer evident

Contrived from the same use of remains as that of the Inujima precedent

FIG. 62. The fusion of art and architecture: Attention to be given to relics for curation. Contrived through Inujimas design of fusing new architecture to aid in the curation of the copper mine remains
FIG. 63-Exhibitions used from recycled materials from original mine operations
4.5 Conclusion

The analysed design themes have established methods to be translated to the Puhipuhi case site. The ideas graphically analysed from the precedents are applied in the developed design chapter.
Investigation into the amenities that are currently in the region
5.1 Introduction

This chapter explores the programmatic benefits of the tourism industry, with translation to the case site. Attention is set to museum design as the primary program with support of laboratory design as the secondary program for the case site. Through the analysis of precedents, design triggers present a graphical analysis, testing the ideas on the Puhupuhi Mercury Mine site.

5.2 Tourism

Tourism accounts for a total expenditure of $29.8 billion and generates 6.9% of NZ’s total employment (Tourism New Zealand). The stimulation of tourism comes with its allure and the capability of retaining use. Without the sense to uphold the intrigue that deems something an attraction it can fall into abandonment. The appeal to a wide audience results in more visits, therefore the endurance of an attraction.

With the case site seeking value for its history and environment, marketable ecotourism is what we strive to achieve. Eco tourism is defined as ‘Travelling to natural areas that conserve the environment, sustains the well being of local people, and involves interpretation and education’ (TIES, 2015).

Ecotourism principles (TIES);
• Minimize physical, social, behavioural, and psychological impacts
• Build environmental and cultural awareness and respect
• Provide positive experiences for both visitors and hosts
• Provide direct financial benefits for conservation.
• Generate financial benefits for both local people and private industry
• Deliver memorable, interpretative experiences to visitors that help raise sensitivity to host countries’ political, environmental, and social climates
• Design, construct and operate low-impact facilities
• Recognize the rights and spiritual beliefs of the indigenous people in the community and work in partnership with them to create empowerment
The marketability of eco-tourism, as well as the educational opportunities of the relics and intended toxicity museum for the Puhipuhi site, provides economic incentives for conservation of the natural and cultural heritage.

5.3 Museum

At the beginning of the 20th century, works of art began to be seen as more than just a display of visual intent. The contemporary conception that art was a link between emotional impressions of the artist and the viewer became readily expressed, where the viewer was seen as a part of the creative process. As the onlooker viewed the piece, they would ‘conceive the work as it unrolled in his [the artist’s] mind’ (Noordegraaf, 94).

‘To fulfil its complete purpose as a show, a museum must do the needful in both ways. It must arrange its contents so that they can be looked at; but also help its average of visitors to know what they mean. It must at once install its contents and see to their interpretations’

- Gilman, 280.

In terms of viewing conditions, design had to be simple, both internally and externally, to decrease competition with the display, and view points had to be made clear so that the viewer could establish where they were at all times (Noordegraaf). Museums are visitor focused. Accommodating occupants as well as successfully displaying work that has a standpoint are of upmost importance.

A toxicity museum is the main programmatic function for the case site exploring education on mercury, the history of the case site and the display of other contaminant sites and their remediation. The intended museum is to act as a container for the curated relics, whilst offering other exhibitions.
FIG. 68-(Top) Ruhr museum exterior
FIG. 69-Ruhr museum digital display
5.3.1 Precedent: Ruhr Museum

A former coal washing plant turned museum, located in northwest Germany. The area was best known for its mining of ‘Black Gold – Coal’ up until the end of the industrial era in the 1960’s. Over the last few decades the government and locals have pushed to culturally enrich and redesign Ruhr.

With a sustainable approach, the original structure has been utilized, the use redesigned, and shifted into an integrated future (Borsdorf). They deem Ruhr as being ‘healed’, now something to be recognised and for its people to take pride in (Hernandez).

The displays are white, clean and minimal for a visual detachment from the original structure. Their white partitions, focused lighting and soft finishes allows for the new to be considered secondary, creating a contrast between them.

The visitor enters the building into a vast space, before being led into a more confined area that allows an intimate connection with the exhibition. Through partitions and lighting, the occupants are guided through the space and, as they are being led, the layers of Ruhr’s history and memories unfold.

“A highly layered architectural and visual communication path keeps visitors engaged and focused in this experiential journey through history”
- Hernandez

Reactiving Ruhr enables the sharing of both its positive and negative times for the rest of the world to acknowledge and appreciate.

5.3.2 Design Triggers

- Shift into integrated future. The fusion of new and old
- Contrast display to the rust of relics – visual detachment between old and new
- White partitions, focused lighting and soft finishes. Investigate in developed design
- Vast entry, then led into a more confined and intimate space
- Journey of toxic history, education and case site history unfolding. Narrative through proposed design
DESIGN TRIGGERS

Investigate further in design phases
FIG. 74—Visual detachment between new and old.
Sleek and clean design that does not overpower the relics as they are the display feature. Contrived from the soft finishes of the Ruhr museum precedent.

FIG. 75—Narrative through proposed design contrived from the Ruhr precedents ability to narrate its history through new displays and the remains of its original programme.
SPACE PLANNING ANALYSIS

FIG. 76-Ruhr Museum floor plans. Investigate further in design phases
5.3.3 Ruhr Museum: Space Planning Analysis

The large factory space offers freedom for the arrangement of displays. The placement of the displays direct the circulation through the programme. The variety of displays present a breakup to the exhibition typologies. The vertical circulation and back of house facilities are positioned on the boarder of the form allowing the exhibition space to remain uninterrupted by another amenity and therefore enables a continuous narrative through the site. A cafe and shop amenity located around the displays offers a relief in the circulation. This presents the occupants with a range of experiences within the programme confines.

The temporary exhibition space proposes the constant change in experience for repeated audiences. The small encasement of areas in the memorial exhibition provides an uninterrupted visual focus on the remains urging for an emotional and visual reflection.

The change in use of the facility presents a fragment in the ideology of the museum. The site specific nature of the display calls for a unique experience that is not only aesthetically intriguing but also offers a true historic experience.

The Puhipuhi case site has no existing buildings remaining therefore new architecture is to be introduced. This presents control over the positioning of displays to generate a narrative through the site.

The main exhibition space would benefit from being spread along the site to use it as a link between spaces. Like Ruhr, the proposal of a cafe and shop space would provide a relief from the areas of display.
FIG. 77-(Top) Antakya museum/hotel exterior  
FIG. 78-Antakya ruins as main exhibition
The Antakya ruins, located in Turkey, were discovered while their site was being prepared for a Hilton Hotel (EAA). This lead to the hybrid hotel/museum proposal by Emre Arolat Architect which will become the first hotel perched over an archaeology site.

This architectural development allows new architecture to reactivate the history of a site through the curating of the discovered ruins. The archaeological aspect became a huge part of the design's progression with the process of creating private areas on what should be considered a public site, due to its historic presence in the Antakya community (EAA).

The entire design is elevated off the site as to minimise potential damage to the ruins and columns are strategically placed around the site to achieve this (EAA). The programmatic function of the hotel/museum and the accompanying amenities are distributed on platforms of varying levels.

The circulation pattern of the design allows visitors to view the artefacts from different perspectives. Slits in the floor are strategically placed so as to create a visual connection between the old and the new (EAA).

An information box displays the path around the site with information of the site's artefacts (EAA).

**5.3.5 Design Triggers**

- The relics on the site are to inform the placements of forms and a circulation path around the site.
- Hotel programme. Architectural tent structure built off the design.
- Slits in the design to create a visual connection between the program and the ruins.
- Informative displays educating visitors on the ruins
DESIGN TRIGGERS

Investigate further in design phases
FIG. 84-Camping structures. Elevated off the ground. Contrived from the hotel programme and the ability to adapt the idea to a contaminant site.

FIG. 85-Educational panels explaining the site and its history. Contrived from the on site display boxes used to explain the Antakya precedent’s history.
SPACE PLANNING ANALYSIS

FIG. 86-Antalya Museum/Hotel floor plans. Investigate further in design phases
5.3.5 Antakya: Space Planning Analysis

This Antakya programme has generated through the addition of new architecture. With all levels of the introduced architecture orientated around the pre-existing ruins creates a central shaft up the entirety of the design. This develops a visual connection from all areas of the programme. The addition of minimal mass to the prehistoric site enables a new use that does not overtake the historic ruins of the original programme.

The programme is broken into a variety of forms with boardwalk circulation between them. The boardwalks are not all linear; areas of the platform are abstracted, resulting in a relief in the circulation.

This design is a refreshing take on the hotel programme. It offers all the amenities of a hotel with a rare view that engages a site-specific historic experience. The rooms of the hotel have been placed into clusters of pods. This reduces the mass on site and allows the occupants to reside in their own individual form. This reduction also benefits the elevated viewing perspective from the rooms to the ruins.

The boardwalk experience, to view the ruins, would benefit the Puhipuhi site due to the minimal spaces between each relic, and would give the occupants a closer visual. This also presents the opportunity to see the contaminant testing and mitigation of contamination - to see the machine in operation.

With a confined site, building vertically would maximise the case site, and by placing the forms around the abandoned mining ruins it is possible to maintain a visual from all amenities.

Sleeping pods as a permanent exhibition on site could be developed to utilise the educational aspect of the mercury contamination. Mercury is a cumulative poison therefore the longer you are in contact with it the more harmful it can be. The air at the case site is safe, this would be a safe venture but would generate a psychological thrill to interested audiences and prepare the site for the possible change of use to a campsite after the remediation process.
FIG. 87-Laboratory of genomics
courtyard

FIG. 88-Site plan of Chile’s
subantarctic research base
5.4 Laboratory

The Laboratory is a major building type yet we have come to only use it to provide functional space (Kemp, 170).

With the aim of eliminating contamination from the Puhupuhi site, there is the requirement for constant testing of mercury levels. The introduction of a laboratory would benefit on site testing.
FIG. 89-(Top) Concrete exterior of genomics lab
FIG. 90- Visually one sided transparent facade
5.4.1 Precedent: National Lab of Geonomics

This laboratory design was developed by TEN Arquitectos/Enrique Norten and located in Irapuato, Guanajuato, Mexico. Positioned in an empty field, the intervention is situated in artificial topography (Gordoa).

The main building form is encased by a facade that is visually one sided. From the exterior the cladding appears as solid panels but from the interior it is transparent. The exterior contrasts between the engineered form and the natural surroundings yet the interior acts to incorporate the landscape within the interior (Gordoa).

The architects have used the nature of the landscape to position the forms. The programme is divided into two areas defined by a fault line running down the centre. On one side is the administration block and auditorium and the other is the laboratory spaces (Gordoa).

The collaboration of open spaces with minimal detailing and a light colour palette, along with loose furniture, allows for variation of laboratory functions evident in the Laboratory of Geonomics precedent.

5.4.2 Design Triggers
- Visually minimal. Simple forms
- Facade transparency brings landscape into the building
- Flexible space
FIG. 93-Minimal. Contrived from the Geonomic laboratory precedents
use of simple forms

FIG. 94-Facade transparency. Contrived from the cladding of the
Geonomic laboratory precedent

FIG. 95-Large open space for flexibility. Contrived from the
Geonomic laboratory’s lab space design

DESIGN TRIGGERS

Investigate further in design phases
SPACE PLANNING ANALYSIS

FIG. 96-National laboratory of genomics floor plans. Investigate further in design phases
5.4.3 National Museum of Geonomics: Space

Three massed forms have been used to divide the programme's functions, with the only connection being the ground level. The laboratories make up the large mass with a repeated layout. Long narrow spaces have been divided by furniture with no permanent walls, this allows the flexibility for change.

The main offices/cafe and auditorium space is kept separate from the laboratories due to the specific requirements of the programme.

The development size of the Puhipuhi site requires a small testing facility where open space would enable the freedom to change and the ability to adapt the use once the contamination has been mitigated.

Keeping the laboratories separate is crucial for the safety of the museum occupants due the hazardous mercury substance being tested.
FIG. 97-Exterior of Chile's subantarctic research base
Located in the remote area of Cape Horn, Chile, the proposed design for the subantarctic research centre presents a form that mimics its landscape. Ennead architects propose a small environmental footprint and the potential for the programme to operate using its own renewable energy.

Ennead have replicated the aura of the existing landscape, creating an intriguing form (Ennead). By placing it in the foreground they have formed an elevation that seamlessly integrates into the context. Three pavilion forms emerge from the side of the bluff, mimicking the peaks of the surrounding mountain ranges (Ennead). The designs feature pre-weathered cladding, representing the staggered landscape and extremely cold climate, and requires no maintenance in the isolated region (Ennead).

The programme is broken into three areas: 1st pavilion, educational spaces for sustainable tourism and biocultural conservation, including classrooms, library and study areas; 2nd, exhibition space, research laboratory facilities and two apartments for visiting researchers; 3rd, multipurpose lecture hall, cafe and offices.

These three forms are bound by a link way that acts as the main circulation path through the research centre. This creates clear segregation of programmatic functions, and the private and public areas. The exterior also acts as an extension of the educational facilities, making the most of the learning opportunities from the context (Ennead).

5.4.5 Design Triggers
• Mimic Landscape
• Forms drawn out from a singular perspective
• Use the context as a learning opportunity by extending the program to the exterior
• Cluster of forms bound by a link way
FIG. 98- Site plan of Chile's subantarctic research base
DESIGN TRIGGERS

Investigate further in design phases
FIG. 101-Multipurpose lecture hall interior
FIG. 102-Forms bound by link way. Contrived from the use of a linkway in the Chile research centre precedent.

FIG. 103-Use context as learning opportunity. Contrived from the Chile research centre precedents use of testing facilities for educational purposes.
SPACE PLANNING ANALYSIS

FIG. 104-Chile’s Subantarctic Research Centre programmatic design. Investigate further in design phases
5.4.6 Chile's Research Centre: Space Planning Analysis

The design takes its form around a central axis, with three forms extruding out at even intervals. The extrusions on each side of the axis hall have their own programme. The educational mass is positioned at the entry with the auditorium/multipurpose space and cafe/administration spaces just after this. All private facilities have been placed in the back end of the form. An exterior courtyard externally binds the entry and the cafe/administration.

The laboratory space, like the Geonomics precedent, operates in an open space with no permanent divides. The facilities layout is easy to understand. The linkway creates a clear circulation path between all the programmes. This has allowed for the complexity of the design to be allocated to the interior finishes.

The Puhipuhi case site is bound to the confines of a narrow site, therefore the opportunity of a linkway with breakout spaces will generate a non-confusing path through the programme.

The private sector of the laboratory requires separation from the public areas of the museum similar to Chile's research centre.

5.5 Conclusion

The analysis of museum and laboratory precedents have provided an insight to the functioning of the programmes that will later be explored in the developed design phase.

The introduction of a 'Toxicity Museum' would prevent the Puhipuhi area from being just a transit route between Whangarei and the Bay of Islands. The programmatic opportunities of a tourist attraction aims at not only reactivating the case site but also adding value to the region. The rarity of the site's history and its current levels of contamination would enable the site to flourish in the tourism industry.
FIG. 105-Tested contaminated area of the Puhipuhi mine site
6.1 Introduction

Contamination creates an inoperative site. Activities such as landfills, industrial production, use and storage, treatments plants, mining and quarries are the main factors which create an unusable site (Whangarei District Council, Part B: 69).

This chapter challenges an unusable site by exploring methods to mitigate the mercury pollution. Methods and design styles are analysed to establish a machine that integrates with the relics and proposed intervention to clean the site.
LIMESTONE LOCATIONS

FIG. 106.
6.2 Methods

The Machine, in collaboration with current relics, will generate the remediation process and provide an educational opportunity of toxicity mitigation.

Powdered limestone is currently used around the case site to temporary halt the spread of the mercury. Limestone aids in levelling the pH balance which makes it beneficial for neutralisation (Butcher). In close proximity to the Puhipuhi area is a limestone quarry - see FIG. 106.

The machine needs to allow for the transport of limestone from Mine Rd. The limestone would then need to be crushed for distribution. This powdered solution would only provide a temporary solution.

As the site is located in a flood prone area the mercury is constantly leached into surrounding waterways. The addition of a barrier would reduce this spread, and Phytoremediation would create this barrier.

Phytoremediation is process whereby the roots of a plant absorb the metals contaminants present in its surroundings and the metal then accumulates in its leaves and stems. Regular harvesting of the plant and disposal of as toxic waste is required (Unep.or.jp). The site would benefit from a neutralised solution being leached into plant beds for phytoremediation purposes.

6.2.1 The Process

- Transport limestone to site
- Limestone crushed into powder
- Insert tube into outer tower for rainwater collector. Mix water with crushed limestone to develop a neutralized solution
- A sprinkler system would act as a controlled distribution system
- Plant beds for phytoremediation to act as barriers, preventing the induced leaching process from entering into surrounding streams
- Removal, disposal and replanting of plant beds
Machine Function & Language Analysis

FIG. 107.

Establishing a visual method for the machine

1. Conveyor: transport limestone from quarry
2. Crusher: break down large limestone forms
3. Mixer/Neutralizer: create solution from rainwater
4. Distributor: controlled sprinkler system
5. Leach into plant beds
FIG. 108- Conveyor precedent

FIG. 109- Crusher precedent

FIG. 110- Mixer precedent

FIG. 111- Phytoremediation precedent

FIG. 112- Distributor precedent

FIG. 113- Distributor precedent closeup

MITIGATION & MACHINE COMPONENTS

Machine precedent investigation
Preliminary Conveyor design

FIG. 114.
Preliminary Crusher design

FIG. 115.
Preliminary Mixer design

FIG. 116.
Preliminary Distributor design

FIG. 117.
FIG. 118-Developing the machine
FIG. 119 - Testing design ideas over the machine
FIG. 120 - Elevation of machine model with design ideas
Limestone conveyed from neighbouring site

1. Crusher

2. Mixer

3. Conveyor structure

FIG. 121.
The Mixer mixes crushed up limestone with added water

1. Strengthened glass contains mixer and allows the process to be viewed

2. Water source. Rain water collected in cooling tower

3. Mixer

4. Grate refines solution

5. Pipes directed to troughs

FIG. 122.
Crusher breaks down the large limestone forms

1. Crusher joined with first part of machine process

2. Crusher view

3. Arms of crusher are electronically controlled

FIG. 123.
Neutralised solution distributed on site for leaching process

1. Water stored in troughs

2. Sprinkler system on ground.  
   4m x 4m grid placement

3. 360° distributing system

4. Sprinkler placement in soil

5. Exploded sprinkler view
Neutralised solution leaches contamination to plant bed

1. Leached solution

2. Phytoremediation process

3. Removal of contaminant plants
6.3 Design Language

The following images are a retrieval process of the developed machine form to establish a cohesive design language for the main intervention. The retrieved language is later used in the developed design chapter.
CONVEYOR RETRIEVAL PROCESS

Elements translatable to introduced intervention:

**Design Triggers**

- Facade
- Interior Wall Elements
- Structural Supports
FRAME RETRIEVAL PROCESS

FIG. 127.

Elements translatable to introduced intervention:

**Design Triggers**

- Wall Elements
- Roof Elements
- Structural Supports
CONVEYOR RETRIEVAL PROCESS

FIG. 128.

Elements translatable to introduced intervention:

Design Triggers

• Facade
CRUSHER RETRIEVAL PROCESS

FIG. 129.

Elements translatable to introduced intervention:

**Design Triggers**
- Facade
- Structural Supports
MASSING ANALYSIS

Testing form placement on site
Preliminary Application

7.1 Introduction

This chapter applies the ideas from the design triggers to the case site. It generates iterations of massing and space planning on the case site and then articulates the final form using the design language established in Chapter 4: The Machine.

This chapter results in the final design solution.

7.1.1 Massing Analysis – see facing images

+ Advantages - Disadvantages

1. Two separated forms

+ Identifies two possible areas that allow bulk

+ Makes use of area hidden by the cooling towers at the back of the site

- The forms would need a connection bridge between them for circulation and to view the relics in the centre of the site better

2. Elongated form down side of site

+ Control of one viewpoint direction

+ Good size bulk to accommodate all the amenities of the programme

- Doesn’t frame relics. The relics will act as the main exhibition and therefore need to be the focal point
3. Elongated form over relics

+ Visitors can view relics from directly above and be fully immersed in the historic design

+ Similarities to the original forms positioned over the relics

- Needs more strategic articulation in relation to viewing the relics

4. Cluster of forms

+ Playful design. Allows for bridges between forms

- Lower level on ground may cause aggregation of contaminated sediments in soil

- Possibility of too many separate forms for the program
5. Testing forms on case site

6. Testing forms on case site

FIG. 130-Diagrams 1-6. Testing forms on case site
5. Bordering form

+ Frames the central forms

+ Creates the potential for good circulation through exhibitions

- Bulky form that dominates the site. Height needs to be reduced so that it doesn’t go higher than the 12m high cooling towers

6. Staggered forms

+ Staggered forms create a variety of optional paths for the exhibition

+ Visually intriguing elevation

- Exceeds site constraints

- Wide central spaces require further interior articulation to narrowly draw occupants through the exhibition

Form 2 will be tested further in massing development
FIG. 131—Programme’s amenities tested on site

1. Reception
2. Staff Areas
3. Storage
4. Permanent Exhibition
5. Flexible Exhibition
6. Cafe
7. Bathrooms
8. Lab
9. Viewing Platform

SPACE PLANNING ITERATIONS
7.1.2 Space Planning - see facing images

a. This plan takes the configuration of massing analysis 2 and simplifies it into space placement and size. With only one safe entry into site there is only one place for reception. The permanent exhibition is elongated down the central circulation path. This forces occupants to move through before reaching the café.

This plan needs additional space to cater to the programme's amenities.

b. Elongated storage area separated by bridges to break its bulk from the main form.

The staff area takes up prime relic viewing space.

c. The bathrooms need to be more integrated.

The café needs to be positioned more towards the southern end to make the most of the view.

d. This plan has been broken into two levels. This allows more spaces in the confinements of the site.

e. Reception is orientated on an angle and thinned allowing for a more concentrated entry that opens up into an atrium.
7.2 Integration

The form has been integrated on site to slot within the relics and to stay within the confines of the tree line. These limitations have structured the long narrow shell of the design. The spaces have generated around the view points of the relics as they are the main exhibition of the museum.

On entry, the space separates into a viewing/circulation space and the permanent exhibition space. The permanent exhibition space narrows to lead you through the design ending in the large open cafe space that provides viewing points to relics. A temporary exhibition and flexible space have been allocated the majority of the upper level of the design with additional viewing platforms.

The laboratory space has been kept separate from the main form due to the specific programme requirements. The constant testing of contaminant substances seeks a detachment from public areas.
MASSING DEVELOPMENT

Iterations of form
Chosen - Form 2
- Needs more articulation
- Requires more engagement with the relics

1.
A. Articulation of front form to make most of the view
B. Lab bulk stretched along lower relics
C. Pod placement near entry into main form

2.
A. Adding in 2nd LVL
B. Panel simplifying forms so that the relics are the main focus from the exterior
C. Adding 2nd LVL & view points to the relics
D. Articulating Lab form
E. Articulating Pods
FIG. 133-Diagrams 1-4. Development on case site
3.
A. Adding roof form
B. Panel simplifying form allowing the relics to be the main focus from the exterior

4.
A. Articulating elevation view of roof
B. Articulating the lab form
C. Adding additional Pods
DESIGN LANGUAGE

Articulating form from the machines design language

FIG. 134-Developed form 1

Truss design from supports
Repetitive elongated form from crusher design
Repetitive form for primary structure & separation between both sides of the lower walkway
2nd Floor: Viewing deck for Cooling Tower forms
Landing Platform for stairs
1st LVL
Panel for detailing to the western wall and mirroring the eastern wall view control panel

2nd LVL. Temporary Exhibitions

Panel simplifying the main form so that the relics hold the attention of the viewer from the exterior

Truss design for roof detailing

FIG. 135-Developed form 2
Panel simplifying the main form so that the relics hold the attention of the viewer from the exterior.

Truss design for roof detail.

Conveyor support design.

Structure support design.

Elongated forms from crusher design.

2nd LVL for temporary exhibition & viewing deck to valley and relics.

1st LVL.

FIG. 136-Developed form 3
Truss design form supports

Curved elongated form from crusher design

East wall to mirror west panel

Repetitive detailing of design language acting as structural support

1st LVL Lab

Panel simplifying the main form so that the relics hold the attention of the viewer from the exterior

FIG. 137-Developed form 4
POD FORM DEVELOPMENT

Bulky in relation to the design language
Curved form softens the bulk. Develop curved design articulation
Visually fits with other developed forms

FIG. 138.
Panel simplifying the main form so that the relics hold the attention of the viewer from the exterior.

Truss design from supports.

Curved elongated form from crusher design.

Developed Pod form.

Truss design for support.

Repetitive detailing of design language acting as structural support.

FIG. 139-Developed form 5
FIG. 140 - Possible mezzanine cafe space

FIG. 141 - Possible gallery space, with varied viewing platforms to exterior forms

FIG. 142 - Possible viewing platforms and laboratory
FIG. 143-Developed forms orientated around site and remaining relics.
1 Viewing platform for ruins
2 Exhibition, Office & Bathroom space
3 Cafe & Exhibition space
4 Laboratory
5 Sleeping pod exhibition

FIG. 144-Final articulated form
7.3 Conclusion

The new intervention seamlessly integrates with the abandoned relics. The viewing platforms establish the relics as an aesthetically intriguing display and presents moments for historic reflection.

The industrial design language pays tribute to the original use value in a contemporary way.

The complexity of the forms have been strategically formatted as to not overshadow the relics. Panels have been placed in site lines to encase the relics as the primary visual attachment, this is also replicated in the interior. The interior of the form presents uninterrupted views, clean lines and a minimal colour palette.

The machine operates alongside the cooling towers. The establishment of the sleeping pods exhibition, generated from the design triggers, consistently fits in with the design and initiates the opportunity for the possible future use of a campsite.

This chapter has logically applied the design triggers and developed them to feature the age, historic and use values. This provides a means to conserve and a solution for the site's rehabilitation.
FIG. 145 (Facing) Exploded view of programme arrangement within the final developed form
AURA OF THE PAST
8.1 Introduction

This chapter presents the findings and the author's critical reflection of the thesis which aims to fuse the architecture of a toxicity museum and laboratory with the abandoned remains of the Puhipuhi Mercury Mine site. The programmes aim to generate flow and decontaminate the area.

The importance of the thesis is to provide a response for abandoned sites with challenging areas, either because the access or, as in this case, contamination.
SITE ACCESS
From SH1

FIG. 148.
MASSING DEVELOPMENT

From carpark to site

FIG. 149.
FIG. 151.
8.2 Programmatic response

The resulted design is a fusion of art and architecture. It is expressive and compelling, with a visual detachment between the old and new, yet programatically functions as a whole.

The main program of a toxicity museum strives to achieve an educational standpoint on contaminant sites supported by the remediation of contamination on the Puhupuhi case site.

8.2.1 Museum

Permanent and flexible exhibitions spaces have been allocated within the main form:

Permanent

1. Curated relics - see FIG. 153, 154
The displayed ruins are the main allure to the developed design. Various viewpoints have been established throughout the intervention for visual appreciation and education of these historic relics.

2. Permanent exhibition display - see FIG. 152, 163
On entry to the design, as you pass through the atrium, you enter the main exhibition space. This space presents the history of the case site as well as additional education on toxicity and tested remediation processes.

Flexible

Three exhibition spaces - see FIG. 164
Allows for the constant change of scenery and knowledge. Two are located off the main exhibition hall, stretching between the atrium and the cafe, and another one is located on the second level.
1. Exhauster/Fan [Relic]
2. Tanks [Relic]
3. Towers [Relic/Rain water collector]
4. Conveyor
5. Crusher
6. Grinder
7. Mixer
8. Exchange [Relic]
9. Pipe Battery [Relic/Neutral solution storage]
10. Water Tanks [Relic]
11. Cooling Trough and Pipes [Relic]
12. Furnace [Relic]
13. Entry/Reception
14. Staff Areas
15. Exhibition space
16. Sleeping Pods [Permanant Exhibition]
17. Laboratory
18. Bathrooms
19. Cafe
20. Storage
21. Plant Beds
22. Sprinkler System
1. Exhauster/Fan [Relic]
2. Tanks [Relic]
3. Towers [Relic/Rain water collector]
4. Conveyor
5. Crusher
6. Grinder
7. Mixer
8. Exchange [Relic]
9. Pipe Battery [Relic/Neutral solution storage]
10. Water Tanks [Relic]
11. Cooling Trough and Pipes [Relic]
12. Furnace [Relic]
13. Entry/Reception
14. Staff Areas
15. Exhibition space
16. Sleeping Pods [Permanant Exhibition]
17. Laboratory
18. Bathrooms
19. Cafe
20. Storage
21. Plant Beds
22. Sprinkler System
Exhauster/Fan [Relic]
Tanks [Relic]
Towers [Relic/Rain water collector]
Conveyor
Crusher
Grinder
Mixer
Exchange [Relic]
Pipe Battery [Relic/Neutral solution storage]
Water Tanks [Relic]
Cooling Trough and Pipes [Relic]
Furnace [Relic]
Entry/Reception
Staff Areas
Exhibition space
Sleeping Pods [Permanant Exhibition]
Laboratory
Bathrooms
Cafe
Storage
Plant Beds
Sprinkler System
TIME DEVELOPMENT

FIG. 155 Past, present and future site elevations
8.3 Architectural response

The main design of the intervention presents a contemporary industrial style through the collaboration of past and introduced elements. The overall form reflects that of an industrial history, enhancing the contemporary depiction of the narrative. As the establishment of remediation of the site was required before possible habitation, the machine was developed first and the main programmatic forms generated from this design language. To reduce historic and environmental disruption, the case site and remaining relics have guided the form. The entire design is contained within the limits of the processing plant site, as this is the only published test area for contamination. The heights and levels have developed around the existing structures and organic growth.

The interior of the design reflects a dramatic contrast to the external environment. Though developed through industrial features, the use of light framed steel construction presents a visually clean and crisp design that is refreshing as it sits in contrast with the decayed exterior relics, shifting the design into an integrated future.

Additional metal panels strategically block the view from the complex architectural design of the main form in certain areas, that would otherwise draw attention away from the curated relics.

The use of large amounts of glass is beneficial when viewing the artefacts from the interior of the intervention. It brings the exterior into the building for cohesive purposes, displaying the same narrative in different entities. The establishment of a curated display and the introduced intervention, as well as the interactive boardwalks, allow for a narrated journey through the site’s history.
FIG. 156.
FIG. 158—Interior view looking out from permanent interior exhibition space
FIG. 159-Second floor viewing platform. Displays contrast between deteriorated relics and new intervention interior.
FIG. 160—Exterior experience of machine and sleeping pods
FIG. 161 - Diagrams of The Machine

DISTRIBUTOR & LEACHING

MIXER

CONVEYOR & CRUSHER
8.3.1 The Remediation Machine - see FIG. 121 -125

The introduced machine is the main contribution to the site remediation. Relics have been integrated to be used as a resource and for aesthetic purposes. These ruins have been reconstructed with minimal intervention.

Limestone conveyed from the neighbouring quarry enters the introduced crushers that break down the large limestone forms. These forms then enter the mixer with the additional rainwater from the transformed cooling tower or the grey water from the dwellings. The smaller pieces readily dissolve in water, where the solution is then piped to the troughs and stored for distribution. The sprinklers are set manually dependant on weather. If rain is present then the sprinklers are not required, as this would supply too much leached solution to the plant beds. The process of phytoremediation is then use, where the plants absorb the contaminated solution. The plants are then removed and would be transported to a main waste treatment facility. This process is repeated.

All main elevations of the machine that face the building have been allocated a panel so as to prevent the complexity of the form from disrupting the view to the remaining relics from the interior of the design. One is able to access the elevated exterior platform surrounding the machine to witness its operation.
Permanent Exhibition
1. Screen for separation and privacy
2. Elevated Entry
3. Sleeping Pod
4. Communal Pod

FIG. 162.
FIG. 163.
FIG. 164.
FIG. 165.

SHORT SECTION 3
Aura of the Past

FIG. 165.
1. Cafe
2. Flexible Gallery Space
3. Storage
4. Flexible Gallery Space
5. Staff Offices
6. Permanent Gallery Space
7. Storage
8. Observation Deck
9. Lobby
10. Boardwalk
FIG. 167-Exterior experience on boardwalks
FIG. 168 - Main Gallery space
FIG. 169 - Flexible exhibition
8.4 Critical reflection

This thesis explored a variety of experiments on the case site. These were initially used to generate methods that could be translated to similar derelict site but through the analysis and design phases it was evident that the problems of the site were very site-specific. The extent of the contamination beyond the confines of the processing operations is unknown and, with my limited knowledge on toxicity and the spread of contamination, the machine, while capable of cleaning the site within the operational site limits in accordance with the 2015 toxicity report, may not have the capacity to clean the surroundings should the contamination spread further than anticipated. This is a weakness in the design and could be addressed in conjunction with scientists to analyse any spread of toxicity that might occur beyond the scope of the machine’s capabilities in this thesis.

The confines of the site presented a challenge, as keeping the design within the tree line was imperative to limit the disruption of contaminated soil. This was a deterrent from excavation and focused my attention on developing within the elongated site as it currently exists. I had to seek massing and space planning iterations that functioned within a narrow site and this hindered the occupancy levels that would have been possible had the contamination not been present.

The success of the proposal is dependant on its ability to become worthy of conservation, which is not only an architectural endeavour but a combined effort from public authorities, local communities and the designers. My approach, emphasising the narrative, sense of place and curation of the site and its history, support the intervention’s place within the community and adds credibility to the aims of this proposal.
FIG. 171-Machine view: neutralising solution stored in water troughs
8.5 Conclusion

The programmatic introduction of tourism presents Puhipuhi as more than just a transit zone. The new intervention offers a visible historic identity and expresses a playful visual that develops a sense of place within the region.

The intention of historic conservation is beneficial to the prevention of historic loss. With a damaged history there is no sense of urgency when abandoned elements reach their tipping point. The age and historic values elevate the normality of the mercury mine site.

Curation of the case site’s history is unique and intriguing, as the age value visually presents itself to establish an emotional and physical connection. The remaining relics present a narrative that coexists in harmony with the functioning of a toxicity museum. Beyond the aesthetics and the history, the use value of the introduced museum flourishes as an enhancement to the region and a revitalisation of the economy.

The final design solution enables the continuing of the current historic layer. Beyond the scope of this research, as remediation continues, we are presented with the opportunities of the 5yr – 10yr visibility plan displayed in ‘Chapter 3: Design brief’. This plan presents the foreseeable future, predicting:

• The complete elimination of the proposed gold mining
• The initiation of anticipated alternatives of walking/cycling tracks
• Expansion of the facilities as more land is reclaimed from contamination
• A complete self-sufficient design, with the ability to support surrounding farmlands in relation to vegetation growth
• Complete elimination of contaminants from waterways
• Environmental appreciation through the addition of a campsite

The intent of this thesis was to rehabilitate a site for current day use. The final design outcome of this research presents itself as something of value, not only as a witness to its history but as an enriching presence within the region. It captivates the history, honours remaining relics and documents disregarded memories establishing a site of significance.
FIG. 172-Rehabilitated site with the fusion of old and new architecture


Hauge, Ashild L. “Identity and Place.” Architectural science review, 50.1. 2017. Print


Longstretch, Richard. When the Present Becomes the Past. print


Scott, Fred. ‘On altering architecture’. USA, Canada: Routledge. 2008. Print


<http://www.arcspace.com/features/sambuichi-architects/inujima-seirensho-art-museum/>


<http://www.cultures-of-history.uni-jena.de/exhibiting-20th-century-history/germany/the-ruhr-museum-at-zollverein/#fn-number1>


<http://www.archdaily.com/180173/antakya-hotel-emre-arolat-architects>


<http://www.ennead.com/work/cape-horn>


<https://www.yatzer.com/the-ruhr-museum-hg-merz>


<http://www.japan-guide.com/e/e5725.html>


<http://www.thisiscolossal.com/2014/05/nishi-building/>


FIG. 80. Authors own image. "Glass panels in floor for visual connection." 2015  
FIG. 81. Authors own image. "Relics inform circulation path around site." 2015  
FIG. 84. Authors own image. "Camping structures." 2015  
FIG. 85. Authors own image. "Educational panels." 2015  
FIG. 93. Authors own image. "Minimal." 2015  
FIG. 94. Authors own image. "Facade transparency." 2015  
FIG. 95. Authors own image. "Large open space for fl exibility." 2015  
FIG. 99. Authors own image. "Forms drawn out from singular perspective." 2015  
FIG. 100. Authors own image. "Mimic landscape." 2015  
FIG. 102. Authors own image. "Forms bound by link way." 2015  
FIG. 103. Authors own image. "Use context as learning opportunity." 2015  

FIG. 107. Authors own Image. "Machine function and language analysis." 2015 pg125


FIG. 114. Authors own image. "Preliminary conveyor design." 2015 pg127

FIG. 115. Authors own image. "Preliminary crusher design." 2015 pg128

FIG. 116. Authors own image. "Preliminary mixer design." 2015 pg129

FIG. 117. Authors own image. "Preliminary distributor design." 2015 pg130

FIG. 118. Authors own image. "Developing the machine." 2015 pg131

FIG. 119. Authors own image. "Testing design ideas over the machine." 2015 pg132

FIG. 120. Authors own image. "Elevation of machine model with design ideas." 2015 pg134

FIG. 121. Authors own image. "Conveyor design." 2015 pg135

FIG. 122. Authors own image. "Mixer design." 2015 pg136

FIG. 123. Authors own image. "Crusher design." 2015 pg137

FIG. 124. Authors own image. "Distributor design." 2015 pg138

FIG. 125. Authors own image. "Leaching design." 2015 pg139

FIG. 126. Authors own image. "Conveyor retrieval process." 2015 pg141

FIG. 127. Authors own image. "Frame retrieval process." 2015 pg142

FIG. 128. Authors own image. "Conveyor skeleton retrieval process." 2015 pg143

FIG. 129. Authors own image. "Crusher retrieval process." 2015 pg144

FIG. 130. Authors own image. "Diagrams 1-6. Testing forms on case site" 2015 pg151

FIG. 131. Authors own image. "Programme's amenities tested on site." 2015 pg153

FIG. 132. Authors own image. "Integrating massed form and space layout." 2015 pg155

FIG. 133. Authors own image. "Diagrams 1-4. Development on case site." 2015 pg159

FIG. 134. Authors own image. "Developed form 1." 2015 pg161

FIG. 135. Authors own image. "Developed form 2." 2015 pg162

FIG. 136. Authors own image. "Developed form 3." 2015 pg163

FIG. 137. Authors own image. "Developed form 4." 2015 pg164

FIG. 138. Authors own image. "Pod form development." 2015 pg165

FIG. 139. Authors own image. "Developed form 5." 2015 pg166

FIG. 140. Authors own image. "Possible mezzanine cafe space." 2015 pg167

FIG. 141. Authors own image. "Possible gallery space, with varied viewing platforms to exterior forms." 2015 pg167

FIG. 142. Authors own image. "Possible viewing platforms and laboratory." 2015 pg167

FIG. 143. Authors own image. "Developed forms orientated around site and remaining relics." pg168

FIG. 144. Authors own image. "Final articulated form." 2015 pg169

FIG. 145. Authors own image. "Exploded view of programme." 2015 pg172

FIG. 147. Authors own image. "Overview." 2015 pg175

FIG. 148. Authors own image. "Site access." 2015 pg177

FIG. 149. Authors own image. "Massing development." 2015 pg178
Earlier stage of the Puhupuhi workings, from H. Ferrar et al. 1925 (Butcher)
Map of mine workings from J. Henderson, 1944. (Butcher)
Contour map of substrate pH in a quarry developed in mineralised rocks at Puhipuhi, showing wide acid pH variation (Craw)
Mineralised zones and general land use. Roads marked with heavy black lines have been surfaced with aggregate made from mineralised rocks.
Vertical cross sections for the Pupipupu area, summarising the effects of land use changes on arsenic and mercury mobility in soils.

The lower diagram shows the original fully-forested state. Arrows from this show evolution to the present land use situation, depicted in the upper diagram.

Land use changes involving agricultural lime addition and pH rise are highlighted on the left. Resultant metal discharges in water are shown with arrows at the top.