CONSTRUCTING THE CONTEMPORARY SOLDIER
REDESIGNING BURNHAM’S BARRACKS

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FIG 0.01 SOLDIERS TRAINING ("Soldier's training", n.d.)
The traditional design of military barracks is an identified issue throughout the world. Due to neglect, age and original design, their condition is causing soldiers to suffer both mentally and physically. Michel Foucault provides a theoretical perspective that underlines the reason for the poor approach to barracks design. He believes that it is to control and survey occupants. This theory has provided the theoretical overview for this study. It aims to discover ways in which barracks can be redesigned to enhance a soldier’s living condition, thus enhancing their overall health and well-being. However, well-being isn’t the only factor that requires consideration in the design of barracks. Military order, systems and function is vital towards the creation of a successful army. These elements should not be disregarded in the solution to an improved barracks design for soldiers. These two aspects, military order and well-being, generate a tension that tugs design elements in opposing directions. Design for military order is rigid, structured and efficient. Whereas design for well-being is soft, natural and has privacy. This thesis develops a barracks design for permanent, single soldiers that creates a harmony between these opposing tensions. The design is situated within Burnham Military Camp, New Zealand. Some of the buildings are currently in poor condition, presenting an ideal opportunity to develop a new barracks model for the camp. Multiple research strategies have been used throughout the process, beginning with historical and case study research to establish the foundations for the design. Following this, the overarching method used is research through design. This method informed the process of the design to be iterative, progressing upon critical reflection. The final design integrates the tensions of military order and well-being. It does this in a way that is not often seen within new military barracks today, creating the opportunity for progressive change within the field of military barracks design.
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Military barracks hold a negative connotation that is prevalent around the world. This has derived from the poor condition and nature of their designs over the course of history. Theorist Michel Foucault believes that the traditional style of barracks derives from a modern form of discipline; that the nature of their layout and design reinforces the notion of control and surveillance. This thesis researches further into this theory and finds in literature that this way of designing is causing soldiers to suffer from both mental and physical health issues. This has provided the incentive for this thesis to explore how well-being can be enhanced in the design of military barracks. Although this factor is crucial, it has an opposing argument around the concept of military order, function and practicality. These concepts create a design that is somewhat opposite to the ideal design for well-being. This thesis aims to explore each side, determine the factors that are important in each and create an integration of the two arguments, which will be referred to as 'tensions'.

The condition of military barracks is affecting New Zealand’s soldiers. The New Zealand Defence Force has identified that the Estate is in declining condition. Due to this, the government has put a plan in place called the ‘Estate Regeneration programme’. This programme aims to improve the Defence Force’s buildings, including the barracks. The task to improve the barracks is currently being developed under the New Zealand Defence Force’s Accommodation, Messing and Dining Modernisation Programme’. This programme presents the opportunity to rethink how the New Zealand barracks model is designed. Internationally, defence force’s around the world have already implemented strategies to improve their barracks accommodation for soldiers. The consistent goal within these new barracks is to improve the well-being for soldiers. Although the new designs attempt to improve well-being, they still contain many aspects that align with the traditional model; A large, multi-storey box-like form with clinical interior features. This creates a risk that the new barracks could quickly date and in a few decades time, will not meet standards of a future society. Therefore, this thesis aims to push the concepts a step further and determine additional elements that will improve the living conditions for soldiers in a New Zealand context.
### Research Question

How can traditional military barracks be redesigned to balance the tension between military order and design for well-being to support the well-being of soldiers within the New Zealand Defence Force?

### Aims and Objectives

This research aims to create a barracks model that incorporates both the functionality and practicality found within the traditional military structures as well as an improvement to soldier’s well-being. It is easy to imitate projects being done by precedent throughout the world. However, this research’s goal is to determine an alternative solution that provides even better living conditions to further enhance the soldier’s well-being. It will focus on being relevant in its context, as opposed to copying and pasting a design that is used in new military barracks models today. This will be done by the following:

- Analysing the progression that is occurring within new military barracks today and how these are applicable to a New Zealand context.
- Determining aspects that are successful as well as their limitations and challenging these new ways of designing barracks.

To design an alternative barracks model that solves issues around health while also maintaining the important aspect of military order. This will be done through an iterative approach to allow reflection and further improvement to the concept as the research progresses.

1. Researching the theory around military barracks and how the issues found might exist within military barracks both globally as well as New Zealand.
2. Researching the New Zealand Defence Force and determining aspects that allow the New Zealand military to run effectively in terms of their accommodation, thus developing the framework for military order’s ideal design.
3. Researching how well-being can be enhanced through design. This will be done by focussing on a small number of aspects that are relevant to military barracks to develop the framework for well-being’s ideal design.
SCOPE AND LIMITATIONS

Although the Estate Regeneration Programme's goal is to upgrade various types of infrastructure in the military, this thesis is mainly focusing on barracks. Barracks are a soldier's home and a home has been found to have a significant impact on one's well-being. The barracks, as an architectural entity, therefore present an opportunity to explore how one building type in the military can not only be upgraded, but positively benefit a soldier's well-being.

The breadth of barracks design is vast, varying throughout the multiple levels of hierarchy within the military. The scope for this thesis would be too large if it were to attempt to solve issues encompassing all barracks types. Literature research found that the barracks for recruits are designed to enhance the aspect of military order and hierarchy. On the other hand, the higher ranked soldiers who choose to live in barracks receive a higher quality of accommodation already. Therefore, this thesis will focus on the permanent, single soldiers who reside in barracks on-site.

A limitation to this thesis was the inability to gain qualitative data from the soldiers themselves. Due to the sensitivity of the topic and ethical complications, conversations with soldiers could not occur. Instead, this thesis is based around literature research. Soldier's feedback could be helpful in a further reflective process on top of the work that has been carried out in this thesis.

Research on design for well-being will find architectural aspects that should be considered in the new barracks proposal. 4 aspects of this broad topic have been chosen as they are the most significant factors that affect an occupant's well-being and related well to the aim of this thesis. These aspects consist of: The dwelling, sense of place, social and nature.

This project is a theoretical concept that is not bound by the full limitations of real practice. Therefore, budget, structure and client communication has not been taken into consideration. In reality, the design would be largely influenced by cost, structure and the client would have a significant input into the outcome. It is absent of 'real world' constraints and because of this, likely has limitations as to how it would work realistically. Instead, this thesis aims to have a focus on the soldiers and the military and what architecture can do to best benefit them. Its goal is to give readers an idea on what architectural aspects could be taken into consideration, allowing the design to provide ideas on alternative features for a future barracks model for New Zealand.
"Of the different modes of architectural research, it is design which appears to offer the most potent set of possibilities" (Jane Rendell in Fraser, 2013, pg. 118).

The dominant methodology undertaken to develop this thesis is research through design. This method encourages the process of design to be iterative and reflected upon along the way (Jane Rendell in Fraser, 2013, pg. 117). It allows the researcher to find answers to questions through design as opposed to other means. Although this is the case, this project aims to build the foundations for the design off literature research. This adds an additional research method that can be categorised as a combination of historical and case study research. Chapters 2-5 focus on using these two methods to understand the history and important information on the issue, the NZDF, well-being, progression in barracks design and the site. Therefore, this project takes the approach of using research through design to solve an issue found in theory and literature research.

Research through design has a focus on iteration and reflection. This has been incorporated into each section of this thesis. Chapters 2-5 include a reflection and critical evaluation at the end. This allows important aspects to be drawn out and identifies the limitations and challenges found within the research. From the design chapter onwards, this format alters. The design phase of this research involves an iterative approach which will be critically evaluated throughout the development of the design. This allows the architecture to evolve through design to create an improved outcome. The final design will then be reflected upon one last time in the final chapter.

A range of tools were used during the design process. Modes such as sketch, physical and digital modelling were the dominant tools, allowing a progressive and diverse process to occur. These various modes were beneficial to the research. By using physical modelling, scale was able to be established. This form of design tool was used during the massing phase. The scale of the models allowed the massing to be calculated and iterated correctly for the site. The mode of sketch had its own benefits, producing ideas rapidly and abundantly. Towards the end of the design phase, digital modelling was the main tool used. This allowed me to communicate the design intent appropriately. The digital tool produced clear plans, visualisations and detail to express the design that is a product of the research.
The structure of this thesis aims to allow the reader to understand the drivers behind the design and how the outcome has been produced. To do this, the thesis has 10 chapters that follow a logical order.

CHAPTER 2: Chapter 2 focuses on the issue that has influenced this thesis. It explores literature that provides the theoretical overview on the topic, as well as the extent of the issues found within military barracks.

CHAPTER 3: Chapter 3 aims to give an understanding of the New Zealand Defence Force, its history, values and culture. This will outline the way in which the military runs. It will focus on the 'military order' aspect of the two opposing tensions.

CHAPTER 4: This chapter explores the well-being side of design. It aims to understand what literature suggests would create better well-being through design elements. This is a focus on the 'well-being' aspect out of the two opposing tensions.

CHAPTER 5: Chapter 5 aims to give an understanding of the progression in new military barracks today. It focuses on countries who have made leading steps to improve their barracks and critically reflects upon whether or not these designs can, or should, be incorporated into a New Zealand context.

CHAPTER 6: This chapter explores the chosen site conditions and issues. This allows a solid base for the design to be built from, ensuring that the design works well in its military context.

CHAPTER 7: This chapter focuses on concept design. It explores the iterations, changes, reflections and results of design, which is influenced by the literature explored in chapters 2-6.

CHAPTER 8: Chapter 8 progresses the design to the developed design phase. It uses the critical reflection and critique from previous chapters and the August reviews to develop the design further and produce a final barracks design.

CHAPTER 9: Chapter 9 concludes the thesis. The design will be critically reflected upon. Both the successful and unsuccessful elements will be discussed, as well as how the research could be furthered following this study.

CHAPTER 10: This chapter has the references and figure list.
TERMINOLOGY

NZ – New Zealand
USA – United States of America
NZDF - New Zealand Defence Force
WO – Warrant Officer
US – United States
DOD - Department of Defence
UPH - Unaccompanied Personnel Housing
COO - Chief Operating Officer
BBQ – Barbeque
ADF - Australian Defence Force
SINGLE LEAP - Single Living Environment and Accommodation Precinct
N – North
NE - North East
NW – North West

Tensions:
‘Military order’: A general term that means the ways and reasons traditional military barracks are designed.
‘Well-being’: A general term to encompass the meaning of physical and mental health.
INTRODUCTION

This chapter aims to give a brief understanding of the drivers behind this thesis. Theoretical views will be explored in the form of a literature review. This will develop the theoretical framework for this thesis. The main theorists explored are Michel Foucault and Manuel DeLanda, who support the idea that barracks are in poor condition and do not enhance the well-being of occupants. Their theories will be critically reflected upon in order to find relevance to the research aims and objectives. This reflection will draw out the counter argument from Philip Smith, who supports the idea that military order has a significant role in barracks designs.

Following this, research into military barracks will be conducted to better understand the issues that Foucault and DeLanda have identified. These issues will be explored through barracks as a whole, before focusing on New Zealand itself. Lastly, The NZDF’s Regeneration Programme and traditional barracks typologies will be discussed. This aims to understand where New Zealand currently sits in terms of improving barracks for soldiers. The research in this chapter will provide a base understanding of both the positive and negative aspects of barracks design which will influence further research that will occur within this thesis.

THEORETICAL FRAMEWORK - LITERATURE REVIEW

Introduction
Military barracks have been designed inadequately in the past, causing harm to soldiers’ well-being. Theory’s exist that explain the reasoning behind their design and in order to understand these, a series of texts have been reviewed. The accommodation for soldiers in the form of military barracks has been a discussion for a range of theorists. One of particular importance is Michel Foucault, a French philosopher who published the book named ‘Discipline and Punish: The birth of the prison’ in 1975. A second important philosopher is Manuel DeLanda. This review will focus on his article named ‘Beyond the Problematic of Legitimacy: Military Influences on Civilian Society’, published in Boundary 2, 2005. Here, he supports and expands on Foucault’s notion of control. The goal of this literature review is to determine the reasoning behind the traditional design of military barracks. It aims to explore Foucault and DeLanda’s theories that look to uncover these reasonings and challenge them in order to determine whether military barracks should be reinterpreted in today’s society. These theorists’ ideas will be challenged by the views of author, Philip Smith. The review will critically evaluate to what extent theorists’ concepts on the topic should be taken into consideration in the design of a new military barracks model.

Theory
Within the book ‘Discipline and Punish’, Foucault discusses his theory on the design of buildings such as prisons, schools, hospitals and military barracks. He theorises that they are built to portray the notion of control (Foucault, 1977, pg. 138). He discusses military barracks mostly under the section for ‘discipline’. He explores how discipline in a modern sense differs to that of the past, highlighting that nowadays it is achieved through more subtle forms. “In the first instance, discipline proceeds from the distribution of individuals in space” (Foucault, 1977, pg. 141). Rather than it be through one centralized power and physical means, there is now a series of smaller nodes who control through the design of architecture. The subtleness is accomplished through creating spaces in order to achieve control over the occupants within (Foucault, 1977, pg. 191).
Foucault expands on how this control is achieved, discussing the concept of the ‘art of distributions’. This concept suggests that to control occupants, they must reside within non-permeable spaces that are designed to control movement. This is done through the cell-like design seen in traditional barracks, aiming to regulate masses and create a separation to the outside world (Foucault, 1977, pg. 141). Control through space is also achieved through the use of surveillance. 

Foucault describes that spaces are ‘analytical’, designed to allow better supervision of what occupants are doing. This concept of supervision is evident in the traditional open-plan barracks designs. With one large, open room housing multiple bunks alongside each other, supervision of soldiers is easily achieved. However, barracks designs have developed to become more private, somewhat reducing the extent of supervision in barracks. The way in which barracks are designed today with their multi-storey, block-like structures with bedroom beside bedroom, suggests it has just developed into a modern form of supervision. One final form of control that Foucault discusses is the notion of rank. Hierarchy of spaces assigned to various ranks aids in control by encouraging lower ranked occupants to work hard in order to live in better quality accommodation (Foucault, 1977, pg. 147). This is evident in the design of military barracks, where higher ranked soldiers clearly receive better accommodation and amenities than soldiers of a lower rank.

Foucault’s theories on control is further supported by Manuel DeLanda, who suggests that this need for control has derived from the desire to control large bodies of people (DeLanda, 2005, pg. 119). In a military context, this has formed from the multitudes of people who make up an army. He goes on to describe that control was enforced on soldiers through training and pinning them to their bedrooms. In order to do this, the design of barracks was based around controlling the soldiers and ensuring they can be monitored efficiently (DeLanda, 2005, pg. 119). DeLanda discusses that collectively, a group will succeed. However, individually they may fail. He connects this concept to soldiers on the battlefield (DeLanda, 2005, pg. 119). But could this be applied to soldiers’ daily lives? While training, they may succeed as a group and produce the soldier the military requires. However, when split from the group and left to be the individual self within their bedroom, do they fail? This could be argued by the state of soldier’s mental health and declining retention rates. Therefore, Foucault and DeLanda’s theories do play a significant role in order to improve living conditions for the soldier.
Discussion

Foucault and DeLanda believe that the design for military barracks does not aim to provide a good quality of life for soldiers. They believe that instead, barracks act as a means of obtaining control and surveillance. But should this be challenged? Is the notion of control an important aspect to military order? The military’s structure has depended on hierarchy and authority throughout history. Foucault outlines this fact, when discussing philosophers dreams of a perfect society, he states that “there was also a military dream of society; its fundamental reference was not to the state of nature, but to the meticulously subordinated cogs of a machine… not to the general will but to automatic docility” (Foucault in DeLanda, 2005, pg. 3). Foucault suggests that this is a negative aspect of the military, acting as a driver for the poor design of barracks. Author Philip Smith provides another view on this, stating that “although there is deep individuation and increasingly local autonomy of action [in the military], there is also a passive dependence upon authority” (Smith, 2008, pg. 275). Having rank within the military allows it to run successfully and produce soldiers who are well trained and ready for combat. Soldiers need to be willing to support one another and fight for each other on a battlefield. The systems at work in the military are there to allow this to happen. From the training that they receive, to the way that they dine together in a Mess. The social aspect of the military is significant; therefore it could be argued that the way traditional barracks have been designed is to encourage these social bonds and allow for a successful army. The structured body of soldiers who are a product of the military systems in place creates an army capable of supporting our society. It seems as though there are two opposing arguments that are each important aspects to consider in military barracks design. On one hand, that the design of military barracks is to control and the soldiers are suffering because of it. A normality should be implemented into military barracks designs that aligns them with standards of civilian society. While on the other, the control measures are necessary in the creation of a successful soldier and military. There are traditions that should not be altered as they keep the military machine running successfully.

Conclusion

The well-being of soldiers is negatively affected by the design for control as discussed by Michel Foucault and Manuel DeLanda. However, traditional military structure and systems are fundamental to create a successful army and soldier. I conclude that the concepts that Foucault and DeLanda support should be considered in new military barracks designs. However, I believe military order should not be entirely abolished and a link should be made to connect the two opposing concepts. A harmony should be found between the two that allows for improved living conditions for a soldiers well-being, without eliminating the military order that is necessary.
Robin Toft Klar and Susan O'Hara outline that the World Health Organisation considers military barracks to be a congregate or shared house setting. These settings are prone to generating communicable diseases due to the density of people living under one roof (O'Hara, 2017, Pg. 55). This is mainly an issue within barracks that house multiple soldiers in the same room. The influenza of 1918 was a demonstration of this, taking the lives of soldiers living within Featherston Barracks (New Zealand) where the disease was easily spread. Figure 2.03 shows the rows of barracks that held soldiers in this way ("Influenza at the Featherston barracks", 2013, Para. 1).

As well as physical health, mental health issues are greatly present in the military. In the UK, the reported mental health rates in the army have doubled over the last 10 years from 1.5% to 3% ("House of Commons Defence Committee", 2018, Pg. 13). They believe that this statistic could actually be closer to 10% due to unreported conditions ("House of Commons Defence Committee", 2018, Pg. 21). These mental issues within the military are thought to be caused by the rigorous schedule, training, accommodation, environment and the nature of deployment that a soldier endures.

The role that barracks play towards this is evident when exploring a
sense of opinions towards them. Traditional barracks have been labelled as discipline factories for soldiers (Black, 1991, Pg. 70). Brad Howard relates the barracks to college dormitories and describes them as “large filing cabinet-like buildings” (Howard, 2018, Para. 1). In the UK, Johnny Mercer states that soldiers live in barracks that are “not fit for animals” (Mercer, 2019, Para. 1). As there is little privacy, drama and tension occurs more frequently. Soldiers work with their neighbors and/or roommates, therefore there is little differentiation between work and home (Lightfoot, 2019, Para. 4).

While looking into the condition of the NZDF estate specifically, similar issues were found to be apparent. The condition of the entire estate within the New Zealand Defence Force (NZDF) has declined significantly over time. As it is currently, it does not meet the standards of today’s society. Many of the buildings are in poor condition and are reaching the end of their life span (“Ministry of Defence”, 2016b, Pg. 71). This is largely due to the little investment that the Estate has received. Because of this lack of budget, in order to deliver on capabilities, the military has resulted in creating temporary solutions to its buildings and depending on ‘reactive maintenance’ (“Ministry of Defence”, 2016a, Pg. 11).
Within the NZDF, the most important factor is its people. Without the people, there would be no military ("Ministry of Defence", 2016a, Pg. 15). One consequence to the Estates degradation is the way in which soldiers are living. Not only are the barracks old, but many of them contain a layout that provides little privacy and amenity. This is causing soldiers to suffer both mentally and physically, making them dissatisfied and threatening the retention of personnel for the NZDF ("Ministry of Defence", 2016b, Pg. 72).

One specific military camp that requires attention to its architecture is Burnham Military Camp. Numerous sources recall the poor condition of Burnham’s buildings near the beginning of the camp’s conception. Charles Upham described Burnham’s buildings in 1939 as being “grim, Bortsal-like buildings” (Upham in Amodeo, 2008, pg. 15). Conditions improved when an upgrade to barracks occurred in 1962. These were built in order to provide a more acceptable standard of accommodation for soldiers. In the 1990’s, a further upgrade was carried out and 10 more barracks blocks were built. However, although they were an improvement for their time, they are now outdated and in need of further development.

John McCrone states that “you can immediately see where New Zealand’s taxpayer dollars are not being spent” (McCrone, 2018, Para. 6). He describes the camp’s architecture today as being unsightly, low buildings made mostly of “breeze block and un-landscaped, set in a confused grid of roads” (McCrone, 2018, Para. 7).

The Defence White Paper 2016 lists 4 aspects that will achieve regeneration of the Estate ("Ministry of Defence", 2016a, Pg. 12):

- A safer, contemporary and cost-effective Estate
- Opportunities to rationalise and consolidate the Estate
- Increased investment
- Improved strategic asset management and an increase in senior level scrutiny of infrastructure investment.

The goal for the architecture is to provide spaces that are multifunctional and flexible, fit-for-purpose, reduce the cost of maintenance, enhances well-being and supports future capability. The upgrade will ultimately aim to improve the recruitment, retention and well-being of the Defence Force’s personnel. This is not aimed to be achieved through creating ‘like for like’ buildings, but rather by creating improved designs that will accommodate the contemporary soldier ("Ministry of Defence", 2016a, Pg. 1 & "Ministry of Defence", 2016b, Pg. 71).
TRADITIONAL BARRACKS TYPOLOGIES

1. Low density, house-like form with an open-plan interior. Houses multiple soldiers within one room. Bunks set up beside each other with little privacy.

2. Quonset hut. Low density, shed-like, half cylinder form that has interior like No. 1.

3. High density, block-like, concrete form that holds many soldiers within. Can be individual rooms or shared.

4. High density, block-like, timber form that has house-like features. Similar interior layout to No. 3.

5. Tent barracks. Canvas materials and temporary solution. Used in the past as permanent barracks or for deployment.

6. Larger tent barracks. Canvas materials and temporary solution. Used in the past as permanent barracks or for deployment.

The images to the left are a series of traditional barracks typologies. Exploring these aims to get a better understanding of the visual outcomes of some poor barracks designs. These are described in more detail below:

1. Low density, house-like form with an open-plan interior. Houses multiple soldiers within one room. Bunks set up beside each other with little privacy.

2. Quonset hut. Low density, shed-like, half cylinder form that has interior like No. 1.

3. High density, block-like, concrete form that holds many soldiers within. Can be individual rooms or shared.

4. High density, block-like, timber form that has house-like features. Similar interior layout to No. 3.

5. Tent barracks. Canvas materials and temporary solution. Used in the past as permanent barracks or for deployment.

6. Larger tent barracks. Canvas materials and temporary solution. Used in the past as permanent barracks or for deployment.
The literature review conducted in this chapter determines the theoretical overview for the thesis. It found that Michel Foucault and Manuel DeLanda had a strong stance concerning the negative aspects of traditional barracks designs. Further literature explored confirmed their theories, showing that there is an issue within the design of military barracks that negatively affects a soldier’s well-being. A soldier endures great hardship while in deployment, creating a lot of the negative health issues identified. However, barracks play a significant role and a soldier should be able to return home to a comfortable dwelling. Foucault and DeLanda’s theories will drive the motivation towards the well-being side of design. On the other hand, research also found that aspects of the military’s way of designing still has its place. These systems are important in creating a successful army. This drives the motivation to sustain important aspects of the way in which the military designs its barracks. These two opposing drivers are both significant. Therefore, it is important that the health of occupants is considered, while not completely compromising the structures and systems that the military has in place.

The Regeneration Programme that the NZDF has put in place is a progressive step to improving the living conditions for its soldiers. It is the beginning of change, providing an opportunity for a new barracks design to be considered. This thesis will explore one form of a new barracks model that merges the two tensions of military order and well-being. The next chapter will focus on the NZDF, providing the military order aspect of design.
This chapter aims to provide an understanding on the New Zealand Defence Force and how it operates. It will focus on the values of the organisation, the soldiers, their accommodation and the military estate itself. By exploring these aspects, a better sense of military order can be obtained. It will paint a picture of the reasons why the NZDF is the way it is and how military order influences this. This will then be reflected upon to outline what needs to be considered as the design progresses.
The NZDF is comprised of 3 areas; The Army, the Navy and the Air Force (Rolfe, 1999, Pg. 33). There are approximately 15,000 personnel who serve the NZDF in all 3 areas. The Army itself contains the highest number of personnel, approximately 4600 in 2016 (“Personnel Summary”, 2019). There are various military bases across New Zealand, as highlighted in Figure 3.02.

The New Zealand Defence Force plays a significant role in protecting both the NZ community and the country. It does this by providing well-being, safety, security, prosperity and resilience (“Ministry of Defence”, 2018, Pg. 5-8). The White Paper 2016 states that the NZDF supports and follows the values of New Zealand, preserving the community’s trust in the military. The NZDF must be made-up of personnel who are highly trained and skilled professionals. They are required to be disciplined, physically and mentally strong, flexible and combat competent, making them fit and ready to defend the country (Rolfe, 1999, Pg. 34-35 & “Strategic Defence Policy Statement 2018”, 2018, Pg. 11).
THE SOLDIER

When a soldier first enters the NZDF, they begin their initial training before they can specialise in their particular fields of the military. This training is an intense time for a soldier, often working more than a normal working week. Once soldiers complete this training, they are posted to their specialised fields. This is also when they decide if they will reside within barracks or the wider community where they will be required to commute to their camp ("Life in the NZDF", 2019). The NZDF aims to have about 1/3 of soldiers living on-site in barracks, 1/3 in military housing and 1/3 out in the community.

Soldiers will develop very strong friendships with their peers. Many aspects of military order aims to encourage this. These social bonds are important within the military to ensure happiness, well-being and a closely connected army ready for combat.

The intensity of a soldier’s training, paired with the nature of deployment, means that the NZDF recognises it is important to maintain good mental, emotional and physical well-being ("Life in the NZDF", 2019).
Soldiers operate on strict routine schedules. This schedule exists to ensure personnel receive the training and social interactions required to become diligent soldiers. The NZDF aims to have their daily schedule align with a civilian working day, allowing soldiers to maintain a balance between work and personal life.

During a soldier’s down-time, they are able to partake in any activity they please. The NZDF provides facilities for a large variety of sports and hobbies and has many existing sports, musical and cultural teams that soldiers can join ("Life in the NZDF", 2019).

Soldiers eat together in a building named the ‘Mess’. The military provides soldiers with breakfast, lunch and dinner which are all eaten here. By having soldiers eat together at the Mess, the military is encouraging stronger social bonds.

A typical NZ soldiers’ daily schedule:

6.30am: Wake up
7.00am: Breakfast at the Mess
7.45am: Work
(7.45am Tuesdays and Thursdays report to gym to conduct 1 hr of physical training)
11.30am: Lunch (1 hr break) at the Mess
12.30pm: Work
(15 min afternoon break)
5.30-6pm: Dinner at the Mess
Historically, the militaries around the world haven’t always accommodated its soldiers on base. When exploring the UK’s military history, reasons unfold as to why soldiers should be housed on-site. Up until the 17th century, soldiers were largely accommodated for through billeting. However, this became an issue when it was identified that it was negatively impacting the ability to have a cohesive Army. Having soldiers placed within the community, separated from one another resulted in a lack of discipline and competence (Childs, 2011, pg. 4). The first barracks to be built to accommodate soldiers on-base was the Ravensdowne Barracks located in Berwick-upon-Tweed (Figure 3.04). These barracks resembled a traditional style of military barracks made of stone, holding multiple people to a single room. There were two of them, sitting at 3 storey’s high around the parade ground, each of which could house up to 300 soldiers (Childs, 2011, pg. 7). This ensured soldiers were accommodated for on-site to enhance the Army.

New Zealand’s Army was formed later than the United Kingdom. In 1886, the New Zealand Defence Act was formed and by 1911, a regular force for New Zealand had been established. Figure 3.06 shows the canvas tents that were used as accommodation on-site at the beginning of the NZDF.

Rank is present within the NZDF, allowing for successful operation of the army and a progression of career for personnel. This rank is demonstrated in figure 3.05.

Within the NZDF, there is a strong hierarchy present in the way soldiers are accommodated. When a soldier first enters the defence force as a Recruit, they are housed within buildings that resemble traditional style barracks. These barracks hold multiple soldiers within one room. By accommodating the new recruits in such a way, they gain powerful skills and discipline that set them up for the following stages of their military career. Having them live amongst one another so closely, they get to know fellow soldiers and develop strong bonds that is significant for a successful army.

Once they have graduated from their initial training and move into corps training, they are housed in barracks that have single, unshared rooms. The Warrant Officers and Sergeants get their own barracks and Mess.

This content is unavailable. Please consult the print version for access.
* FIG 3.06  WAIOURU MILITARY TRAINING CAMP, 1940’S ("Waïouru military", n.d.)
Historically, the military has used temporary materials with a short lifespan such as canvas or timber. The use of canvas has been largely due to the nature of deployment and the requirement for a temporary accommodation solution. The military has now moved away from these materials in permanent bases due to their high maintenance and poor quality. Instead, materials used in military infrastructure aim to be low maintenance and cost effective. These are materials such as concrete, corrugated iron, steel and masonry. Ideally, a new design of military barracks would use materials of this nature in order to support the notion of military order.
In order to better understand the military order aspect of barracks design, an ideal massing model has been created. This model has been developed from the information gathered in this literature research and the nature of traditional barrack layouts. The ideal military order model was found to be a series of large block buildings placed alongside each other in a neat row. This design is efficient in that it houses many soldiers within one building and takes up little space with the orthogonal nature of the buildings and their layout. Housing multiple soldiers within one building also creates a high number of social interactions, which is encouraged to achieve military order.
3.0 THE NZDF - MILITARY ORDER

*FIG 3.11 'MILITARY ORDER' IDEAL MASSING MODEL*
WELL-BEING

It is clear after researching the history of accommodating soldiers in the UK that such a separation of the army does not work. Unit cohesion is important in the military and something they strive to achieve. The design should aim to encourage social connections, enhancing the military’s unit cohesion.

Although it seems like initial recruits should get better accommodation, I believe that it is not the best use of resources to upgrade their barracks. The barracks used for initial training are designed in such a way that promotes more positive outcomes than negative. Not all recruits carry on a career in the military, therefore it would be better to invest in barracks for more permanent soldiers first. Warrant Officers and Sergeants are deserving of better accommodation due to their rank and commitment to the Army. This aspect is already recognised by the military, therefore these barracks are in less need of an upgrade. Through my research, I believe that the permanent, single soldiers are at most harm due to their barracks accommodation. Their accommodation isn’t up to standard in today’s society. These soldiers will be the focus for a new design for military barracks in New Zealand.

Although the ideal military order massing model works well for efficiency and social interactions, it poses issues around the well-being of soldiers. It creates a design that has little privacy, homeliness or individuality. The result is a design that works well in the creation of a successful army, however, falls in the support for the soldier’s health. It is recognised by the NZDF that health and well-being is vital for a successful army and happy soldier. Therefore, a new military barracks model should not follow the path of this model, but rather draw from the successful attributes it contains and create a new model that integrates design for well-being. The following chapter will explore what aspects of design support positive well-being of occupants and create the ideal massing model for this.

REFLECTION

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INTRODUCTION

This chapter will explore what elements of architectural design will enhance the well-being of occupants. It intends to progress from Foucault’s theory on how the traditional barracks are designed to control, and find what can be altered in order to improve the design of barracks today. It was found that architecture goes beyond the concept of being a visual artwork and can have a significant effect on an occupant’s mental and physical well-being. People associate meaning to the dwelling, making it a place of significant influence. After exploring this further, it was found that humans desire a sense of place. People develop a connection to places and need a comfortable home to return to each day. Another aspect that influences mental and physical health is social well-being and the connecting factors of density, privacy and control. Occupants need a balance of density and privacy, and once they achieve this, they gain a sense of control over their environment. The last aspect found to be of importance is the presence of nature. Nature and biophilic design are a part of human history. People respond positively to being surrounded by nature, which is shown in numerous studies conducted around the world. When these main factors are achieved, positive physical and mental health is enhanced. The goal is to explore these significant aspects of design that encourages well-being in order to find what could be incorporated into a new barracks model.
Architecture encompasses a large proportion of people's daily lives. The average human spends approximately 90% of their time indoors (Kellert, 2012, pg. 157). This allows architecture to have a profound effect on people, whether that be through visual, sensual, physical or mental means. Architect and Professor Juhani Pallasmaa suggests that "Instead of creating mere objects of visual seduction, architecture relates, mediates and projects meanings. The ultimate meaning of any building is beyond architecture; it directs our consciousness back to the world and towards our own sense of self and being" (Pallasmaa, 2014, pg. 13). He is suggesting that architecture is much more than a visual outcome. Rather than vision alone, architecture can evoke multiple sensory encounters, thus strengthening one's experience of life (Pallasmaa, 2014, pg. 45). This is further supported by Architect and Author, Amos Rapoport. Rapoport believes that meaning generates a person's response to an environment (Rapoport, 1990, pg. 13). He explains that the meaning associated with the dwelling is notably important. People generate strong personal and emotional connections to their home (Rapoport, 1990, pg. 22). Christian Norberg-Schulz believes that this makes the dwelling more than a shelter, it is the "meaningful relationship between man and a given environment" (Norberg-Schulz, 1987, Pg. 20). This, along with the amount of time one spends in their home, gives the dwelling a unique capacity to influence an occupants mental and physical health. In order for a dwelling to enhance the occupants well-being, it should ensure stress and accidents are minimised (Lawrence, 2017, Pg. 23). It should be a place one can take refuge and relax, enabling them to remove themselves from any outside stresses (Norberg-Schulz, 1987, Pg. 20).
SENSE OF PLACE

'Sense of place' can be defined as a person’s reaction to their environment. This can be through the meaning, emotions, experiences or even memories that are associated to it (Roberson, 2010, Pg. 2032). Dr. Lisa Waxman believes that the notion of a 'sense of place' is valuable in that it grounds us, allowing us to have a sense of belonging (Waxman, 2017, pg. 159). She suggests that humans develop an attachment to spaces, creating an emotional connection. Jonathan D. Sime describes how this emotional connection between a person and their environment turns a 'space' into a 'place' (Sime, 1986, Pg. 51). Norberg-Schulz expands on this, adding that a place equals a "space plus character". Creating a 'place' is what makes an architectural design successful for the occupant. An aspect for a space to become a place is to incorporate the meanings that are in its environment, making the architecture familiar and relevant to its surroundings. Each culture associate's familiarity in different ways. What one person believes is homely could be the opposite to another. Therefore, it is essential to explore what aspects of the surrounding context contribute to its 'sense of place' (Norberg-Schulz, 1987, p. 18). These concepts have a significant effect on one's mental and physical well-being. If the place has a positive association to the occupant, their health will thrive (Mina Najafi, 2011, Pg. 1055 & Waxman, 2017, pg. 162).

SOCIAL

Angela Liegey Dougall, Stacie Spencer and Andrew Baum have written about the idea that there are 3 aspects that indirectly effect well-being in terms of social interaction. These 3 aspects are privacy, density and control (Dougall, 2007, Para. 3). Density and privacy are described to impact occupants negatively when isolation or overcrowding occurs. In an overcrowded environment, control of social interactions and privacy is reduced, causing a decline in their overall health. This leads to a retraction from social encounters and even isolation, which is not a healthy scenario for humans to be in (Dougall, 2007, Para. 2-3). An isolated environment can evoke stress. People require human interaction, however, only in controlled amounts that enable a healthy balance between personal and social time. This is evident in the 1970's studies these authors have discussed that explore the behaviour of occupants in university dormitories. During the first few weeks of living in traditional dormitory style accommodation, occupants were more competitive, reactive and willing to meet new people. This would suggest that the military tradition to house new recruits in open-plan barracks has a positive effect, allowing soldiers to meet more people than they would otherwise. However, these positive outcomes wore off between 3-7 weeks and occupants began to display negative reactions. The conclusion was that this layout generated unwanted and high occurring interactions. It caused occupants to isolate themselves and feel as though they didn't have control of their communal areas. To improve this, the design should allow for both planned and chance encounters to occur. This was found to be best achieved in 'suite-style dormitories', creating smaller clusters of people with more privacy, however still surrounded by others. Communal areas and pathways are other aspects that encourage these encounters and create a positive atmosphere for enhanced well-being (Waxman, 2017, Pg. 162 & Dougall, 2007, Para. 5).
The effect of nature in design has been a topic of architectural interest for a long time. Author Stephen R. Kellert stated in 2012 that people’s need for nature has come from our biological origins. The natural environment has encouraged humans to adapt, survive and thrive (Kellert, 2012, pg. x). Throughout the course of history, humans have lived in a very natural world. Only recently have we constructed the built environment that encompasses 90% of our daily experience that is, for the most part, disconnected from nature. It is believed that human’s mental, emotional and physical health is reliant on the presence of nature (Alex Wilson in Kellert, 2008, Pg. 325). In architecture, this concept is called biophilic design, which aims to connect an occupant to the environment. Kellert discusses 2 main aspects of biophilic design that will influence an occupant’s well-being. The first is the direct experience of nature, which includes aspects such as ventilation, natural light, plants, water and landscape. The second is the indirect experience of nature, which includes elements such as natural forms, colours, patterns and images (Kellert, 2015, Pg. 9). Not only will the individual benefit, but so will the community as a whole. When a community is exposed to these natural elements, either directly or indirectly, it will obtain a higher quality of life, stronger sense of place and stronger social bonds. Incorporating these aspects into design will allow both the occupant and the communities’ health to prosper (Kellert, 2008, Pg. 4).
This concept has been proven in numerous studies. One of these studies is outlined by Howard Frumkin, who explains that a group of investigators at Johns Hopkins University carried out a study on patients who have undergone a bronchoscopy procedure. 40 patients were assigned a room with a view to nature before the procedure and played the sound of a bubbling brook during the procedure. Whereas another 40 patients were not given natural views or sounds. The result was that patients who experienced nature before and during the procedure had better recovery results, stating 50% more “excellent” and “very good” pain results (Howard Frumkin in Kellert, 2008, Pg. 110). Another study carried out in Sweden looked at people’s opinions on the matter through focus groups. This produced result’s outlining how people react to architecture who may not have an architectural background. A notable observation in this study was participant’s opinion on the materials used in buildings. They stated that using wood as a building material enhances mood and overall well-being. They thought that a lack of wood produced an institutional space, whereas a space with wooden features was warm, comforting and able to improve health (Bysheim, 2016, Pg. 20). Wood as a material has been proven to improve the health of people it surrounds. It achieves positive health benefits such as lower stress levels, increased attention, focus and creativity, quicker recovery and reduced pain perception. Wood can achieve this because it is a warm, comforting and natural material.

“Nature is a part of our humanity, and without some awareness and experience of that divine mystery man ceases to be man.”
- Henry Beston (Kellert, 2015, Pg. 22)
To compare against the ideal military order model, a massing model for well-being has been generated. Its design and layout is influenced by the information gathered through literature research on well-being. This literature suggested that unit-style buildings that have privacy without isolation would greatly enhance an occupant’s health. These would be sitting amongst clusters of nature that adds a biophilic element to the design. The massing model demonstrates this, giving an overview of what an ideal barracks model might look like if it were to be designed purely for well-being.
FIG 4.05 'WELL-BEING' IDEAL MASSING MODEL
REFLECTION

It is critical to consider aspects of design that affect well-being to truly improve a soldier’s quality of life within the barracks. This chapter has focused on 4 areas that are likely to have a significant effect on soldier’s health: The dwelling, sense of place, social and nature. The research found that each aspect affects an occupant’s well-being in some way.

The dwelling should provide a home, full of positive connotations. It should act as a comforting retreat for soldiers to return to after the stresses of work, training and deployment. This can be done by incorporating elements that give it a ‘sense of place’. This will aid in giving the dwelling meaning and relate the architecture to its New Zealand context.

The social aspect of design should be delicately tampered with to create a balance between chance encounters and privacy. The current model of barracks with either open-plan rooms or dorm-style buildings creates too many social interactions. The well-being stance suggests that unit-style architecture could improve this while still allowing for chance encounters, however at a smaller, more controlled scale.

Biophilic design greatly improves well-being in architecture. Allowing the soldiers to experience more nature will ensure that the barracks are providing a healthy environment. The best ways to do this is through materiality and views. The material proven to provide the most health benefits by nature is wood. Therefore, using wood as a material will be considered. Natural views can be achieved by having tree’s surrounding the bedrooms of the barracks. This will ensure soldiers are experiencing an abundance of nature daily.

The findings from the research on well-being will be used to influence design decisions that aim to enhance a soldier’s quality of life. Incorporating the 4 factors of well-being explored in this chapter will add the well-being end of the tension into the new barracks model. The next chapter will look at precedents of barracks designs. This will discover what is currently being constructed to improve soldiers living conditions and determine whether or not these designs should be challenged.
INTRODUCTION

There has been a shift in barracks designs internationally due to widespread cultural and societal changes. Military's across the world have recognised that the barracks accommodation for soldiers is inadequate in today's society. This chapter explores some of what the United States, Australian and Danish Defence Forces have achieved in their progression to improve barracks for soldiers. It discusses the drivers for change, the designs created and how these are unique to each individual country. 2 precedents have been chosen each for the U.S.A and Australia, plus an innovative project in Denmark. These will be explored in depth to gain a further understanding of the dynamics of their new barracks designs. Some are then reflected upon at the end to determine both positive and negative aspects, thus determining what could be incorporated into a barracks design for New Zealand.
The United States (U.S) Department of Defence (DOD) has identified that approximately 2/3 of the military accommodation for soldiers is not up to standard (Stewart, 2001, Pg. 1). They are outdated and in poor condition. Soldiers living in these barracks share their bedroom with several other soldiers and use communal facilities such as toilets, showers and laundry rooms (Holman, 2003, Pg. 4). In order to overcome this, the US DOD are aligning new designs to match the local housing market, creating apartment-style buildings to accommodate soldiers. Their goal is to enhance soldier’s quality of life, enabling the military to better attract and retain personnel (Holman, 2003, Pg. 1). The type of military accommodation the US DOD is focusing on upgrading is the Unaccompanied Personnel Housing (UPH). The design of UPH now has some key goals and considerations, with the main one being to provide adequate, comfortable housing by increasing personal space, privacy and recreational amenities (Mion, 2017, Para. 15). To add homeliness, the U.S.A aim to have a residential character for their new barracks designs (Mion, 2017, Para. 16). The standard floor plan layouts for these new designs are called the 1+1 barracks design, shown in figure 5.02.
Fort Meade barracks, located in the state of Maryland, underwent an upgrade in 2003. Previously, only married or senior unaccompanied soldiers were offered a higher quality of living. Michael DeLaRosa, the COO of Covias Group, states that "if we are providing such a great standard of living for family service members and now for senior unaccompanied enlisted service members, it seems natural to also offer that exact same standard for our enlisted junior soldiers" (DeLaRosa, 2013).

Upgrading Fort Meade’s barracks has resulted in an additional 800 beds (Wotapka, 2013, Para. 3). These are located in 8 new barracks buildings standing 3 storey’s high (Holman, 2003, Pg. 17). The new design is based around the 1+1 barracks design. Each unit contains either one or two bedrooms, kitchens, private bathrooms, walk in wardrobes, climate control, storage, laundry facilities and either a private or common living area (Wotapka, 2013, Para. 3) (Bongioanni, 2013, Para. 4). Michael DeLaRosa states that the new barracks "enables you to have privacy, decompression space, the ability to feel like you’re truly home. With the pace of today’s deployments and the pace of our single soldiers, they need to have just as nice amenities as families." (DeLaRosa, 2013).
The Australian Defence Force (ADF) has also identified that the quality of accommodation within the military has a direct impact on the attraction and retention of personnel. A review conducted in 2003 found that 26,000 military rooms were inadequate and required remediation. Following this the government announced the Single Living Environment and Accommodation Precinct (SINGLE LEAP) project which aimed to align military accommodation with community standards ("Department of Defence", 2006, p. 4). The aim of this upgrade is to retain more military personnel by improving their living conditions. This has been done by giving each soldier increased personal space and a sense of belonging, while also maintaining the physical notions of a group that is traditional of military structure. The new barracks feature individual, self-contained rooms with an ensuite, a kitchenette, internet and phone connections, nearby car parking and secure storage space ("Department of Defence", 2006, p. 12).
One particular outcome of project SINGLE LEAP is Lavarack barracks, located in Townsville, Queensland (figures 5.07-5.09). This design takes a different approach to barracks than other projects developed under SINGLE LEAP. These new barracks see each soldier have their own private unit, which includes a bedroom, bathroom and balcony. Each unit is formed into 2 and 3 storey blocks. Materials have been drawn from the influence of domestic rural architecture of tropical Queensland, adding a sense of culture to the new designs. The barracks incorporate materials such as tin and timber throughout the building, stairs and sun-shading devices. Exterior walls are cladded in corrugated metal or plywood panels. Some of these panels are left natural, while others are coloured. This adds a sense of location and individuality to the units. These materials and minimization of paint allows for a very low maintenance design required by the military. The design also celebrates the existing views on the site, allowing soldiers to view Mount Stewart to the south and Castle Hill to the north. This, along with the careful design to maximise sun and protect from weather conditions, allows soldiers to live in an enjoyable space that greatly improves their well-being. ("Outback Barracks: an experiment", 2003 & Noble, 2002)
The Green Circuit is an innovative project designed and developed by Danish architectural firm Adept (Frearson, 2014, Para. 2). The design won a competition for the Danish Armed Forces that centres around redesigning Aalborg military barracks in Denmark (Frearson, 2014, Para. 1). It focuses on designing for a modern military, recreating how military architecture is put together while enhancing the sense of community required in military design ("Green Loop", 2018, Para. 2). It does this by having a series of both permanent and moveable building elements. There are 3 main buildings: a multi-purpose hall, a workshop block and an office and barracks block. Each building contains a permanent ‘Hub’ with a range of options to attach the moveable ‘circuits’. This allows the military to change the layout and location of their buildings to suit current, alternative and future needs.
NEW BARRACKS TYPOLOGIES

The images to the left place some of the new barracks typologies alongside one another for comparison. Exploring these aims to get a better understanding of the visual outcome’s of new barracks designs. These are described in more detail below:


5. Medium density, unit-style forms. Use of corrugated iron and plywood on exterior. Soldiers in individual units.

It is evident that numerous militaries around the world have recognised the poor condition of barracks and are taking positive steps towards providing better accommodation for soldiers. The main aim of these barracks is to improve the quality of life for permanent soldiers. However, considering what quality of life means through exploring design for wellbeing, it is evident that they still fall short in some areas. Although their designs are modern and greatly improved, many are still very institutional and dorm-like. There is a lack of wooden materiality present, other than the exception of Lavarack barracks. It could be argued that Lavarack barracks presents the most improved barracks design out of the upgrades in the U.S.A and Australia. The bedroom units are placed in unit-style buildings that are only 2 storey's high. This creates a more house-like barracks typology that moves away from the large block building as seen with Fort Meade barracks. Although this is the case, Lavarack barracks are still rather block-like and although they incorporate aspects to create a sense of place, the design is not particularly homely. They also lose an aspect of military order due to their interior programme. Having one person to a unit that has a kitchenette, ensuite and balcony is creating a space that is very private. This is great for well-being, however, may not help in creating a more cohesive army.

The concept of the Green Circuit is innovative and interesting, but this barracks typology may not be suitable in a New Zealand context as our military is much smaller than the Danish Armed Forces. U.S.A and Australian militaries are also much larger than the NZDF and require many more soldiers to be accommodated. Perhaps this is why they have taken the approach of larger, multi-storey block buildings. Does this give us an opportunity to design something even better for our smaller military? I believe this should be a consideration. Therefore, the design will take a route that aims to push a step further than the precedents described. Following this chapter, the site will be explored. This will determine how a design like Lavarack barracks could be altered to suit a New Zealand specific site.
Burnham Military Camp has been chosen as the site for a new barracks design. This site has been chosen due to its significance to both the NZDF and the wider New Zealand community. The camp is the largest military camp in the South Island and has served the community many times when disasters occur. Personnel share their expertise and provide shelter to those in need. It is a camp that provides a great deal to the New Zealand community; however, its infrastructure is in a state that is not helping it support its own military community. Literature research has shown that Burnham Military camp’s barracks are degrading in condition. This presents an opportunity to explore how its barracks could be improved to better support the soldiers who dwell within them.

Site is significant in the design process and it is important to understand it before designing can commence. By researching and analysing the site, this understanding can be used to influence elements of the design. This chapter focuses on the conditions of the site and its history, allowing for a greater appreciation and understanding of where the design will be situated and how it might affect design decisions.

\*FIG 6.01 BURNHAM MILITARY CAMP 1950 (Whites Aviation, 1950)
\*FIG 6.02 BURNHAM MILITARY CAMP 1950 (Whites Aviation, 1950)
Burnham military camp is located within the small town of Burnham. Burnham is largely known for the military camp, however it also contains industrial areas and farmland. Burnham is approximately 28 kilometers south-west of Christchurch City, sitting within the Selwyn District (Reed, 2002). The Selwyn District is a part of the Canterbury plains in the South Island. It has significant economic, cultural and social importance to the wider Canterbury Region and New Zealand.
One aspect to ensure that the design will encourage the well-being of soldiers was found to be the incorporation of a sense of place. To explore how a sense of place could be determined in the context of Burnham, an exploration into the wider contextual aspects has been conducted. By zooming out over the Canterbury plains, 4 significant features stand out. These are its surrounding hills (Port Hills, Banks Peninsula and Arthurs Pass), its parks and gardens, its farmland (which Burnham sits within) and its rivers (Rakaia, Waimakariri, Avon and Heathcote). The most prominent of these is the parks and gardens due to Christchurch having a common reputation of being the ‘Garden City’ in New Zealand. This nickname has derived from the many parks, gardens and trees that are placed throughout the city and its streets. Hagley park, shown in figure 6.05, is one of the main parks, acting as a central hub of greenery. Many people use it for sport, walks, site seeing or a route of transport. This could be incorporated into the proposed barracks design by using the concept of a central green space, achieved by a series of trees that relate to a space of social interaction. This will give the proposed barracks design a sense of place and connection to Christchurch. This central green hub will also provide well-being to soldiers through biophilic design.
Burnham town began in the 1860’s as a large freehold property. It gained its name from the English pioneer settler Richard Bethell, who named the area Burnham after his fathers’ property in England named Burnham Beeches (Amodeo, 2008. Pg. 11). The Education Department bought properties in Burnham and in 1871, constructed a building to accommodate boys and girls from the Canterbury orphanage and Reformatory (Millar, 1973, pg. 37). Following this, it became the Burnham Industrial School. It gained an infamous reputation, being described as “dilapidated and miserably cold” (Amodeo, 2008. Pg. 52). The Industrial School was eventually closed in 1918 by the Education Department due to its lack of success (Millar, 1973, pg. 24). The Defence Department then took over the site and under command of Captain ARC White, Burnham Military Camp was officially opened on 31st May 1921 (Amodeo, 2008. Pg. 12). The old Industrial School building, shown in figure 6.07, was repurposed and used as accommodation for the single soldiers on the ground floor, while the top floor was used for the storage of equipment (Millar, 1973, pg. 36). The camp’s development grew rapidly around World War 2 (“A Modern Army for a Modern World”, 1964, pg. 18) and by 1941, more than 200 buildings were present on the site (Millar, 1973, pg. 47).

Lieutenant-colonel Johnston began modernising the standards of accommodation at Burnham Military Camp in the early 1960’s. He marked the point in which Burnham Camp really began addressing the major issues within its accommodation for soldiers. He planned to build 6 three-storey barracks made of permanent timber materials (Figure 6.19) (Millar, 1973, pg. 91). In 1966 Lieutenant-colonel R.R Harding took over and continued Lieutenant-colonel Johnston’s modern vision. He developed a town plan to continue this vision. The plan concentrated training and accommodation to one area, leaving increased space to expand Other Ranks housing. He also developed a green belt to achieve a separation between work and living quarters.
Figure 6.09: Graphic Timeline of Burnham's History

- 1864: Beginning of Burnham settlement, sod houses
- 1894: Canterbury Orphanage and Reform School built, later turned Burnham Industrial School
- 1919: Tromp - Cold in Winter, hot in summer
- 1939: Burnham Industrial School closed and opened as Burnham Military Camp
- 1944: First modern barracks built
- 1960: Fast development after World War 2
- Burnham Military Camp today
THE BOUNDARY

The area of Burnham Military Camp is shown in colour in figure 6.10. It is a large site that is approximately 500 hectares. Paddock 189 is a large open space that is used for training and operations. The other large open space is the area to the right of the camp. This area has Coronation Park, the golf course and the 25m firing range. The main area of the camp is marked within the grey dotted lines. This area holds most infrastructure that makes up Burnham Military Camp.
In the image to the right, the area within figure 6.10’s grey dotted lines is magnified. This outlines the density of buildings within the camp in comparison to the surrounding areas that have little-no buildings. Although they are more densely packed, the building heights are all consistently low. The tallest building on the site are the 2 water towers, while the tallest barracks building is 3 storeys high. There are 5 heritage listed buildings and 2 protected trees within the site, however none of those buildings are barracks. Each building has different purposes, such as accommodation, training, storage, facilities, offices and amenities. These are outlined in figure 6.11.
FIG 6.12 BURNHAM MILITARY CAMPS BUILDINGS LABELLED
The camp has numerous roads that are highlighted in figure 6.13. The main road that leads to the camp is State Highway 1. It is the main access to Burnham from nearby towns and Christchurch City. It also has all traffic travelling between the top and bottom of the South Island, making it a very busy road.

The main entrance to the camp is off Aylesbury road. Arrivals to the camp enter along Queens Drive. Queens Drive holds the gatekeeper to the camp. After this, there are various roads that split off Queens Drive to other areas of the camp. Queens Drive passes through the area of the site that is dominantly barracks and amenities. As it is a busy vehicle access, this causes the area to be less pedestrian friendly and create a split between the field and the barracks.
The site is situated amongst the Canterbury Plains, making it very flat with little shelter from surrounding geographical features. Nearby buildings and trees provide the most shelter to the site, however many trees have been removed due to safety reasons.

Overall it has a warm and temperate climate. Snow is not a regular occurrence; however, it does happen occasionally. The prevailing wind is a north easterly and the rainfall is moderate at 640mm a year.

The ground that the site sits upon is mostly alluvial gravels. As the site is in Canterbury, it is prone to the occurrence of earthquakes. Because of this, the low density of the site is an advantage.

The diagram to the right illustrates some environmental conditions on the site.
Today the camp holds approximately 1300 personnel during a workday. There are far fewer people to accommodate on-site now than in the 1940s when the military had increased significantly due to the war.

The following demographic information has been taken from the 2013 census due to a lack of more recent information. It could be assumed that the data will have similar percentages today:

- The average age of personnel is 22.6 yrs. Figure 6.15 outlines that there is 77.9% of the population between the ages of 15-64 yrs. The majority of the camps population is between 20-29 years old as shown in figure 6.16.

- Due to policies within the NZDF, the ethnic groups most prominent at the camp are European, Maori and pacific islanders.

- 77.8% of the people who are over 15 years old are single. This is much more than the surrounding Selwyn District.

- The dominant form of transport to the camp is via walking or running (47.8%). This is likely due to personnel who live on-base. No buildings on the site are privately owned by individuals.

The population is generally of a young age, with many of the younger, single personnel residing in barracks. Once they start a family, they can move to the housing, however this typically happens when personnel are slightly older than the average age of the camp. Therefore, the barracks should be aimed at a younger demographic, such as ages 18-30 years old.

Currently, the barracks accommodate 568 personnel. Due to the Regeneration programme, this number is currently being assessed and it is likely that Burnham Military Camp may be required to accommodate more soldiers. It is uncertain as to how many may be required at this stage.
There are 12 existing barracks buildings at Burnham Military Camp that accommodates permanent, single soldiers. These barracks are labelled on site in figure 6.18. Gallipoli and Quinn’s Post barracks were built in 1962 by Lieutenant-colonel Johnston. They are made of timber materials and have a homely aspect through the use of a gable roof (Figure 6.19). Each of these barracks buildings are 3 storey’s high and house up to 144 personnel. There are 12 rooms per floor, with each room accommodating 4 people in a shared space as shown in figure 6.20. Each room contains built-in beds, wardrobes, drawers and desks. There are communal drying rooms, baggage areas, laundry facilities and toilets and showers. There are 2 bathrooms per floor, holding a total of 8 toilets and 6 showers to be shared between 48 personnel. There is no communal social area placed throughout the building and no provision for disabled access. Today, these barracks hold the Youth Development Unit and the Infantry Corps trainees. For their time, they were an improvement to existing accommodation and progressive for barracks in New Zealand. However, they are now outdated and do not meet standards of today’s society. ("A Modern Army for a Modern World", 1964, pg. 18)
This was realized by the NZDF and in 1992, 10 new barracks blocks were built. They are called Suvla, Saribair, Chunuk Bair, Taiping, Ipoh, Terendak, Borneo, NuiDat, Nee Soon and Dieppe. These barracks hold a wide range of units, including the 2/1 RNZIR Infantry, Defence Health School and Southern Health Medical, 3 Transport Company, 3 Catering and Supply Company, General engineering and electronic technicians, 3rd Military Police, NZ Army Band and 3 & 4 Signal Squadrons. Each of these buildings are concrete block construction, standing mostly at 2 storey's high. Soldiers have their own room in these barracks, sharing only a communal area, drying room and laundry facilities. There is also communal toilets and showers, which have 2 showers and 2 toilets to every 8 soldiers. These barracks improved the living conditions for soldiers greatly in comparison to Gallipoli and Quinn's Post barracks. But they too have become outdated and are in need of an upgrade.
Figure 6.24 uses colour to show the different uses of spaces surrounding the existing barracks at Burnham. The Mess, shown in black, seats up to 800 people. Most personnel eat here for each meal. It is placed amongst the barracks, allowing personnel to access it from their barracks easily.

Training and work areas are also placed amongst the barracks. This has resulted in all barracks except Gallipoli, Quinn’s Post, Terendak, Diepee and Chunuk Bair to have views into large concreted areas that are associated with work. There are green spaces throughout the barracks and plenty of trees. However, some barracks have more greenery than others.

Most of the barracks back onto roads. There are carparks in close proximity to each barracks block, allowing soldiers with cars to park next to their accommodation.

The newer barracks are orientated in a way that half of the individual rooms receive north-east sun, while the other half receives south-west. The laundry and drying rooms are located on the southern side of the building, while the common areas and courtyard are on the northern side. The older barracks have little area facing North. The section that does face North consists of the toilets, laundry, drying and baggage rooms. There are more of these spaces at the southern ends of these buildings. Bedrooms in these barracks mostly receive either an eastern or western view.
Having access to recreational activities, amenities and green spaces is vital for health and well-being. The military camp acts as its own small community and provides most of these aspects itself. The following list has been identified as some of the more important ones for personnel to have access to within the camp:

- Mess
- Gym
- Swimming Pool
- Field
- Golf Course
- Coronation Park
- Chapel
- Tennis Courts
- Library
- Canteen
- Cinema
- Bowling Green
- Fuel Station
- General Store
- Community Centre

The distances (approximate only) between these and the barracks have been measured in figure 6.25 to see how close they are for personnel. Realistically, these are even further than what is stated in this image, as this only shows ‘as the crow flies’. Most of these aspects are concentrated around the barracks, suggesting that this has been considered in the original planning of the camp. The only aspect that breaks up this cluster is busy roads passing between them as well as the Headquarters and other work areas surrounding some of these amenities.

The places that are located furthest from the barracks are the fuel station, general store, community centre and bowling green. These are located here in order to be easily accessed by the military housing at that end of the camp. The general store is one of these destinations that soldiers living in barracks would use often. Currently, it is approximately 700m – 1000m or more away from the barracks. For soldiers who do not have a car, this is an unreasonable walk to do often in order to go to the store. Soldiers living in barracks would benefit from having a general store in closer proximity to the barracks.
FIG 6.26  MODEL ILLUSTRATING LOCATION OF AMENITIES/FACILITIES FROM BARRACKS. ONE BARRACKS BLOCK SHOWN WITH TREE’S SURROUNDING
Burnham Military Camp has a rich history and plays a significant role in the NZDF. The barracks have accommodated many soldiers over time; however, research suggests that these barracks are becoming outdated and require an upgrade.

Due to the orientation of the newer 1992 barracks and layout of rooms within, approximately half of the bedrooms do not receive any northern sun. The common area is positioned well to receive this northern sun, however the courtyard that exists off this is then not sheltered well from the dominant north easterly wind. The two older barracks blocks, Gallipoli and Quinn’s Post, do not utilise the northern aspect at all. 7 of the 12 barracks were placed alongside large, open spaced concreted areas where work occurs. This means many soldiers would have views over a concrete workspace from their barracks. Preferably, the barracks should open out to relaxing views of nature as found in the literature research for well-being.

When looking into the proximity of the barracks to surrounding amenities and facilities, it was found that they were generally in close proximity. There seemed to be a cluster near the northern corner of the camp where the barracks are located. The main aspect that did break up this cluster are the roads that cross between them. These roads are Queens Drive, Mead Road, Powles Road, Robin Road, Fulton Road, Melville Road and the main Aylesbury Road. Queens drive is the main access to the camp, making it a very busy road. Ideally, the area surrounding the barracks would be more pedestrian friendly and be less orientated towards vehicular flow.

The Mess was located in the middle of the barracks, acting as a central food and social hub. This aspect was positive in that not only is it easy to access, but it brings soldiers together at least 3 times a day during meals. This allows for a stronger community to be formed. However, due to the layout and nature of the site being low density, there is a slight disconnect between the barracks and some amenities/facilities. Although some amenities may be far from the barracks, they are in that location to allow the housing to easily access them. Therefore, it would not be practical to move all amenities/facilities to be within close proximity of the barracks. However, soldiers would benefit from having an easily accessible general store or café, so this could be considered in the new design. Having more amenities densely packed around the barracks would encourage the notion of community, an important aspect to ‘military order’.

These aspects found in the site analysis chapter will be incorporated into a proposed design for the camps barracks. By analysing what is working and what could be improved, these can be considered in the new design and create a greatly improved barracks for soldiers at Burnham Military Camp.
This chapter will focus on the iterative process towards a concept design. It explores aspects of design such as massing models, physical models, sketches, programme, plan and materials. It progresses the design in the lead-up to the August reviews. An initial concept is formed and reflected upon at the end. The critique given at the August reviews is then outlined and considered in order to best progress the design in the developed design chapter.

The initial literature research focused on gaining an understanding of the topic and determining the direction of the new barracks design. The new barracks design will be derived from the research and massing models, aiming to incorporate elements from both opposing tensions.

This will be done through an iterative approach. At various moments these iterations will be reflected upon in order to understand the best path to take for the design to achieve its goal. This will gradually develop the design to a conceptual point that will be presented at the August reviews.

The NZDF has been supportive of this thesis and are interested in holding the thesis within their library, as well as using it as a reference for the Estate Regeneration Programme. Because of this, the design will aim to produce a result that is practical and realistic within Burnham Military Camp. It is a suggestion as to what can be achieved in a military barracks form that isn’t often seen in new designs today.
ASPECTS TO CONSIDER FROM RESEARCH

- Military barracks have a negative connotation of creating poor barracks for soldiers.
- Not all military order and tradition should be removed from a new design. Encouraging social interaction and using long-lasting, cost-effective materials is ideal.
- The new barracks should encourage social interaction between soldiers to encourage a cohesive army.
- The dwelling is a piece of architecture that has a significant effect on an occupant’s well-being, homely architectural aspects would imitate this notion in barracks.
- Privacy, density, territoriality and control are 4 important aspects to consider.
- Models of accommodation proven to improve health is suit-style dorms and unit-style buildings.
- Sense of place is significant.
- Nature and wooden materiality enhances well-being significantly.

CONTEXTUAL INFLUENCES & CONSIDERATIONS

- Create a barrier that ensures the dominant north-easterly wind is blocked, providing shelter to outdoor spaces.
- Aim to utilise the sun as there are not many contextual obstacles to consider.
- Do not create buildings that are over 3 storeys high as they do not fit in with the low height of the surrounding buildings in the camp.
- Create a low-density design that ensures the proposed barracks fit in appropriately.
- Ensure the new barracks are placed in a position that is appropriate for soldiers to access easily and efficiently.
- Create a separation between work and home.
- Consider pedestrian flow that isn’t as broken up by main roads as what is existing today.
THE HUB

Analysing the disconnection between the different amenities and facilities on the site allowed me to consider the option of integrating some of these to create a central 'Hub'. The Hub would have multiple amenities/facilities within the same building. This would be more convenient for soldiers while also encouraging soldiers with varying interests to interact more and enhance the social bonds that the military encourages.

The chosen spaces to include in this Hub are the Mess, 4 square, bar, cinema and library. It wouldn’t be practical to include all amenities/facilities in the Hub. Especially the community centre, fuel station and bowling green. These are located at the south-western end of the site to accommodate soldiers in military housing.

Due to the scope of this thesis, the Hub will not be designed in detail. But the idea will be present in the proposed design, influencing the layout of the new barracks. This will be done by having the barracks near the Hub, ensuring military order is obtained.

* FIG 7.01 SKETCH DEMONSTRATING CONCEPT OF RELATIONSHIP BETWEEN BARRACKS AND MESS*
1. POSITION ON SITE

- Demolish existing cinema and bar, creating space for relocated work/training buildings
- Create an amenity belt
- Change the entrance into the camp to be above the barracks
- Provides more space for new barracks than there was previously.

- Keep entrance in existing location.
- Demolish existing cinema and bar, creating space for relocated work/training buildings
- Barracks wrap around Hub.
- WO and Sergeants buildings closest to gym, pool, golf course and firing range.
- Parade ground close for soldiers to access from Hub and barracks.
- Still a busy vehicular flow between barracks and field
The chosen layout option is No. 1, shown in figure 7.02. This layout creates a belt of amenity which has the existing gym, pool, chapel, golf course and firing range aligning on the same axis horizontally. The gaps in this amenity belt would then be filled with the hub, new sports courts, parade ground and WO and Sergeants buildings. It concentrates buildings that are related to amenity in a zone, leaving buildings for work purposes to be separate. This enhances the aspect of well-being by allowing soldiers to experience a more defined difference between work and home.

Placing the entrance in a new location above the barracks encourages a layout that is much more pedestrian friendly.

There is now an increased area to design the new barracks on. This will ensure a high quality design that accommodates an increased number of soldiers can be achieved.
The location for the proposed barracks design will be in the same place as the existing barracks. This is because the existing barracks location is in the best location in terms of space available and access to facilities, amenities and work.

Having the new barracks designs sitting within the parameters of the existing demonstrates that the barracks designs don’t have to be less efficient in terms of space utilisation to achieve a better outcome.

Burnham currently accommodates 568 soldiers, the intention for the proposed design is to hold more than this to accommodate future increase of personnel.
To begin the design process, a massing exploration has been conducted. This has been achieved through an iterative process informed by literature and site. As the measurements of the proposed design has not yet been determined, the initial massing models are based off the new American standard for barracks units. These units are 10m x 6m. The models have been made to the scale of 1:500 and are shaped from standard card.

Earlier in the literature research, massing models were created for each end of the tension; Military order and well-being. This created designs that were somewhat opposites. The following massing exploration aims to create a result that incorporates aspects of each.
The well-being massing model is more in-line with unit-style buildings. This is the direction the proposed barracks design will go. The sketches below illustrate some forms that would be suitable to this concept.

The initial layout looked at creating...
a ‘cluster’ of units that would hold a platoon of soldiers (approximately 30 people). The layouts followed a circular pattern. This aims to encourage interaction by having soldiers exit their units to the centre of the cluster and use a shared path to leave it. The intent is that each unit would be one storey high, holding either 2 or 3 people each.

However, after exploring this idea further, issues began to arise with how much space this would take up for only 30 soldiers. It also posed issues around the design of the units. In order for the units to get the most out of orientation to sun, nature and amenities, there would have to be a range of different floor plans. An unlikely solution within the military due to cost.

A more linear solution that maintains the encouragement of connections was then created, shown on the following page. This solution ensures that there are only 3 different floor plan designs and an improvement to the well-being side of the design due to orientation.

This layout allows for 30 soldiers to a cluster, however as there is only 2 people to a unit, the platoon’s architecture is becoming quite widespread.

This layout allows for 30 soldiers, however, reduces the number of buildings required to meet this target. It does this by having 4 larger units that hold 3 people (shown in green). This layout allows the buildings to be reduced by 1/3 of the original layout in no. 1, creating a much smaller area of land to be used for the architecture. This will ensure there is sufficient space on site to house more soldiers. This reduction of space is achieved by having 3 two storey units that hold 4 people, 4 one storey units holding 2 people, and 3 one storey units holding 3 people (shown in green).
FIG 7.13 CONCEPT MASSING MODEL OF PROPOSED BARRACKS
FIG 7.14 PROPOSED BARRACKS LAYOUT
The next step in the design process is to develop the form. To start this process, a series of wire mesh models have been constructed to determine a basic shape to develop (Figure 7.16). The chosen form is shown below in figure 7.15. It is a simple, relatable form that has been chosen for its association to the dwelling. The gable roof gives a homely feel, causing the barracks to resemble a home as opposed to a series of boxes like traditional style barracks. The chosen form looks like a home, ensuring well-being is achieved.

^ FIG 7.15 CHOSEN FORM TO DEVELOP
> FIG 7.16 SERIES OF INITIAL FORM ITERATIONS
Following the mesh model exploration, the chosen form has been transferred to the digital realm to create a more detailed form iteration. This allowed many options to be explored. The final form chosen is shown in figure 7.17. This form is once again simple, yet elegant. It encompasses the notion of well-being and the dwelling, while allowing a canvas for military order to occur.
Next, multiple forms and their proximity to one another has been tested. The barracks will be placed unit beside unit, but there are many ways this can be done. The following series experiments with some options:

The chosen iteration has each barracks unit separated from each other. This will ensure more spaces on the interior have windows to the outside, thus experiencing light and nature. Having each unit positioned so that they are not perfectly aligned steers the design away from the traditional military barracks layout. It adds interest and individuality, which will enhance the aspect of well-being.
The programme and circulation of Burnham’s existing barracks is shown in figure 7.19. The next page (figure 7.20) shows the programme and circulation of some new barracks that have been constructed in the U.S.A and Australia. When comparing the old and new barracks in this way, it is clear to see a direct correlation between them. This suggests that there hasn’t been much progression to improve the programme and circulation in new barracks designs. The exception is Lavarack barracks, outlined within the square box. This design is innovative and aligns most with the goal of this thesis.
To develop the interior programme of the new barracks design, a sketch process took place. These units will be flat-style designs to ensure soldiers receive increased privacy while still being encouraged to engage in social interaction. Each unit contains individual bedrooms, a shared living area, bathroom and a kitchenette. To ensure soldiers still go to the Mess to eat and socialise with fellow personnel, the kitchenette will not have an oven. It is designed to allow soldiers to have close access to a sink and be able to reheat and store food easily, while not being able to skip group meals. This adds an aspect of well-being, while not eliminating military order. These plans place the bedrooms as priority for sun access. This is because soldier’s study in their bedrooms, causing them to spend a great deal of time here. To ensure the living area also received sufficient sun, the barracks were placed on an angle so that the bedrooms received NE/NW sun, while the living area received NW. The bathroom and entrance have been placed in the South as these are aspects that do not require increased daylight.
LEVEL 1 FLOOR PLAN

GROUND FLOOR PLAN

3 SOLDIER UNIT

2 SOLDIER UNIT

4 SOLDIER UNIT

FIG 7.22 CONCEPT FLOOR PLANS

FIG 7.23 FLOOR PLANS IN CLUSTER LAYOUT
7.0 DESIGN - CONCEPT

^ FIG 7.24 SKETCH DEVELOPMENT MATCHING FORM TO REFINED PROGRAMME

^ FIG 7.25 SKETCH DEVELOPMENT MATCHING FORM TO REFINED PROGRAMME
MATERIALS

1. Strong compressive strength
2. Structure of aggregate and cement paste
3. Hard, cracking form and rough or smooth texture

CONCRETE

1. Strong compressive strength
2. Structure of aggregate and cement paste
3. Hard, cracking form and rough or smooth texture

TIMBER

4. Strong tensile strength
5. Porous and fibrous, natural composite of cellulose fibres
6. Softer, natural form

Using a combination of concrete and timber will allow the materiality to reflect the tension between military order and wellbeing.
REFLECTION

The concept phase has produced an initial design that has begun to incorporate the two tensions of military order and well-being. Having unit-style designs enhances well-being, just like Lavarack barracks. However, to add more of the well-being aspect, they have been formed to resemble a civilian’s home, as opposed to a box-like military form. To add more of the military order aspect, these do not have individual units that are self-sufficient like Lavarack barracks. My proposed design focuses on a flatting style of accommodation that ensures soldiers develop strong friendships with their ‘flat mates’ and neighbors. By ensuring they don’t have a full kitchen, they will continue to use the Mess for meals, thus interacting with their peers often. The units are placed within clusters to make the overall layout successful. However, these layouts do take up a great deal of space and could negatively impact the overall layout and flow between each cluster of barracks. Having various floor plans allows for a nice variety between each barracks building, however it is not efficient enough to produce a successful design. Therefore, this will be addressed in the developed design phase. An option to improve this would be to cut down the number of different floor plans and house more soldiers within a cluster. The materials used does create a balance of the tensions. However, having this much timber on the exterior disregards military order as it creates an increased amount of maintenance to the barracks. In the developed design phase, it would be beneficial to explore a design that reduces this amount of timber, while still managing to achieve the presence of wood for the benefit to soldier’s health.
The goal of the August reviews is to present the current work and receive critique on the design so far. The reviewers had valuable feedback which will be taken into consideration for the next phase of the design.

They suggested that the form and layout of the barracks are more important than the details of architectural aspects. This is due to the nature of military barracks design and the goal I would like to achieve with them.

As I had looked at the lifespan of previous barracks, I was questioned on how long mine will last. Therefore the lifespan of the proposed design should be discussed to ensure it will meet standards for the future.

It was suggested that the floor plan be reconsidered, as a general rule-of-thumb is to prioritise the living area over the bedrooms.

Traditional barracks caused personnel to be a soldier 24 hours of the day. The reviewers enjoyed that my design rethought this idea so that personnel are a soldier while at work, but a civilian once they return to the barracks.

A question asked was: Is there a limit to how comfortable the barracks should be? I believe that there is, which is being brought out in the military order aspect of the design.

This balances the proposed barracks between a military barracks and a civilian’s home.

After receiving these critiques, I have decided to incorporate their advice into the developed design phase. They will influence particular decisions to ensure the design is successful.
This chapter explores the developed design phase that will lead to a final design for the thesis. It uses design tools such as massing models, physical models and computer software to develop form, sketches, programme, plan and more detailed design elements. Following the August reviews, some valuable critique was given and has been implemented into the design throughout this chapter, which follows the same process conducted in the concept phase. Elements of the design are revisited in order to improve them further. This chapter will conclude with the final design of the proposed military barracks model.

Although the idea to have lower density units with varying floor plans and building heights was ideal, it is not practical on site. Not only could it not quite accommodate more soldiers, it was too cramped to enhance well-being. It resembled the traditional layout of barracks and would not leave enough room for trees and green spaces between the clusters.

One idea to overcome this is to alter the buildings to hold 6 soldiers in each unit, which stands at 2 storey’s high. The clusters would then hold 60 soldiers (equivalent to approximately 2 platoons). This allows 780 soldiers to be accommodated.

The following page contains a series of explorations on how these clusters would fit on site.
This diagram arranges the clusters in a way that draws from the first massing model concept. This would give the clusters an element of the benefits of that original circular layout, such as encouraging social occurrences and providing an open space for greenery or a barbeque area.

This second diagram rotates the clusters to provide an easier circulation between the barracks and the Mess.

This last diagram rotates the clusters again, providing both improved circulation to the Mess as well as better utilisation of the sun. This rotation ensures the longest side of the barracks unit is facing North, thus improving well-being. This will be the cluster layout for the final design.
^ FIG 8.06  FINAL MASSING MODEL OF PROPOSED BARRACKS
FIG 8.07 FINAL MASSING MODEL OF PROPOSED BARRACKS
As the layout and orientation has been altered, the floor plan must be adjusted. Taking the basic layout of the 3 bedroom unit in the concept design phase, a new floor plan has been developed.

The lower and upper floor plans are the same. This makes for ease of design and savings on cost. The living area is placed to receive Northern and Western sun. Smarter Homes outlines that the living area should receive most northern sun due to its high use as a space (“Smart guide - House Orientation”, n.d.). The bedrooms are also placed in the North. Each bedroom has its own wardrobe, ensuring soldiers have ample storage. There is extra storage allocated in a separate room for each unit. The laundry is placed near the entrance for optimal practicality. There are storage cupboards on entrance for the soldiers to place any gear, coats, shoes or uniforms upon entering their barracks unit.
The following series explore the shadows cast from the barracks. The original layout for the barracks are generally in a good position for the sun. However, in some hours of Winter the living area is shaded. While conducting the shadow study, the focus will be to ensure that the living area receives as much sun as possible. 8am and 4pm are not a priority as the shadows are significant long at these hours.

Focusing on Winter between the hours of 10am-2pm, the series in figure 8.13 shows that there are 7 units that lose sun to the living area over various times in the day (shown in green). At 10am, 7 units do not have sun. At 12pm, 3 units receive no sun, and at 2pm, 2 units receive no sun.
By moving some of the units slightly as shown in figure 8.14 & 8.15, their living areas can receive increased sunlight. Only 4 units now lose sun to the living area at various times of the day. Figure 8.16 outlines the improved areas in green.
Some window placement options have been considered. The chosen layouts are highlighted in green.
MATERIALITY REVISITED

The concept design had a mix of concrete and timber, attempting to create a balance of the tensions. Upon reflection, this goes against military order too much. The large amounts of timber on the exterior will cause the buildings to be high maintenance and will date quickly. The oldest barracks at Burnham were built in 1962, with the next being built around 1992. Today in 2019, we are nearing the 30-year mark from which these latest barracks were built. One could assume that the barracks tend to have a 30-year lifespan before they do not comply within society. The lifespan of a building is largely dependent upon the materiality of its envelope. Lifespan is an important aspect to consider and is regarded as high importance by the military. Not only is saving on long term costs, but it provides a sustainability factor that the military considers in high regard. Therefore, military order will take precedence over the types of materials used on the exterior. Well-being will be intertwined into this with the use of timber in spaces where soldiers study, sleep and relax.
dominant use of New Zealand COLORSTEEL metal cladding which is sustainable and cost-effective. It gives the design an NZ character which aids in providing a sense of place to the soldiers. COR-TEN steel has been used as highlights to the exterior. It replaces the wood previously used to warm the colour palette. It does not weather fast, making it an ideal cladding choice. Concrete is used along the entrance wall. This adds interest, structure and passive design to the final barracks model.
As the sun was very strong during the summer months, a perforated metal shading device was installed to one series of the large northern windows. This provides soldiers with the opportunity to control the shading within their barracks unit with a large amount of variation.

The updated materials on the building meant that wood was removed from the exterior of the design. This eliminates the natural aspect of well-being. Therefore, a metal trellis has been installed on the southern entrance area. The aim of this is to allow greenery to grow, creating a vibrant aspect of nature to the design.
FINAL DESIGN

Allocated space for carparking close to barracks

Jagged layout adding interest amongst the barracks. barracks each look the same saving on material and design costs

Social space amongst cluster, including BBQ area and circular timber seating

Unit-style buildings, 6 soldiers to each unit (3 on each floor).

Shared path to Mess and amenity belt, encouraging chance encounters

Trees adding natural elements and views

[Diagram with annotations]

FIG 8.20 Rendered Cluster

FIG 8.21 Group of 5 Barracks Clusters

FIG 8.22 One Barracks Cluster in Detail
FIG 8.23 WESTERN UNIT - LEVEL 1
FIG 8.24 WESTERN UNIT - GROUND LEVEL
FIG 8.25 EASTERN UNIT - LEVEL 1
FIG 8.26 EASTERN UNIT - GROUND LEVEL
FIG 8.29  BEDROOM INTERIOR WITH HIGHLIGHTS OF TIMBER AND VIEWS TO NATURE

FIG 8.30  KITCHEN UNIT (WITHOUT OVEN)
**FIG 8.31** VIEW FROM KITCHEN UNIT TO LIVING AND OUTDOOR AREA

**FIG 8.32** VIEW DOWN HALLWAY
FIG 8.35  VIEW TO WESTERN BARRACKS

FIG 8.36  ENTERING INTO CLUSTER
FIG 8.37 ENTRANCE AT SOUTHERN SIDE OF WESTERN BARRACKS

FIG 8.38 NORTHERN SIDE WITH SHARED OUTDOOR SPACE

FIG 8.39 CLUSTER AND SOCIAL AREA

FIG 8.40 FRONT VIEW ON RAINY NIGHT
CONCLUSIONS

The final design has been developed from the critique of the concept. It has pushed the design further to create a result that achieves the goal of creating a balance between military order and well-being. The result encompasses the tensions in a way that is simple and practical, yet elegant.

Various design tools were used to produce the final outcome. Massing models were reintroduced to develop the layout in refined detail. An updated massing model found the right balance between unit-style designs and efficiency. This allows 780 soldiers to be accommodated in the same space as the existing Burnham barracks while simultaneously greatly improving their living conditions. This is 212 more soldiers than the existing barracks at Burnham which is ideal for future expansion. There is also extra space to spare in the center of the clusters to use for other facilities, barracks expansion or parks.

A lot of massing model exploration has occurred due to the nature of the thesis. The feedback from external reviews suggested that form and layout is more important than specific design elements. This has resulted in a pared back outcome that has a strong overall solution to solving issues within military barracks, however has not developed the design in the immense detail that would be required in reality.

To improve the floor plan, it has been adjusted to maximize the sun and create a barrier to the prevailing north-easterly wind. It has been carefully designed to provide soldiers with maximum comfort and well-being. Having 3 people to each storey of the barrack units achieves a successful balance between privacy and social interaction. It creates the privacy, density and control aspect of well-being outlined in chapter 4.

Exterior materials were adjusted as upon reflection in the concept phase, they did not satisfy design elements within military order. Military order took precedent in this regard due to the significant impact exterior cladding has on a buildings cost and lifespan. Steps were then taken to bring back an element of well-being to the design. These were in the form of CORE-TEN highlights and a trellis of greenery.

In all aspects, the final design has ensured that there is a balance between military order and well-being, thus accomplishing the goal of this thesis. Not only does it maintain aspects of the military that are important, it has greatly enhanced living conditions for soldiers at Burnham Military Camp.
The theoretical overview in Chapter 2 determined the direction of this thesis. Michel Foucault and Manual DeLanda brought light to the issues found within military barracks and how this is negatively impacting the health of soldiers. It also revealed that the traditional nature of barracks designs has its place, as highlighted by Philip Smith. The structure, systems and layout encourages a soldier to be a part of a cohesive and successful Army. It became apparent that there are two significant drivers for the design of barracks; Military order and well-being. These two aspects guided design elements in opposing directions, creating a tension. It generated the research question: How can traditional military barracks be redesigned to balance the tension between military order and design for well-being to support the well-being of soldiers within the New Zealand Defence Force? With extensive literature research and development through design, this has been answered in the form of a new barracks model at Burnham Military Camp.

Each aspect in the tension was researched individually in Chapters 3 and 4. The information gathered was implemented into design through the production of massing models. Each side of the tension generated its own massing model, which each had significant differences. The military order model was rigid, cost effective, long-lasting and efficient. Whereas the well-being model was a soft and natural design with privacy. Chapters 7 and 8 bring this research into fruition through design. A masterplan was conceived and provided the basis for developing the location and layout of the design. The design was then developed, iterated and reflected upon until the outcome presented achieved the goal of this thesis. This process through design focused largely on form and layout. Developing these parameters of the design was relevant in a military context to create a successful programme of barracks. Once these architectural elements had been determined, military order and wellbeing was then incorporated in the detailing of the design, such as plan, materials and systems.

The final design is a form of barracks that is not seen within militaries today. It has moved away from the large-scale, box-like form that the U.S.A and Australia are producing. The design has found an option that significantly enhances a soldier’s well-being while maintaining important elements of social connections and proximity to amenities. It has demonstrated that these important aspects of military order can still remain in a design without compromising the aspect of wellbeing. The result is a simplistic, elegant approach to barracks that achieves a balance of each opposing tension.

Traditional barracks focused on the military order aspect of design. They would be lined side-by-side, housing multiple soldiers in open-plan rooms. Although this layout enhanced particular aspects of the military, it negatively impacted individual soldiers’ health. The new designs being produced in the U.S.A and Australia do improve these living conditions. However, they still consist of large block-like buildings lined side-by-side, each soldier sharing communal facilities with large multitudes of people. This style would not fit cohesively in Burnham Military Camp due to the camp’s low density, 1-3 storey high architecture. Therefore, the scale and materials chosen for the barracks have been chosen to not only solve issues within barracks, but also to fit into the New Zealand context and surrounding site.

The process on design focused largely on form and layout as suggested in the August critical reviews. This was imperative in creating a new barracks model that pushes away from the architectural conditions of barracks being built in the U.S.A and Australia. After extensive research and massing model exploration, it was determined that a unit-style barracks approach would be the most effective. From here the design progressed, looking to develop form and layout for the units that would best integrate both military order and well-being. As the process did focus on form and layout, it could have benefited from an exploration of innovative details and systems. However, this path would have extended the scope of the thesis to be too large in the time given.

A significant amount of the process was literature research. This was critical in understanding the topic and the drivers behind this thesis. It determined aspects of each opposing tension; Military order and well-being. It provided a grasp on the issues that require improvement in barracks designs and established the foundation for how this would be achieved. Understanding the NZDF was imperative, as a design in New Zealand should vary from what is being developed for international militaries. The site and its inhabitants were also significant to research in order to understand who the design is for. The design developed in this thesis is tailored for Burnham Military Camp, however the design concepts could be implemented into various camps across New Zealand. There could be limitations as to how this design would work on other sites. The scale of this design is small and widely spread as Burnham had the space to achieve this. Other camps may not have a similar layout and proximity to amenities, therefore it cannot be assumed that this design could be duplicated onto any military camp in New Zealand.
One issue that occurred in the development of the barracks was that the concept phase attempted to grasp the tension too much. This resulted in a design that was directed each aspect of the tension in a negative direction. Having wooden materials on the exterior would not be the best option in the military and would be detrimental to the lifespan of the building. While the floor plans and layout of the units was moving towards a better design than traditional barracks, however not providing the maximum comfort that could be achieved. This was resolved in the developed design phase, ensuring that the design answered the research question appropriately and successfully.

I believe that considering well-being in barracks design has ultimately improved the aspect of military order. Ensuring soldiers are comfortable, happy and healthy will in turn generate an Army that is positive and better equipped for the training and hardships they endure. It will improve the retention of personnel if they are living within a positive environment and better living conditions. I believe that this supports the Regeneration Programme in that it aligns with the goals the NZDF has set out to achieve.

The New Zealand Defence Force has been supportive of this thesis from the beginning. They have reviewed the thesis before submission and were pleased with the outcome. They believe it has excellently captured the issues around barracks designs and successfully identified an innovative solution to them.

The following are a series of recommendations if work were to progress from this project:

- Health and wellbeing of occupants in buildings is becoming increasingly more important in today’s society. There is little research on what this means for a soldier, therefore expanding on this research would be beneficial in further informing a new barracks design.

- Further design parameters could be developed in more detail, such as road layouts, car parking and landscaping. These all contribute to the function of the design and would be beneficial to experiment with in order to refine the design more.

- This unit-style of barracks has the potential to be created with modular design. This would be a cost-effective approach that aligns with realistic implications of design. This thesis didn’t focus largely on the cost aspects, instead using it as a slight influence on some design decisions. Modular design could be a way to reduce costs further.

- This design could be tested on a range of different military sites in New Zealand. This might produce a different design at each location, but it would be beneficial to explore. This style of barracks design could also be developed to produce a more universal design that would fit well into various military locations.

- I recommend that rather than barracks be designed for the present, they should be designed for a future society. By going a step further in design to create better enhancement of wellbeing than the designs being done in the United States of America and Australia, the barracks will not date too quickly. They would then extend past the 30 year life-span that Burnham’s existing barracks have held.
The final barracks model produced as an outcome of literature research and design development has achieved its goal of creating a balance between military order and well-being. It has been tied to the New Zealand context, demonstrating that the new models of barracks being produced in the United States of America and Australia do not necessarily resonate with New Zealand military sites. The outcome has produced an alternative approach to military barracks that could be considered in future barracks designs.
REFERENCES


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FIGURES

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FIGURE 0.01
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FIGURE 1.01
New Zealand soldier [Photograph]. [n.d.]. Adapted 2nd October 2019 from: https://steamcommunity.com/sharedfiles/filedetails/?id=1278654495

FIGURE 2.01

FIGURE 2.02
Traditional style barracks [Photograph]. [n.d.]. Adapted 14th July 2019 from: http://exhibit.library.pitt.edu/ww1/

FIGURE 2.03

FIGURE 2.04
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FIGURE 3.01
Reprinted with permission

FIGURE 3.04

FIGURE 3.06
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FIGURE 3.08

FIGURE 4.02
Dormitory style design [Photograph]. [n.d.]. Adapted 26th October 2019 from: https://www.nicosia.sgul.ac.cy/student-life/housing-information/corridor/

FIGURE 4.03
Natural views from herrington recovery center, which has used wood throughout to heal patients [Photograph]. [n.d.]. Adapted 2nd November 2019 from: https://rehabreviews.com/herrington-recovery-center/

FIGURE 5.01

FIGURE 5.02

FIGURE 5.03

FIGURE 5.04

FIGURE 5.05

FIGURE 5.06

FIGURE 5.07

FIGURE 5.08

FIGURE 5.09

FIGURE 5.10

FIGURE 6.01
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FIGURE 6.02
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Whites Aviation. (1950). Burnham Military Camp [B&W negative]. Adapted 17th July 2019 from: https://natlib.govt.nz/records/22779933?search%5Bpath%5D=items&search%5Btext%5D=burnham+military+camp
FIGURE 6.07

FIGURE 6.08

FIGURE 6.19

FIGURE 6.20
A bedroom inside Gallipoli or Quinn’s Post barracks. Reprinted from The Christchurch Star, (p. 18), 1973, Christchurch, New Zealand.

FIGURE 6.21

FIGURE 6.22
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FIGURE 6.23
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THE FINAL SETUP

11.0 ADDENDUM

CONSTRUCTING THE
CONTemporary ADJU nTER

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