Planning for the Protection of Industrial Land and Services in the Sustainable City A Nelson, New Zealand Case Study

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Abstract

Industrial zoned land and industrial activities within cities are facing a number of challenges which could potentially see industry displaced from urban environments. Contributing to this is the inadequate coverage of industry in growth management strategies such as Smart Growth and the Compact City, which influence urban development and local planning legislation.

The aim of this thesis was to confirm the increasing evidence that industrial activities remain vitally important to a city's sustainable development and for ensuring the positive function of local economies. This was explored within the case study of Nelson, New Zealand, a region experiencing high levels of population and economic growth within a strictly limited land base. Industrial land is under increasing pressure with future supply expected to be exhausted within six years at the current rate of demand.

Results of this research have confirmed the importance of industry within urban spaces and the need for tighter planning for the protection of industrial land and services if the city's sustainable goals are to be achieved. Intensification was explored as a means by which industry can fit within smart growth strategies and can be reconceptualised to fit within the modern city. In addition, an industrial land supply method was developed as a practical starting point for local authorities to quantify future industrial land supply and also understand the complexity of issues relating to industrial sites and activities. Research enabled recommendations to be made which will assist planning and policy initiatives to ensure sustainable and more efficient industrial zone management.

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Chapter 1 Introduction

This thesis explores the issues and pressures in relation to industrial land availability and the protection of industrial services in the 'sustainable city'. It is a topic which has received little attention in current planning research and is one which is often overlooked in local planning policy.

Despite the reduced influence of industrial manufacturing in developed countries, including New Zealand (Lever, 1991; Bertram, 2009), there is increasing evidence that industrial activities are still vitally important to a city's sustainable development and for ensuring the functioning of its economy (Howland, 2010). However, reviews of urban growth management strategies, such as the Smart Growth and the Compact City, have revealed a lack of consideration in regard to industrial services and retaining industrial land within urban areas (Leigh & Hoelzel, 2012). An inevitable tension exists between the goals of local government which include developing a liveable, environmentally sound, attractive and innovative city, and the existence of a city's industrial sector which contains important services, progressive businesses and activities critical to local economies (Dempwolf, 2009). Intensification is a leading principle in modern growth management strategies, however, industrial intensification is generally neglected within the current application of these strategies possibly due to the perceived unsustainable nature of industrial activities. (Gilmore, 2015)

Whilst New Zealand cities are not impacted by "de-industrialisation" to the same extent as is evident in larger western economies, they are still confronted by similar issues of restricted access to industrial land. The city of Nelson provides a useful case study to examine these issues as topographical constraints limit the ability for the city to expand industrial space. With mixed use, commercial, retail and residential encroachment posing risks to locally available industrial land, tighter protection of industrial zones is required if industrial services are to remain within the region and in close proximity to the city. Nelson is also a city with a proud history of local government and community sustainability aspirations (NCC, 2014), and as such provides a relevant case study into planning policy and practice in relation to industrial land availability and protection.

1.1 Research Context

A small but growing body of research currently exists on the importance of industrial land and industrial services in the new service dominated economy which characterise most cities in the developed world. Howland (2010) emphasises that despite the growth and strength of the service sector, industrial activities are critical to the economic health of metropolitan areas. The importance of the industrial zone includes its role in the creation of local jobs, infrastructure for local government, back-office activities and services which support the local population. This argument is supported by the proliferation of reports sponsored by local jurisdictions across the United States, which recognise the continued and vital role of industrial land in the urban system (Dempwolf, 2010). It is a finding also reflected in the New Zealand context by the number of local councils which have incorporated industrial land use studies into their regional growth strategy plans and strategic documents (Keyse, 2016). However, a gap is evident in the academic literature on the continued importance of the industrial sector post de-industrialisation in New Zealand and beyond. This thesis seeks to add to the body of research on this subject.

Growth Management Strategies

Urban growth management strategies are a policy response aimed at creating sustainable urban growth patterns to counter issues such as urban sprawl (Jabareen, 2006). Smart Growth is a popular urban management strategy which aims to incorporate economic, social and environmental concerns into a model based around sustainable city development (Gilmore, 2015). Historically, unrestricted urban growth has created issues of urban sprawl, inefficient transport networks and insufficient provision of social services. Smart Growth provisions aim to counter these issues by promoting compact urban design, multiple transport options, attractive open spaces, walkable neighbourhoods and mixed land use (Rypkema, 2008).

The Compact City theory is another popular urban management theory closely aligned with Smart Growth and sustainable urban management practices. Compact urban development can aid in achieving reduced energy consumption from sprawling services and infrastructure, rural protection, closer proximity to amenities, greater social interaction and less emphasis on fossil fuelled transport.

Despite the growth of new knowledge based economies and smart, sustainable or compact city planning, local industries which service cities and towns continue to require significant spatial planning considerations. Academic research examining the importance of industrial land availability in an increasingly "de-industrialised" western world is limited both nationally and internationally (Leigh and Hoelzel, 2012). Sprawl-containing policies are often associated with the rezoning of relatively inexpensive industrial land, and allowing non-industrial activities to encroach upon these areas. These authors document the lack of urban industrial land considerations in planning policies and how planning practice narrowly perceives sustainable land use and economic development as promoting nonindustrial activities over industrial activities. A disconnect between sustainable cities and local industry can also be seen in the New Zealand context. Local government legislation in New Zealand is becoming more focussed on sustainable urban development (Freeman, 2003). This refers to cities providing high amenity, liveable and innovative urban spaces which are sympathetic to the environment with little mention of the continued role of the industrial sector in helping to meet urban demands for goods and services. Research which examines the relationship between local planning policy and the protection of industrial land in New Zealand is yet to be undertaken.

Industrial Intensification

Gilmore (2015) argues that industrial zones are a critical factor to consider within sustainable urban practices. He demonstrates within the Metro Vancouver context that while the smart growth and compact cities theories have been focussed on residential and commercial zones, these strategies could be just as effectively implemented within industrial areas. Whilst examining the differences between density and intensity, Gilmore (2015) also shows how industrial land intensification is method by which a city can better utilise limited industrial space.

1.2 Nelson Case Study

Nelson was chosen as a case study because of its unique locality and geography which puts considerable pressure on land use and development. It is a region with a strong industry base, vital port and is currently experiencing high growth in population and economic activity. Nelson also has strong community and local government aspirations towards

sustainability. It is however physically constrained by topographical factors and the small size of the administrative area which requires careful planning to maximise land-use and cater for the current and future needs of the city.

Situated at the top of New Zealand's South Island, the Nelson region is one of the smallest with a total land area of only 445 square kilometres. It is also one of the country's most isolated regions due to the surrounding mountainous landscape which has greatly influenced Nelson's urban form (NCC 2012). The basin effect created by the mountains surrounding the city has constrained further growth close to the central city. This is beginning to force residential, commercial and industrial growth outside of the region's boundaries and into the closely neighbouring Tasman region.

Despite the topographical constraints on land availability, the Nelson region is experiencing a period of growth making it New Zealand's fifth fastest growing region (Infometrics, 2016). The wider region is well known for five key export sectors including horticulture, forestry, farming, seafood and tourism. Nelson is also well known for its extensive port which provides a vital link to the top of the South Island. The city contains a considerable base of industrial services including engineering, construction and maintenance services, along with a small number of innovative and high tech industries which support Nelson's primary industries.

Nelson currently has six industrial zones recognised in the region's district plan. These six zones equate to approximately 310.49ha of industrial zoned land. Land supply research undertaken as part of this thesis confirms Nelson's industrial space is limited with the maximum amount of land available equating to under 6 years potential demand. It is evident that if Nelson's industrial sector is to continue to cater for economic growth, intensification of activities must be considered or the city will face industry developing in the Tasman region, a significant distance away from Nelson City's core. This would contribute to issues of employment sprawl and traffic congestion.

As Nelson has a long history of green thinking and sustainable practices encapsulated in local government strategies such as the Nelson 2060 Vision (2014), this thesis provides a relevant study on how industry can be incorporated into the practices of Smart Growth and Compact City to become more intensified and efficient.

1.3 Research Aims and Objectives

The aim of the thesis is to establish whether planning in Nelson is taking into consideration the role that industrial land and industrial services play in the economic wellbeing of the city. In particular, it seeks to confirm the international literature on the continued importance of industry and the modern city. It also aims to establish the current issues relating to industrial land availability and the relationship between planning provisions and industrial land protection nationally and locally while also considering the potential for industrial intensification. Finally a practical method will be developed to quantify industrial land availability which provides local authorities with a starting point for achieving better industrial zone management.

The following objectives have been designed to direct the range and scope of the research:

1. *To investigate the continued importance of industrial activities in urban spaces.*
2. *To explore how industrial land related issues challenge the goals of the sustainable city.*
3. *To consider the opportunities for industrial intensification in growth management strategies.*
4. *To investigate current regulatory and non-regulatory legislation in relation to protection of industrial land.*
5. *To develop a method for analysing industrial land supply.*

1.4 Research Design

In order to investigate the above objectives a case study approach was used with elements of exploratory and descriptive research design (Neuman, 2011). The exploratory research employed the qualitative methods of document analysis, and key informant and focus group interviews to investigate key themes identified in the literature review and related to the research aims and objectives. Local regulatory and non-regulatory documents were analysed to assess existing industrial land protection and compact city measures in council planning. The descriptive research employed a quantitative methodology to investigate the fifth research objective. Research for this section was conducted by the author as part of an industrial land supply report prepared for the Nelson City Council in the summer of 2016. This method collected data from aerial photographs, property improvement values,

employment density data and site visits in order to quantify industrial land availability. Permission was given by the Nelson City Council Planning Department to use this data.

1.5 Thesis Structure

The thesis is divided into seven chapters, with this introduction leading into the literature review, context and methodology, followed by a presentation of the results, discussion and conclusion.

Chapter 2 The Literature Review explores the historical perspective of industry and the city, followed by the theoretical foundations about urban planning relating to the impact of industrial land use and location on urban form. Research into the importance of industrial land protection, the maintenance of industrial services for a functioning modern city and the need to 'reconceptualise' industry in the new service economy is also included. Finally, growth management strategies are examined, in particular smart growth, and how industrial intensification can be included within its principles.

Chapter 3, the Context provides the national and regional context for this research. It begins by backgrounding the wider New Zealand historical and planning context before examining the case study area of Nelson in detail. This includes the relevant topography, industry, population and the economic growth as they relate to industrial land.

Chapter 4, the Methodology outlines the research design including the case study approach and details the quantitative and qualitative methods undertaken during the research period.

Results from this case study, and the mixed method research approach are presented in Chapter 5 as a series of six key themes along with the analysis of relevant regulatory and non-regulatory documents. Chapter 6, the Discussion provides a synthesis of these results, relative to contextual information and international research which is then used to inform the conclusion the final Chapter, number 7.

Chapter 2 Literature Review

2.1 Introduction

The aim of this thesis is to explore the importance of industrial land use and its protection in the context of current local urban planning strategies. The first element of this research is a review of the literature which is undertaken with the aim of informing the current study by gaining background knowledge and understanding of various concepts and processes related to industrial land use and the industrial sector on which this study is based.

Abbot (2006) emphasises the importance for planners to have knowledge and understanding of urban history and a historical context for examining cities as political, economic and social entities. It is important for current planning practitioners to understand the historical background to the location of industry within a city. With this in mind, the literature review begins by briefly exploring the historical perspective of industry and the city, this is followed by an examination of the theoretical foundations of urban planning relating to the impact of industrial land use and location on urban form. Deindustrialisation is examined to provide a backdrop to the current service economy and to provide an understanding of the processes which have impacted on industrial land use over the past 100 years. The review then examines the literature in relation to the importance of industrial land protection and the maintenance of industrial services for a functioning city and the need to 'reconceptualise' modern industry. Finally, growth management strategies are explored, in particular smart growth, and how industrial intensification can be included within its principles.

2.2 Historical and Theoretical Timeline

Historical Perspective

While cities are often distinguished by social or cultural factors, the overall success of any city is largely shaped by economics. As indicated by Paddison and Hutton (2015, p.1) urban change, including the growth as well as the decline of cities, is "fundamentally intertwined" with economic change. No economic change has had quite as drastic effect on urban environments as the growth of industrial capitalism and the rise of the industrial world

during the mid-18th and 19th centuries. This period saw the role of the city shift towards intensified manufacturing in a "Fordist" period of capitalist development driven by technological advancement in machine based production (Paddison and Hutton, 2015; Thorns, 2002).

The combination of technological change and the creation of a new economic system based on capital had drastic effects on urban form and function (Thorns, 2002). This is no more evident than in the new industrial cities of the 19th century. New cities which came to the forefront with industrialisation included London, Manchester, Chicago, Detroit, Pittsburgh, cities of the Ruhr and North East France (Harris, 2009). These cities grew rapidly as technological advancement in agriculture and factory based production reduced the need for rural or small scale production workers. The intensity of the urbanisation at the time was most evident in London, which in 1801 was the largest city in Europe and the only city in Britain with a population of over 100,000 people. By 1901 there were thirty-five cities in Europe with a population of over 100,000 (Thorns, 2002). Industrialisation, coupled with rapid urbanisation had profound effects on society including issues with health and inequality, but also had a considerable impact on the form many cities maintain to this day (Harris, 2009). The 20th century also saw the development of urban theories which aim to explain urban form and organise the different activities contained within cities including industrial districts.

Theoretical Foundations

The use and location of industrial land and the impact on urban form has a long theoretical history. Historical urban planning theories were influenced by industry due to its economic and spatial significance in the majority of urban centres after the commencement of the industrial revolution. As indicated by Dempwolf (2009, p.4) "the appropriate location of industry, its role in shaping urban form, and its relationship to other land uses was a great focus of early urban planning". This is especially evident during the 20th century with the dawn of professional urban planning (MacDonald, 2014). A brief review of the theoretical foundations relating to industry and urban form provides a useful frame of reference from which to approach industrial land use research.

Although the structure and urban pattern of each individual city are unique, most cities have common districts or zones where groups of similar activities occur. The majority of

cities are divided into a series of retail, commercial, industrial and residential zones (Harris and Ullman, 1945). The placement and interaction of these zones has been the focus of many urban form theories over the past nearly 100 years. A review of the literature indicates there are generally two groups of theories which determine urban form and industrial location. These include descriptive or historical theories and structural theories (Dempwolf, 2009).

Historical theories aim to describe urban form with regard to different activities having set spatial organisation. Theories considered within this grouping include Burgess' concentric ring theory (1926), Hoyt's sector theory (1939) and Harris and Ullman's multi-nucleated zones theory (1945). Within these three theories each urban activity, including industry, has a set zone or district. In Burgess' concentric ring theory each activity is placed into one of five zones which surround and radiate out from the central business district at the city's core. In comparison, Harris and Ullman's multi-nucleated zone theory recognises cities are not always built around a single centre but have a number of distinct zones or pockets of activities which create their own centres of activity. Industry in both of these theoretical models has a set placement relative to other corresponding concentrations of labour and wholesale business districts (Harris and Ullman, 1945).

Structural theories include the work of Weber (1929), Haig (1926), Alonso (1964), Muth (1969) and Mills (1972). These theories stem from economic considerations and are based around market forces and demand which dictate industrial locations. Clusters of industry are concerned with proximity to transport routes which provide efficient input and output relationships (McCann and Sheppard, 2003). The placement of industry in these zones theoretically minimises cost and time, aiming to create increasingly efficient industrial zones and this is more flexible, compared to the more ridged historical theories (McCann and Sheppard, 2003).

Mainstream theories are not without their critics. Alonso (1964) criticises historical models for failing to take market demand into consideration, while structural theories are criticised as being too limiting in their assumptions regarding transport and the location of markets, along with the variety of industrial activities which exist (Pred, 1965; Groves, 1971). However, the modern approach to urban form and industrial location is founded on these two theoretical traditions (Dempwolf, 2009).

Deindustrialisation

The processes of industrialisation and the significance of industry in determining urban form were evident in new urban growth up until the 1970's (Dempwolf, 2009). While the economic recession of the 1950's and 1960's in the western world resulted in a temporary reduction in industrial production, it is widely agreed on in the literature that the period after the 1970's saw a more permanent shift toward deindustrialisation (Dempwolf, 2009). Some debate has occurred on the most appropriate definition of deindustrialisation, however Lever (1991, p.983) indicates it can be taken to simply mean "a straightforward decline in employment in manufacturing or in manufacturing output." Deindustrialisation can also be defined in terms of a city or region's declining division of manufactured exports compared to manufactured imports. An extreme balance of trade deficit can result in the inability to pay for necessary imports, creating a further spiral into economic decline. Harrison (2015) states that during this period of decline in industrial manufacturing, industry was being placed on the periphery in the new spatial fixes of late capitalism.

Britain in the 1970's and early 1980's experienced for the first time, a systematic inability for exports to maintain a position which exceeded those of manufactured imports. This inevitably led to the country's first balance-of-payments deficit in 1983 (Lever, 1991). An early analysis of the causes of deindustrialisation was provided by Rowthorn (1986). Rowthorn's maturity theory indicated that deindustrialisation was a result of the natural stages of national economics which over time move from agricultural to manufacturing and finally to service dominated economies. This theory argues that since Britain was the first to industrialise, naturally it was the first to move into a service dominated phase. Another of Rowthorn's (1986) theories included the failure theory which linked Britain's inability to compete with the international trade of manufactured goods from the newly industrialised countries. This theory is well supported today with the impacts of globalisation, including technological advancements in communications and trade contributing to the shift of manufacturing to the global South (Kratke, 2015).

The Current Service Economy

On the back of the decline in Fordist style industrial production, the rise of the service economy since the 1970's represents the generalised economic base for the majority of cities in the global North. This new economy has its focus grounded in banking, financial

services, research-intensive manufacturing, technology related services, tourism, health care, education and innovative business. The post-industrial environment created by this service based economy has seen the rise of the post-industrial city where some cities prosper while those which have been less adaptable decline (Kratke, 2015). This is most evident in the United States as the original industrial boom towns of Detroit and Pittsburgh, in the 'snowbelt' region of the north and east, now struggle with mass unemployment, urban abandonment and decay. Meanwhile the new technological centres of the 'sunbelt' regions in the west and south, such as Houston and Tucson, have expanded rapidly (Harrison, 2015).

More resilient cities have been able to deal with the economic shock of deindustrialisation and reinvent themselves successfully with the shift in global economic conditions. The majority of these cities have a lasting industrial legacy, with the remnants of industrial zoned lands still prominent within the urban landscape. Many industrial areas are also being redeveloped and gentrified as use of these areas for large scale industry has declined (Dempwolf, 2009). The London Docklands area, which has been redeveloped from being the heart of London's industrial port area to a new, innovative commercial and economic hub, is a prime example of such a redevelopment (Kratke, 2015). While large scale manufacturing industry has largely diminished in many cities of the global north, it is important to analyse industrial and trade based services occupying industrial zoned land and what input they have to servicing the new economy and populations within urban areas.

2.3 Importance of the Industrial Sector

This section will examine the research that currently exists on the continued importance of industrial land and industrial services in the new service economy. It also explores the continued importance of the industrial sector as a source of employment and providing for business incubation. Finally initiatives identified in the literature to change the perception of industry amongst planners and theorists, along with the general public are examined.

Industrial Services

Despite the advancement of deindustrialisation and the evident movement of cities in the global north towards a new economic focus, the works of an increasing number of

researchers can be found in the literature providing evidence that industrial activities do still remain vitally important within urban spaces (Howland, 2010; Gilmore, 2015; Bronstein, 2009; Leigh & Hoelzel, 2012).

Howland (2010) argues that despite the structural changes seen in metropolitan economies, industrial activities remain central to the economic sustainability of these areas. Her concern focusses on the contest over industrial land when growth in the manufacturing sector slows or declines, while commercial, retail and residential demands are growing more rapidly. A methodology is presented for assessing the economic health of industrial zones within Prince George's County, Maryland. The criteria developed in the study determine where industrial areas are economically healthy and remain important components of the regional economy and where industrial zoned land can be rezoned at little loss to the local economy.

A number of key reasons supporting the importance of industrial zones are identified in this study. While the manufacturing industry has declined, cities still require industrial and trade based services. These services are paramount to the function of any city authority as well as providing critical support services to other sectors of the economy and the general public (Leigh and Hoelzel, 2012).

Light industrial zones provide an appropriate location for government led services and operations including road construction and repair facilities, waste disposal and recycling, street sweeping, printing services, telecommunication, power-line contractors and other infrastructural based services. Industrial zoned land also provides space for back office services which maintain the local economic base. These services include warehousing, food processing, wholesale suppliers, high tech manufacturing operations, postal and transport services, along with trade based businesses which provide housing maintenance and building development essential for local urban growth. Finally, industrial land provides for general 'day to day' services required by local populations. Auto repair workshops, panel beaters, household renovation and repair workshops and warehousing for consumer products all reside in industrial areas (Howland, 2010; Gilmore, 2015).

Without these industrial services a city would struggle to function effectively. By adopting a broader definition of industry to include production, distribution and repair (PDR), Howland (2010) makes it clear that her focus includes industrial services which are often excluded from research on industrial or manufacturing decline. With the rezoning of

industrial land to other activities, such as the London Dockland example described earlier, there is a danger the industrial services described by Howland will be pushed to the periphery of the city. By doing so industrial services will no longer be in close proximity to the public, the urban areas they are servicing and other sectors of the economy. This tendency is also recognised by researchers examining inner-city revitalisation and gentrification.

Crack (2005) discusses this displacement of industry in her study on inner city gentrification of industrial properties in Wellington, New Zealand. Crack (2005, p.114) states that "the irony is many of the people who move to the inner city still require and expect there to be a wide range of facilities and services available to them within a close proximity, the very services they have displaced." She continues on to recommend specific zoning rules be incorporated into the District Plan relating to the location and extent of industrial activity in the inner city. These rules aim to prevent the loss of industrial services in the city area to processes of gentrification and revitalisation.

Employment and Industry

While industrial services provision is an essential component of the need for the protection of industrial land, a number of other factors including employment are explored by Howland (2010). The industrial sector remains an important source of local jobs as made evident in a number of studies from the United States, Canada and Britain (Bronstein, 2009; Gilmore, 2015; Nixon, 2006).

While deindustrialisation has caused mass unemployment in cities such as Detroit in the United States, this decline is a result of large scale industrial manufacturing moving off-shore (Turok, 2015). However, within the majority of cities both large and small, there is still a considerable number of people employed in the production, distribution and repair service industries as described in the previous section. According to Bronstein (2009), industrial occupations such as the wholesale trade provided for 5.8 million jobs in the United States, transportation and warehousing 4.3 million jobs, waste management and remediation 361,000 jobs and repair and maintenance based services contribute 1.2 million jobs. With the inclusion of the 12.5 million industrial manufacturing jobs remaining in the United States this accounts for $1/5^{th}$ of employment in that country. In the Metro Vancouver area, while only 13% of the region's urban land is zoned industrial, 25% of the region's

jobs are located within these areas indicating the continued importance of industry based employment (Gilmore, 2015).

In addition, industrial based employment provides job opportunities for workers with lower levels of formal education, while generally also paying higher wages. Using data from the US Bureau of Labour Statistics, 2007, Howland (2010) illustrates that production distribution and repair based industrial services provide for an average wage of US$45,770 in Prince George's County, Maryland. By comparison, the average wage in the service sector consistent with the 'new economy' was $38,360. This is despite industrial workers having lower levels of high school qualifications than service workers and lower rates again than those with university qualifications.

Nixon (2006) examines the different skills and educational requirements associated with the new service economy. The growth of the service economy has coincided with a consistent rise in education levels held by those currently employed. In 1979, one in two workers in Britain held no formal qualifications in comparison to one in ten in 2001. The high-skilled based employment is associated with high value business and producer services as well as the creative or high-tech industries. Lower skilled employment has grown around servicing occupations such as personal services, retail and hospitality (Nixon, 2006). Without the protection and recognition of the importance of industrial or trades based services, those once employed in industrial manufacturing or with industry based skills will struggle to find employment. This is made evident by Nixon (2006) who highlights that low skilled employment in the service economy is clearly gender stereotyped with employers often preferring women for these roles. There is a growth in low skilled jobs such as customer handling and communication, whilst higher skilled technical and trades skills are highly represented in the unemployed (Nixon, 2006).

Industrial land use studies commissioned by local authorities in the US and Canada have recognised the value of industrial zoned land in terms of employment. Dempwolf (2009) describes how San Diego and San Jose refer to these zones as "employment lands", while in Boston there has been a recognition of how main street commercial businesses rely on backstreet industrial services.

Business Incubation

Industrial zones often provide low-cost space critical to the incubation and start-up of new innovative businesses (Howland, 2010). These businesses are essential to the development and growth of the knowledge based service economy. Bronstein (2009) highlights that despite the fact that large scale, Fordist style manufacturing has declined, innovative and high-tech domestic manufacturing is very much part of the new economy. In her account, Bronstein (2009, p.29) states "scientists and engineers make up 9 percent of today's domestic manufacturing labour force, twice the number of any other sector of the economy….and account for almost two-thirds of all private research and development in the United States." Her observations draw attention to the interconnection between "fabrication and inventiveness" which is growing the knowledge based economy and the continued need to provide industrial space.

New businesses incorporating technological and scientific research or high-tech design and fabrication need industrial zoned land to grow and develop. However, one of the areas these firms can control their expenditure is through rent. "Industrially zoned land yields substantially lower rents than land zoned for offices, housing, or retail" (Bronstein, 2009 p.30). New creative and imaginative start-up firms simply cannot afford to be located within new commercial or expensive CBD areas, therefore industrial land provides an often affordable and attractive option for these firms. This is confirmed by Hutton (2004) who explores how the clustering of knowledge based, innovative industry also benefits from spatial links with other like-minded or related businesses and services. Therefore, providing for these firms within protected industrial space where clustering is able to occur, only benefits local economies.

Re-Conceptualising Industry

An essential step identified by Dempwolf (2009) in his review of industrial land use studies in the United States is the need for the re-conceptualisation of industry. As indicated by Leigh and Hoelzel (2012) and Howland (2010), there is a common perception that industrial land is underutilised and unattractive within urban environments. Many people, including planners and government officials, often conceptualise industry as a redundant economic contributor of a bygone era associated with unpleasant industrial spaces and environmental degradation (Leigh and Hoelzel, 2012, Howland, 2010). This is due to

industry still being associated with heavy manufacturing and not with innovative and service based activities which are aligned with the current economic environment. Dempwolf (2009) argues that a re-conceptualisation of industry is essential to industrial land protection and the realisation that industrial services are essential to the function of any city for maintaining a sustainable and innovative economy.

San Francisco has led the way in reconceptualising industry and its relevance as an important use of urban space. Dempwolf (2009) identifies that San Francisco has begun to refer to its industrial zones as PDR zones or Production, Distribution and Repair districts. This has been undertaken as an attempt to change the perception of industry from being associated simply with old-fashioned Fordist style manufacturing to being more aligned with the new service economy. By referring to industry as Production, Distribution and Repair (PDR) San Francisco hopes to help both elected officials and the public understand how industrial land fits into the modern urban land system. Howland (2010, p.41) highlights that "the PDR definition more accurately describes the activities associated with industrial land, and was clearer and more understandable to citizens."

Metro Vancouver Case Study

Gilmore (2015) provides an in-depth case study referring to the Metro Vancouver region in British Columbia, Canada, and the importance of industrial services and industrial zoned land as a whole to the local economy. In the wider Vancouver region industry plays a crucial role in bridging the gap between industrial sectors such as production and distribution and the new service economy. Many local industrial firms gain significant proportions of their income from providing services to the wider service sector and vice versa. Industry in the region is of national significance economically due to its position along major transport routes connecting it to the rest of Canada and international markets. Gilmore (2015, p.15) indicates "with competing land interests and limited room for expansion outwards, many believe that the regional economy could be negatively impacted in the long-term if industrial lands are not protected from conversion to other uses."

2.4 Growth Management Strategies and Industry

This section of the literature review examines growth management strategies including the concept of smart growth. A gap is identified in smart growth strategies which fail to consider the continued importance of industry when discussing economic factors related to sustainable growth and urban form. The idea that industrial intensification can fit within the goals of sustainable urban form is also explored.

Sustainable Urban Environments

Sustainable urban form and sustainable development have grown in popularity as planning concepts throughout the world with the increasing understanding and recognition of the environmental impacts of inefficient urban forms. Sprawling, low-density expansion of cities is both energy and land intensive, creating issues relating to liveability and environmental degradation (Gilmore, 2015). Urban and growth management strategies are a policy response aimed at instilling more sustainable urban growth patterns (Jabareen, 2006). As indicated by Haughton (2003) these strategies come under a number of different names throughout the world such as 'Urban Consolidation' in New Zealand and Australia, 'Smart Growth' in the US and 'Compact Cities' in western Europe, all of which have slightly different emphases but all focus on the need to constrain outward urban expansion. Jabareen (2006) identifies that urban containment policy varies widely but includes the protection of agricultural and greenspaces from the encroachment of other activities, high density development, efficient infrastructure, centre city revitalisation and sustainable transportation. Urban containment overlaps with growth management strategies defined by Nelson et al. (citied in Jabareen, 2006 p.45) as "the deliberate and integrated use of the planning, regulatory, and fiscal authority of state and local governments to meet projected needs." In practice, growth strategies can involve creating growth boundaries, limiting utility expansion, acquisition of green belts and green spaces, controls on density development along with protection of agricultural land. Other common features include pacing development with new infrastructure development, restricting residential permits issued, land preservation programmes and tax incentives, while also having considerable emphasis on city liveability (Gilmore, 2015; Jabareen, 2006).

However, as Gilmore (2015) points out, the literature on sustainable urban form focuses primarily on residential and commercial mixed use development and fails to consider

industrial lands. “Where the discussion of the importance of economic factors in sustainability and sustainable urban form is occurring industrial lands are rarely included in conversation” (Gilmore, 2015 p.30). In fact, elements of urban growth containment can have application to industrial areas, as protecting industrial land from the encroachment of other uses prevents industry from being pushed to the periphery. This gap in the literature relating to industrial land protection is also recognised by Leigh and Hoezel (2012) particularly in relation to smart growth strategies.

Smart Growth

Smart Growth is a growth management strategy attempting to balance economic, social and environmental requirements by promoting compact city development (Gilmore, 2015). As explained by Rypkema (2008, p.5) “there is no movement in America today that enjoys more broadly based support across political, ideological and geographical boundaries.” This is supported by Leigh and Hoelzel (2012, p.90) who describe smart growth as “the most prominent planning approach for sustainable land use and urban development”. The smart growth movement developed out of the Smart Growth Network established in 1996 and Smart Growth America established in 2000. The American Planning Association (APA) was an original member of both organisations. In 2002, the APA created a number of broad policies and goals along with what are now 16 core principles announcing their adoption of the movement (Leigh and Hoelzel, 2012). Rypkema (2008) provides a summary of these principles which refer to:

- Creating a range of housing opportunities and choice
- Creating walkable neighbourhoods
- Encouraging community and stakeholder collaboration
- Fostering distinctive, attractive places with a ‘sense of place’
- Making development decisions predictable, fair and cost effective
- Mix land uses
- Preservation of open space, agricultural land, natural beauty and critical environmental areas
- Providing a variety of transport choices
- Strengthening the direct development towards existing communities
- Taking advantage of compact built design

Smart Growth and Industry

Whilst its principles and concepts are considered sound in planning practice, smart growth is not without its critics. Lin, Mandpe and Meyer (2005) for example are critical of the term's lack of specificity. They conclude from their review of 10 national organisations and 48 documents from the states of Georgia and Kentucky in the United States that smart growth is very "malleable" in its application. However, it is Leigh and Hoezel (2012) who argue that smart growth has an obvious "blindside" in relation to industrial lands. Their research focusses on practice orientated literature intended to guide planning in local economic development and concludes that adopting smart growth, sprawl containing strategies, is often associated with the conversion of relatively inexpensive industrial zoned land to land zoned for mixed use commercial, retail and residential developments.

Leigh and Hoelzel (2012) identify there is a commonly held view that urban industrial zoned areas are both unproductive and unattractive. This was the trend found in ten smart growth publications reviewed, eight of which were written by Smart Growth Network members, and which make up some of the most popular literature on the U.S. Environmental Protection Agencies Office of Sustainable Communities website. Urban industrial areas were referred to in a number of the publications as "functionally obsolete, underutilised, or otherwise insufficient to support the dense, mixed use development smart growth advocates to combat sprawl and improve urban neighbourhood quality" (Leigh and Hoezel, 2015 p.91). Howland (2010) supports these findings in her research relating to the planning and protection of industrial land in a post-industrial world. She states "smart growth advocates who argue for mixed use, high density development and walkable communities often see the displacement of industry as an important step towards creating a liveable community" (Howland, 2010 p.40).

Loss of industrial land is a widespread issue. Between 2004-2009, Atlanta lost 12% of its industrial land to other activities, Minneapolis between 1990-2005 lost 18%, while between 1990-2008 San Francisco lost 46% equating to 1,276 acres of industrial land (Leigh and Hoelzel, 2012). Little attention has been given to the importance of industrial land in providing essential public services and support to other sectors of the economy. This is despite a number of the cities in question requiring additional industrial space to provide basic services relating to public works, waste management and transport servicing. In terms

of regaining industrial land in the urban area, cities have recognised that its loss to rezoning is very similar to that of agricultural land. Once it is gone it is difficult if not impossible to regain, forcing new industrial zones to the periphery (Leigh and Hoelzel, 2012).

Despite evidence that industrial land protection promotes resilient and sustainable local economies, Leigh and Hoelzel (2012) also found no policy guidance for maintaining a justifiable mix of industrial employment. Reducing employment sprawl is a significant focus of smart growth. However, with the encroachment of mixed use, commercial, retail and residential activities displacing industry, the potential for employment sprawl is more likely to occur as the distance between workers and their place of employment becomes greater. Smart growth principles have a strong emphasis on sustainable transport options such as connecting employment centres with effective transport solutions. Greater consideration of transport options helps alleviate employment sprawl if industry does have to occur on the urban periphery. However, again there is no guidance on industrial districts relating to the provision of efficient transport options (Leigh and Hoelzel, 2012). This not only affects industrial employment but also the efficient provision of industrial services within urban areas.

Urban clusters of industry actively provide services to other city activities and the public within close proximity (Hutton, 2004). Movement of industry outside of the urban area resulting in industrial sprawl will require greater reliance on transport and energy consumption, all of which are contrary to the goals of smart growth. This includes both service vehicles entering the city, contributing to congestion issues, as well as city residents having to leave the immediate urban area to access basic services such as mechanics workshops or panel beaters.

Despite the present lack of recognition of industry in smart growth policy and principles, Leigh and Hoelzel (2012) argue there is no reason smart growth cannot be expanded to include considerations of industrial land. “The examples from Philadelphia and other cities we have discussed illustrate that the smart growth framework must be adjusted so that it acknowledges industry’s critical role in creating sustainable and innovative economies” (Leigh and Hoelzel, 2012 p.97). It is this role that planners need to understand when considering the effects that current smart growth models can have on industrial land. The inclusion of industrial planning in smart growth principles requires consideration of the design and regulatory alternatives to make them more compatible with smart growth

visions. This involves working towards disbanding segregated industrial land uses and creating well supported, well connected industrial districts.

2.5 Industrial Intensification

As examined in the previous section, literature focusing on sustainable urban form and growth management strategies, such as smart growth, all refer to the idea of compact urban design and restriction of outward urban expansion. The concept of intensifying the use of space is considered as the way to achieve compact urban design by attempting to reduce urban sprawl. While the intensification of residential and retail areas has received considerable attention, intensification of industry has been less in the spotlight. By exploring industrial intensification options planners will be able to better fit industrial land uses into smart growth style strategies. This will help limit industrial sprawl and aid in better utilising industrial space. This section will look at defining intensification, followed by examining the literature on industrial specific intensification and the factors influencing that intensification in industrial zones.

Intensification

The concept of intensification is important to define when considering industrial intensification and the processes associated with it. According to Gilmore (2015), there is no standard definition of intensification and intensity with regard to land use and development due to the varied meanings and implications within different contexts. These contexts relate to the differing forms of intensification which occur in different zones. For example, retail or residential intensification differs from types of intensification possible in industrial areas.

As identified by Gilmore (2015), many of the growth strategies and the literature relating to sustainable urban form use intensity and density interchangeably. While intensification is often used as a broader term which encompasses density, the two are regularly used to describe the same outcomes. Despite this, when examined more carefully, density generally refers to the concentrations within a given area. Sevtsuk et al. (2013 p.2) define density as "the amount of people or elements of urban form (e.g. dwelling units, floor area) per unit area of land."

Intensification of urban areas can refer to many of the principles associated with the practical implementation of growth strategies including building redevelopment and providing higher density sites, mixed use development, infill development, revitalisation of heritage or aged structures and development of underutilised land (Gilmore, 2015). In line with this, Williams et al. (1996 p.84) refer to intensification as "generally relating to the range of processes which make an area more compact." However, a significant point of difference between the term intensity and density is that intensity also refers to the intensity of activity. Intensification of activity can mean "the increased use of existing buildings or sites, changes of use, which lead to an increase in activity" (Williams et al., 1996 p.84). The increase in activity aims to limit underutilisation and optimises the use of land depending on the activities taking place in those particular zones.

Industrial Intensification

A region's industrial land base can be made more efficient and effective by intensifying these industrial spaces. Gilmore (2015) identifies the numerous benefits of industrial land intensification which include:

- Increased economic activity and employment activity on a limited land base
- Efficient use of land and resources
- Reduced impacts on the environment
- More efficient use of transport infrastructure
- Extending the lifespan of available industrial lands, and
- Reduced pressure to convert agricultural lands to industrial uses**.**

However, distinguishing between density and intensity is important in the context of industrial land use and development because as Gilmore states (2015, p.25) "many industrial activities cannot be intensified through more intense built form (density). Some industries are land intensive, some are job intensive and others are building intensive".

Metro Vancouver's 2012 report on industrial intensification describes intensification as the amount of activity on a given amount of land. The means by which this can be measured is illustrated in Figure 1, in contrast with the measures of density in Figure 2.

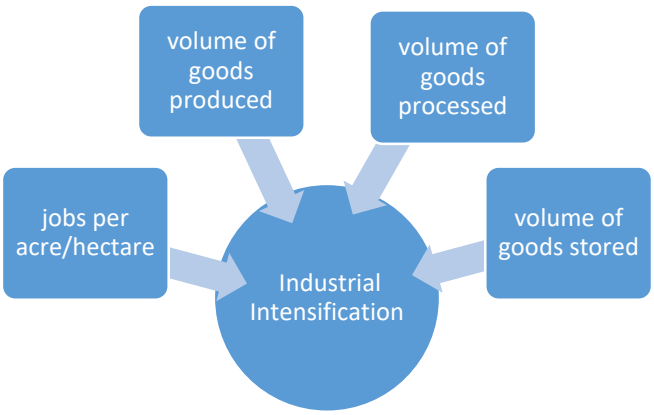

Figure 1: Industrial intensification measures. (Source: Adapted from Metro Vancouver, 2012)

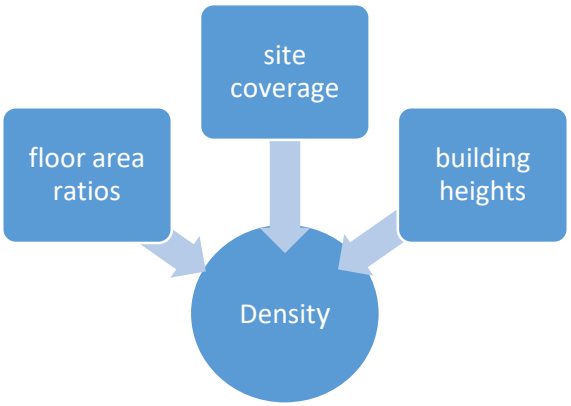

Figure 2: Industrial density measures. (Source: Adapted from Metro Vancouver, 2012)

Industrial intensification optimises the industrial land potential by allowing sites to achieve higher density forms of development and by facilitating new growth through the redevelopment of existing underutilised sites (Metro Vancouver, 2012). This results in a more efficient and productive use of industrial zoned land.

Industrial intensification is more complex than that of residential or retail which can be intensified by increasing density. Many industrial activities require considerable areas of open space for container storage, vehicle parking and loading zones therefore density in the form of floor space does not result in increased intensity as it might in regard to warehousing activities. Gilmore (2015) indicates that industrial intensity can greatly increase without an increase in density through the increased use of technology or increasing numbers of staff within the same industrial site. Therefore there is a consensus in the industrial intensification literature available that industrial activities must be

analysed individually in terms of intensification. It is clear a blanket approach to industrial intensification, such as increasing density, will not be effective in every scenario and various forms of intensification should be explored.

2.6 Conclusion

This chapter has reviewed the literature relating to the importance of maintaining a base of urban industrial land for the sustainability and economic vitality of the modern city. It has attempted to place this issue initially within the historical and theoretical framework of research on urban form. Understanding the impact of globalisation, deindustrialisation and the rise of the new service economy within developed countries has been important for highlighting the impacts on the industrial sector, along with the current perceptions and practices relating to location and protection of industrial zones.

A key finding of this review has been the identification of key academic researchers exploring this issue whilst also recognising the existence of local authority awareness of the issue. Howland (2010) has demonstrated the continued importance of the industrial sector particularly in relation to industrial services, employment and business incubation, in the new service economy. Dempwolf (2009) and Gilmore (2015) point to the need for reconceptualising industry towards an understanding of its modern function of production, distribution and repair. This is suggested as a means to help change perceptions of the sector from that of traditional manufacturing and heavy industry. The 'blind-spot' which exists in relation to the industrial service sector and smart growth was identified by Leigh and Hoelzel (2012) and Gilmore's study on Metro Vancouver illustrates how industrial intensification can be incorporated effectively into such growth management strategies.

Whilst the literature review has informed this thesis, the limited amount of international literature directly related to this research topic underlines how the current case study on Nelson's industrial lands can contribute to this body of research. The following chapter will outline the New Zealand and Nelson context for this research, including a brief examination of the gap in New Zealand's planning literature on industrial land.

Chapter 3 New Zealand and Nelson Context

3.1 Introduction

This chapter will provide the national and local context to this case study research into industrial land availability and protection in Nelson. The chapter will begin by presenting the background of New Zealand's industrial growth and change, along with the relevant planning literature and current legislative framework. Following this, the chapter will explore the Nelson context in relation to location and geography, local industry, population and economic growth as they relate to industrial land and the industrial sector. Finally Nelson's local authority, the Nelson City Council (NCC) will be introduced along with its approach towards sustainability planning and development.

3.2 New Zealand's Industrial Growth

This section is intended to provide a brief rather than comprehensive review of the literature relating to New Zealand's industrial history as a context for industrial land planning issues which exist today.

As Smith (2001, p.11) observes "our society has been predominantly an agricultural society not the southern hemisphere's cradle of industrialisation." Despite this, Smith recognises that much of New Zealand's society of the late 19th century was dependent on local industry. Bertram (2009) outlines three development eras in New Zealand economic history. These include grass monoculture (1830s-1930s), insulation and industrialisation (1935-1970s) and the swing to a serviced based economy (1980s-present).

The height of industrialisation in mid-20th century New Zealand was characterised by a surge in industrial employment driven by construction and manufacturing. As Bertram (2009, p.543) explains, this period saw an expansion of manufacturing for local and export markets but also "massive state-led expansion of housing stock and massive public works construction projects in hydroelectricity, highways and airports." The policies of the fourth Labour government, 1984-2000, which Bertram describes as "extremist neoliberalism" signalled the decline in manufacturing and the move to "centre stage" of finance, education, tourism, business services and design and infrastructure utilities. In this respect New Zealand's industrial development and change has mirrored that in the rest of the developed

world even if on a lesser scale. While there appears to be an understanding in economic discourses, such as Bertram's, of the continued importance of industrial services in the new economy, industry remains largely unconsidered in New Zealand's planning literature and legislative framework.

3.3 New Zealand's Planning Literature

Historically, academic literature referring to New Zealand's urban environments is limited. According to Miller (1998) this lack of urban historical scholarship can be linked to a number of reasons relating to New Zealand's short urban history and the comparatively small size of the country's cities compared to other global cities. Miller (1998) also points towards the historic understanding of New Zealand as a rural and agricultural country which has taken considerable focus off research relating to the development of cities. In other words, New Zealand cities have been largely overlooked, until more recently, in New Zealand's planning literature.

Current urban based academic literature and research on the built environment focuses on sustainability principles and goals, containment and consolidation. Freeman (2003) indicates there is reasonable unanimity regarding these goals of sustainable development. However, Vallance et al. (2010, p.1706) suggest that although enjoying intense interest and wide-spread political support the over-emphasis on biophysical aspects of sustainability ignores "the everyday activities and contexts where people actually work and live".

The concepts of intensification and density which are becoming increasingly prominent in planning literature are discussed mainly in terms of residential development (Dixon and Dupuis, 2003; Ancell and Thompson-Fawcett, 2008). If industrial land is discussed at all it is in terms of brownfield development (Gudsell, 2012; Xu J, 2016) which reflects the lack of recognition of industry in international literature. Contrary to this gap in the literature, industrial land availability and protection are topics that increasingly occupy local authorities throughout New Zealand as evident in their local policies and strategic documents (Wellington City Council, 2014; Waitakere City Council, 2008; Western Bay of Plenty District Council, 2013; Tauranga City Council, 2015).

3.4 Planning Legislative Framework

New Zealand's planning framework stems from the provisions of the Resource Management Act 1991 (RMA). In regard to this research, the RMA is the key piece of national level legislation, with the Local Government Act 2002 and the Building Act 2004 also important to consider.

3.4.1 The Resource Management Act 1991

The Resource Management Act 1991 is New Zealand's primary piece of legislation aimed at effectively managing the environment. Part 2 Section 5 of the RMA is the engine room of the Act and outlines its purpose which is to promote the sustainable management of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing. The RMA focuses on managing the effects of activities rather than regulating activities. It does this through its adoption of an 'effects based' management system which aims to avoid, remedy and mitigate adverse effects activities may have on the environment (Environment Foundation, 2014). Section 5 is designed to be considered when assessing applications of resource consent. This includes the effects an application may have on amenity values which is paramount to the sustainable management of communities.

The RMA 1991 also outlines the functions and requirements for New Zealand's local authorities which must establish and implement a management system outlining specific objectives, and policies and methods in order to achieve integrated management. This is to ensure the sustainable use and protection of natural and physical resources within local contexts. A local resource management plan is the most common way of achieving this within each local authority.

Although in plain terms the RMA of 1991 does not currently include direction on the urban environment, including industry, its emphasis on the sustainable management has created a planning environment which inevitably encapsulates urban spaces (Freeman, 2003). This is made evident by all local authorities' commitment to urban design and other urban considerations, such as industrial zones in their respective local plans. All industrial developments must consider the RMA 1991 and whether they fulfil its principle of sustainable management and proper consideration of the natural and physical environment.

Since its inception, New Zealand's Resource Management Act has been amended numerous times. In 2015 the Resource Legislation Amendment Bill was introduced into Parliament by the National Government. The original intention to overhaul Sections 6 and 7 in order to alter the weight of economic and environment consideration but was stalled for political reasons. Despite this, the Bill still intends to support business growth and housing development by streamlining planning processes (Ministry for the Environment, 2015a). The National Government has also proposed a new National Policy Statement on Urban Development Capacity (NPS-UDC). National Policy Statements are instruments issued under Section 52(2) of the Resource Management Act 1991 and state objectives and policies for matters of national significance (Ministry for the Environment, 2015b).

3.4.2 The Local Government Act 2002

The Local Government Act 2002 (LGA) aims "to provide for democratic and effective local government that recognises the diversity of New Zealand communities". The purpose of the LGA 2002 under Section 3 is to:

- Provide a framework and powers for local authorities to decide which activities they undertake and the manner in which they undertake them.
- Promote the accountability of local authorities to their communities.
- Provide for local authorities to play a broad role in meeting the current and future needs of their communities for good quality infrastructure, public services and regulatory functions.

The power given to local authorities, along with the Resource Management Act, allows local council bodies to create their own resource management legislation. This includes a requirement under Section 12(2) of the LGA for local authorities to prepare long-term and annual plans along with budgets in consultation with their communities. In relation to industry activities, local plans, such as Nelson's Resource Management Plan (2004), have sections which define industrial zones and the activities which take place within them. All industrial development must consider the contents of local plans. Specific rules relating to industry and its affects are contained within these plans and provide the regulations which industrial activity must abide by within local areas.

3.4.3 The Building Act 2004

The Building Act 2004 is New Zealand's legislation relating to the regulation and creation of standards for buildings. Section 3 outlines the main purpose of the Act to ensure buildings are constructed and maintained to a standard which ensures the health and safety of any person who uses them. This refers to the proper construction of buildings but also considers fire hazards, natural hazards, insanitary buildings and providing for the disabled. This Act has considerable application for industrial buildings and informs the rules around the construction of industrial buildings within industrial zones.

3.5 The Nelson Context

Nelson has been chosen as a case study for this research into urban industrial land availability, protection and intensification within the context of a sustainable city planning framework. This decision was based on three key features. Firstly, Nelson has a unique locality and geography which puts considerable pressure on land use and development. Secondly, it is a region currently experiencing significant growth in population and economic activity and thirdly it has strong community and local government aspirations of achieving sustainability.

Location and Geography

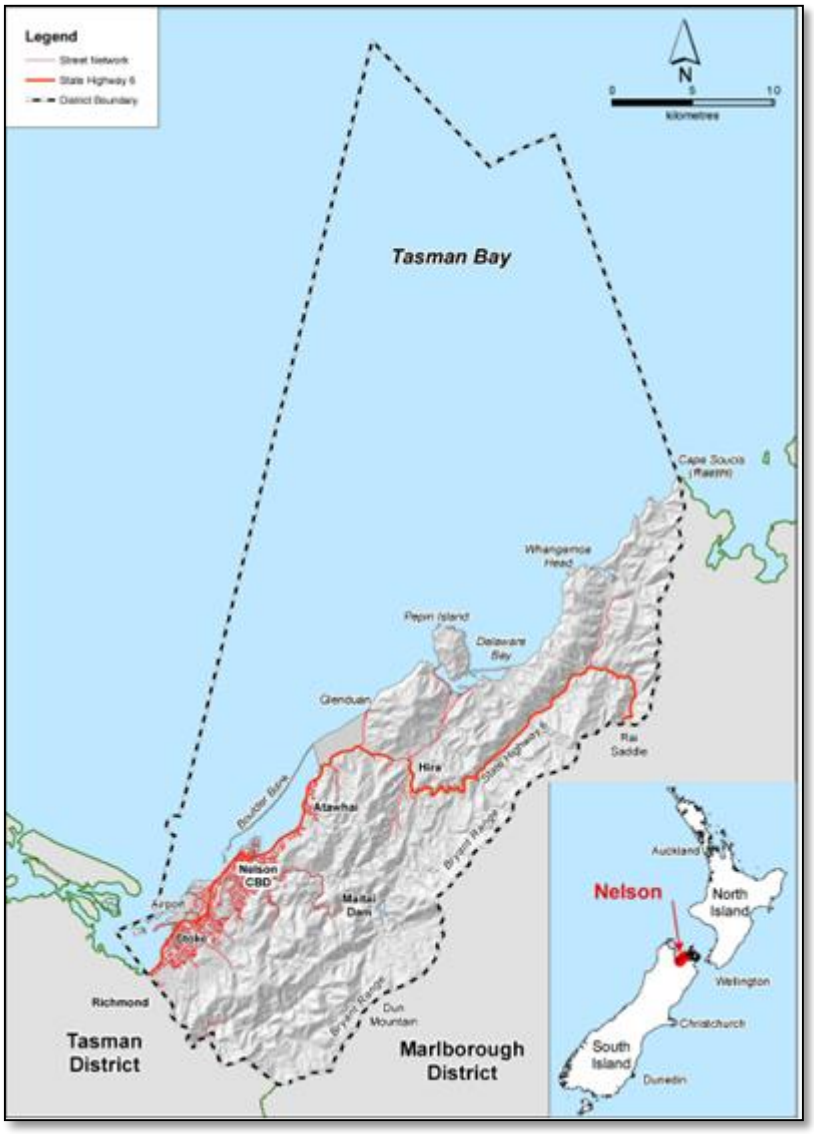

Figure 3: Nelson City Regional Boundary. (Source: NCC, 2016)

Situated at the top of New Zealand's South Island the Nelson region is one of the smallest and most isolated in New Zealand with a total land area of only 445 square kilometres (Statistics NZ, 1999). The region also includes a territorial limit extending 12 miles seawards from the coastline. As shown in Figure 3, Nelson's boundary extends from Cape Soucis to the north east, along the Bryant Range to the south-east. The south-western boundary forms the northern boundary of neighbouring Tasman district and its major urban settlement of Richmond. To the north, the Nelson region then extends out into Tasman Bay (Statistics NZ, 1999).

Nelson City itself is a coastal city occupying the river valleys, low hills and narrow flatlands inland of the Nelson Haven and Waimea estuary. The surrounding mountainous landscape has influenced Nelson's past patterns and possible future forms of urban development (NCC, 2012). The basin effect created by the mountains encapsulating the city has constrained further growth close to the central city due to the lack of available land. This has seen most of the wider region's residential, commercial and industrial growth occurring outside of the central city boundaries as well as in the closely neighbouring township of Richmond, 15 kilometres to the south in the Tasman region.

Industrial History

The Nelson Tasman Region has a rich early history which spans from pre-European Maori settlement and the first European sighting of New Zealand when Abel Tasman sailed into Tasman Bay in 1642. Early European settlement occurred in the 1840's with planned European settlement sold to buyers in London by the New Zealand Company. Nelson's coastline was considered a safe haven for shipping, due to its calm seas and protection by the Boulder Bank (Walrond, 2012). As a result, the port was developed rapidly from the 1850s to create a lifeline to the hinterland and provide access to export markets for the wider region's increasingly diverse produce. This development included deepening the entrance to the port and blasting what is now known as "The Cut" through the boulder bank in 1906 to allow larger ships a direct route to dock. Much of the debris from the dredging of the harbour was used to reclaim industrial land around the port area, in the city and around Tahunanui. This continued into the 1960's and the harbour is still dredged today due to ongoing siltation issues (Port Nelson, n.d.).

Early industries in the region included boatbuilding, sawmilling and allied trades, brick and pottery manufacture, flax and woollen mills and tanneries. By 1867, 50 of New Zealand's 300 manufacturing industries were located in the province (NZ Min. Works, 1965). At the turn of the 20th century, Nelson businesses such as Griffins biscuit's, Newman Brother's Transport, Anchor Shipping, K jams and other tinned products were widely known throughout New Zealand (Neale, 1991). Much of the industrial employment in the region was derived from primary processing and manufacturing which grew until the end of the 1970s. With deregulation in the 1980's, Nelson reflected national trends with mergers and takeovers seeing many of Nelson's original businesses disappear (McAloon, 1997). The

lack of availability of land for development in Nelson and the loss of productive land, particularly on the fringes of the city, was recognised as a concern early in Nelson's history. This prompted several unusual solutions. In the 1950's a Dutch immigrant to the region proposed a dyke system for the reclamation of the Waimea Estuary (Neale, 1991) and in the 1960's the Council seriously considered an extension to the port's reclamation works to include the Nelson Haven (Warren, 2008). Neither project came to fruition.

Industry Today

The combined Nelson and Tasman regions are well known for five key export sectors - horticulture, forestry, farming, seafood and tourism (Reid, 2014). The two regions are regularly referred to in statistics which do not distinguish between the Tasman Region (farming, horticulture and forestry) and the Nelson region (seafood and tourism). Whilst recognising these are core "primary" industries of vital importance to the economy of the two regions, it is the "spin off" or service industries related to these core industries which are the focus of this research.

Port Nelson is Australasia's largest deep sea fishing port and contributed to around 29.9% of the national seafood industry in 2012 while providing for 24.9% of national seafood employment (Reid, 2014). In addition, the wider port industrial area houses a cluster of support industries related to Nelson's fishing industry such as fish processing, engineering, boat building and repair, science, research and education (Pavlovich and Akoorie, 2005).

Nelson also has a range of innovative engineering firms which have enabled growth in the key export industries by providing mechanisation solutions for the primary industries. These firms have built up a wealth of knowledge and capability, particularly in the horticulture, forestry and marine sectors (Reid, 2014). In addition Nelson has an increasing number of hi-tech industries in the communications and construction industries located in its industrial zones.

It is also important to note that Nelson is home to the fourth busiest airport in New Zealand and the busiest regional airport in the country. Air Nelson is a division of Air New Zealand and manages both flight operations and a large maintenance facility at Nelson Airport,

employing highly skilled staff. Both helicopter and fixed wing aircraft support the region's horticulture, forestry, seafood, farming and tourism industries. (Reid, 2014).

Population and Economic Growth

Despite the topographical restraints on land availability, the Nelson region is experiencing a period of growth both in population and economically. Between 2006 and 2013, Nelson's population grew by 8.3% reaching a population size of 46,437 (NCC, 2015). It was one of six New Zealand cities which grew in excess of the average national growth rate of 5.3%, which by Organisation for Economic Co-operation and Development (OECD) rates is considered a significant gain (Nel, 2015). In 2015, Nelson was New Zealand's fifth fastest growing region with the economy experiencing an increase in GDP of 4.4% between June 2015 and June 2016, compared with the national rate of 2.7% (Infometrics, 2016).

Occupation % for those working over 15 years of age
Source: Census 2013

Occupation	Nelson	Tasman	NZ
Managers	15.3%	21.0%	18.7%
Professionals	22.3%	16.9%	22.5%
Technicians & Trade Workers	12.9%	12.2%	12.0%
Community & Personal Service Workers	10.0%	8.2%	9.0%
Clerical & Administrative Workers	11.0%	10.0%	12.0%
Sales Workers	9.9%	8.0%	9.3%
Machinery Operators & Drivers	5.0%	6.2%	5.4%
Labourers	13.5%	17.6%	11.1%

Figure 4: Occupation % for those working over 15 years of age. (NCC, 2016)

Census data on sector employment in Nelson is of particular relevance to this research. According to the most recent data in 2013, the percentage of those over the age of 15 years working in the trades, as technicians, drivers and machinery operators make up 18% of the population with an additional 13.5% described as labourers (NZ Stats, 2013). Taken

together this equates to potentially 28.5% of the working population involved in industry related occupations as shown in Figure 4.

Also of relevance are the region's educational qualifications statistics. 70% of the population over the age of 15 years have either have no qualification or secondary school equivalence (NCC, 2015). These employment and education level statistics are relevant in relation to the importance of Nelson's industrial sector for this segment of the population as a source of jobs as also evident in the international literature (Howland, 2010; Dempwolf, 2009; Leigh and Hoezel, 2012).

Industrial Land



Figure 5: Port Industrial Area. (Source: Solander, 2016 http://solander.com/contact-us/)

Nelson City currently has six industrial zones recognised in the region's district plan including Port Nelson, Vanguard/St Vincent, Tahunanui, Nelson Airport, Nayland Road South and Saxton Road. These zones vary in size along with the activities which are contained within them.

The Port Nelson industrial area is situated on the Port reclamation area off Haven Road, and is in close proximity to the CBD. The zone contains activities essential to the Ports function including wharf space, container and log yards, warehousing and petroleum storage. The zone also contains Nelson's Marina, Talley's and Sealord's factories and a number of engineering and other trades based firms.

The Vanguard/St Vincent industrial zone is the closest industrial area to the CBD and also the smallest of the six zones. It contains a range of light industrial businesses such as small engineering firms, mechanical and panel beating workshops, car dismantlers and warrant of fitness outfits. There is also some retail encroachment in the zone with the large scale retail store Harvey Norman being the most evident.

The Tahunanui industrial zone is Nelson's largest industrial zone and contains a number of large scale industrial sites including processing plants, timber yards and contractor depots. Some smaller scale industry has occurred in the newly developed area off the north end of Nayland and Quarantine Roads which include trade based workshops and industry related retail.

The Nelson Airport adjoins the Tahunanui industrial area and contains airport related activities including the airport terminal runway and related service buildings.

Further south, the Nayland South Industrial area contains a number of regionally significant food related industries with the most prominent being the ENZA apple processing plant. This industrial zone is envisaged as a clean industrial area due to the food related industry occurring within it. The industrial area also contains some of Nelson's most recently developed industrial land which contains a number of light industrial activities including heavy vehicle servicing bays, trade based workshops and transport depots.

The Saxton's Industrial area lies between Nayland Road and the Nelson City and Tasman District boundary. The zone originally contained Nelson meat works but has recently been redeveloped to hold a range of light and heavy industrial activities. There are also a number of big box retail stores within the zone including Bunnings Warehouse and Placemakers.

For the purposes of this study, Nayland and Saxton Industrial zones have been combined together, as well as the Airport and Tahunanui due to their close proximity and interrelations. Therefore the following industrial areas will be referred to throughout the remainder of this research:

- Port Nelson
- Vanguard
- Tahunanui
- Nayland South

Each of the industrial zones referred to in this section are constrained by either surrounding residential areas, CBD activities, commercial space or the coastal environment. With these zones already being highly developed there is very limited space for industrial expansion within the existing zones. Chapter 5 provides a full examination of the exact quantity of available industrial land in Nelson.

Local Authority

Land-use in Nelson, as in all of New Zealand cities, is controlled by a local authority under the LGA 2002. Nelson City Council acts as a unitary authority covering the traditional roles of both district and regional councils. The Council's governance includes the Nelson central business district and outer lying suburbs including Tahunanui and Stoke, which contain two of the most extensive industrial zones in the Nelson region. As a unitary authority, the Council has the combined responsibilities of a local and regional council. This differs from most other local authorities in New Zealand which often have a separate Regional Council with several local authorities, either city or district councils. Under its regional obligations, the Nelson City Council manages pest control, civil defence, water, flood control and environmental protection and regional transport. It also has responsibility for developing its own Resource Management Plan which acts as a combined District Plan (land use) and Regional Plan (coastal, land disturbance and freshwater) aimed at ensuring a sustainable management approach is undertaken in Nelson in regard to these areas.

Nelson City has a long history of "green thinking" within the community which is instilled in Council strategies including its longer term Nelson 2060 strategy launched in 2014. This long term strategy covers goals and visions of the city which have been developed around sustainable principles to ensure Nelson's future liveability, health and prosperity. A key objective of this research is to analyse whether the Nelson 2060 strategy, along with other relevant regulatory and non-regulatory comma documents take industrial land protection and intensification into consideration.

3.6 Conclusion

This context chapter has provided the New Zealand and more specifically the Nelson context for this research. It has examined the industrial, economic and planning background within which this research is placed. Nelson's land availability issues are outlined in relation to the region's location and geography, along with population and economic growth. Finally the region's local authority is introduced and the context of its sustainability goals and aspirations. These factors were explored in detail in the research process which is described in the next chapter.

Chapter 4 Research Methodology

This chapter provides an outline of the research investigation, guiding methodology and selected methods which generated the results and findings of this research on industrial land availability, protection and possible intensification in Nelson. This chapter will discuss the case study approach selected, along with the quantitative and qualitative methodologies used, including why these approaches were considered to be the most appropriate methods for obtaining data in relation to this topic. The chapter will also provide an outline of the key positional and ethical considerations along with possible limitations which may affect the results and findings.

4.1 Research Design

A comprehensive research design is a requirement of any research process. The steps outlined in a research design provide the framework in which information and data is collected. As explained by Yin (2014, p.28) "in the most elementary sense, the design is the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions." The research design creates a 'blueprint' approach through which quality results can be obtained. This research is influenced by the interpretivist theory of social research which requires the researcher to grasp the subjective meaning of findings whilst at the same time interpreting them in terms of the theories and concepts of the literature. Closely aligned with this is the constructivist view which fits well with this research topic as it requires a comprehensive, holistic approach and acknowledges there are multiple factors and perspectives to be taken into account (Bryman, 2001).

This thesis used a case study approach with elements of descriptive and exploratory research methods (Neuman, 2011). The descriptive research employed a quantitative methodology to analyse industrial land availability. Research for this section was conducted as part of an Industrial Land Supply report prepared for the Nelson City Council in the summer of 2016. This method of data collection included analysis of aerial photographs, property improvement values, employment density data and observational research in order to quantify Nelson's industrial land availability.

The exploratory research employed qualitative research methods including document analysis, key informant and focus group interviews to investigate key themes identified in the literature review and related to the research objectives. The documents analysed included local regulatory and non-regulatory documents which were used to assess existing industrial land zoning, protection and sustainable city aspirations. Interviews were then conducted and the narrative data was transcribed, coded and categorised into six themes.

It is common for research designs to incorporate a mixed methods approach of gathering data to ensure the data collected is representative of the situation being investigated and provides for comprehensive results.

Single Case Study Approach

In relation to the current research a case study approach was decided upon in the research design. "Case studies enable us to link micro level or actions of individuals to the macro level, or large scale structures and processes" (Neuman, 2011, p.42). The basic case study design consists of the detailed analysis of a single case which, according to Bryman (2001), can include the likes of a single community, a single organisation, a single school or a single family often in a particular location. Such an approach is sometimes criticised because each case is unique in some respect. However, Denscombe (2007) explains that a single case study can be justified when significant features are used as examples of the broader issues. Through the assessment of individual cases it is more likely that the results will be able to tease out wider implications that would not come to light through broader research strategies (Gray, 2009).

Nelson, New Zealand was selected as a relevant case study for this particular research topic. The city provides an example of an urban area which relies on industry economically, for local employment, along with general services required by any urban population. Despite this, significant topographical constraints and the small size of the administrative area hinder the expansion of industrial land, therefore Nelson provides an ideal setting to explore the need for industrial land protection against encroachment and the parallel potential for industrial intensification in the city.

An important consideration of the research design are the various scales at which the research issues exist. Nelson and the nearby town of Richmond in the Tasman region have an interconnected industrial base with a cross boundary relationship which includes joint

ownership of Port Nelson between the two local authorities. While reference is made to Tasman and its role in relation to industry in the region, it was decided the scale of research would be too broad to obtain results of a focused nature if Tasman was included as part of the case study. Nelson's compact urban form and constricted industrial zones provides an effective scenario to investigate industrial land protection, with results more likely to be useful to other urban areas than a broad cross-regional overview would be able to provide.

4.2 Mixed Method Approach

As referred to in the research design, a mixed method approach was used in this research process. Neuman (2011, p.163) states "mixing approaches has advantages but adds complexity and is more time consuming". However, using various methods adds depth and comprehensiveness to the research and allows for triangulation. Triangulation is based on the principle that the researcher obtains a better understanding of the issues investigated if viewed from a number of different positions and includes various data inputs (Denscombe, 2007; Neuman, 2011).

This section will describe in detail the quantitative and qualitative methods used. Both secondary and primary data collection methods were also employed in the research process. Secondary data collection included the literature review and document analysis while primary data collection involved a mixture of land use analysis, key informant and focus group interviews.

Literature Review

A review of the relevant literature was an essential part of this research process. Reviewing the literature placed the research issue within the current body of literature while highlighting the debates surrounding the topic (Gray, 2009). This process assisted with the drawing out relevant research objectives and questions which led to qualitative and quantitative investigations further along in the research process. Use of this secondary data aided in formulating the potential issues and questions which later presented to key informants. Key authors identified in the literature review such as Gilmore (2015), Dempwolf (2009), Howland (2010) and Leigh and Hoelzel (2012), confirmed the choice of a case study as the appropriate approach for this research. The limited amount of

literature found internationally and within New Zealand, especially on industrial land protection, the importance of industrial services and intensification, re-emphasised the need for the current study and an investigation into the issue in a New Zealand context.

The sequence presented in the literature review began at the broad historical and theoretical level. Neuman (2011) considers this a "specialised review" in which an issue is traced over time. This was followed by a "context review" situating the study in a broader framework but also narrowed down to particular issues and considerations which are relevant to the Nelson context. The key arguments, especially surrounding the importance of industry, industry's position in growth management strategies and the potential for industrial intensification were all prominent areas of discussion during key informant and focus group interviews.

Document, Legislation and Policy Analysis

A thorough review of the relevant documents relating to industrial land and zoning was an essential component of the research process. The process involved critical analysis of local, regional and government level legislation, policy documents and strategies which ultimately shape how industrial land is managed in Nelson. This included a review of documents such as the Nelson 2060 strategy 2014, Nelson Long Term Plan 2015, Nelson Regional Policy Statement 1997, the Draft Nelson Regional Policy Statement 2016 and the Nelson Resource Management Plan 2004. By analysing such documents a wider understanding of the current planning environment was achieved along with the analysis of how industry is considered within both regulatory and non-regulatory documents.

A critical approach was taken to analysing relevant documentation when considering the extent industrial land, services and intensification were represented. The findings of this analysis are used throughout the following results and discussion chapters.

Land Use Analysis

A land use analysis was undertaken in order to answer the second objective of this research. The purpose of the land use analysis was to provide an estimate of Nelson's vacant and underutilised industrial land, highlighting areas where development or greater utilisation of land could potentially occur. The methodology was established after reviewing recent

industrial land research (i.e. Metro Vancouver, 2012; Waitakere City Council 2008; Coffey Geotechnics, 2013; Tauranga City Council, 2015).

This analysis used data from a number of sources and different methods of collection included aerial photographs, property improvement values, employment density data and observational data from site visits. In this way the reliability of the data was improved by using what are described by Neuman (2011) as multiple indicators.

The set of criteria for categorising industrial land is shown in Table 1.

Table 1: Criteria for the Analysis of Industrial Land in Nelson

Vacant Land	Industrial land which contains no structures or few substantial structures. Also largely clear of any substantial plant or material industry.
Vacant Land (storage)	Properties with no substantial buildings on site and which are predominantly used for storage as to there is no productive output associated with the land.
Vacant Building	Those buildings identified as being for sale or lease or identified as likely vacant during site visits.
Underutilised Land	Industrial land on which structures and plant or material industry make up under 50% of an individual site OR, Significant open spaces in a property outside of the main site building and groupings of associated vehicle, plant and material industry.
Planned Development	Vacant or underutilised land with obvious planned development identified either by signage on the site or early stage construction/earthworks.
Full	Industrial land where over 50% of the site is covered by structures, plant or material industry AND, There are no significant open spaces with possible development potential.

Source: Adapted from Tauranga City Council (2015)

It was discovered early in the aerial analysis that underutilised properties were determined more often by significant open spaces rather than the documented 50% criteria due to the built nature of Nelson's industrial land. Significant open spaces were defined as areas within a property which were outside of the main site building and groupings of associated vehicle, plant and material industry. These areas were selected on the basis of whether another building of similar size could fit within the property, while also taking into account considerations such as access.

Aerial Map Analysis

The analysis of the industrial areas involved examining recent aerial maps of all industrial zones. These maps were sourced from the Top of the South Maps (http://www.topofthesouthmaps.co.nz/website). Each property within Nelson's industrial zones was systematically investigated against the above criteria. All properties identified as "vacant land" or containing "underutilised land" were placed in a database for further analysis.

Property Improvement Value Analysis

Analysis of property improvement values, from the NCC databse, aided in determining sites which could be considered "vacant" or "underutilised". Properties with improvement values under $100,000 were analysed and a number of storage based properties were added to the database. Examples of these sites included properties used for the storage of wrecked cars, used tyres, industrial scrap and vehicles.

Employment Density Analysis

Employment density of industrial property by census mesh block was an additional method used for determining the utilisation of existing industrial areas. A mesh block is the smallest geographic area for which statistical data is collected by Statistics New Zealand. GIS data, drawn from Nelson census information (Statistics NZ, 2013), also aided in the establishment of employment densities in each of the industrial zones by census mesh block. Employment density data provided an initial indication of the level of activity on an industrial site or potentially inefficiently used land. This was later verified by observational data.

Consistent with Bay of Plenty's Smart Growth Strategy (2013) employment density was considered on a scale of:

- 69+ employees per hectare = very high density
- 50-68.5 employees per hectare = high density
- 28-49.5 employees per hectare = medium density
- 20-27.5 employees per hectare = low density
- 0-19.5 employees per hectare = very low density

Nelson's industrial areas were broken down into their mesh block areas and employment densities calculated for each of these. The employment density data helped confirm a number of the industrial sites already identified. The results of this analysis are presented as a series of maps in Chapter 5.

Site Visits

Observation is a method of data collection which involves the researcher observing activities or behaviours occasionally with, but often without any direct contact with the subjects being observed (Bryman, 2001). As identified by Chambliss and Schutt (2003) the collection of observational data is a useful way to supplement or confirm information gained from other methods.

Final analysis of the industrial sites included site visits to each of the industrial zones. During this step, properties were given a final confirmation of categorisation. A small number of industrial sites were ruled out due to falling outside the criteria listed in Table 1 when physically viewed. During the site visits, additional industrial properties that were deemed vacant either through 'for sale' signs or observation were recorded and are listed under vacant buildings in the results. Vacant land with obvious future development plans, either through signage or early stage earthworks for example were noted, along with residential properties within each industrial zone.

In this way observational methods were used to gain an understanding of Nelson's current industrial land availability and confirm existing data. Observational methods were purely quantitative with no contact with land or business owners.

Quantitative Data Analysis

As described above, the quantitative analysis of industrial land use and availability in Nelson used a mixture of data collection methods. The aim was to categorise industrial land using a set of criteria showing vacant, underutilised, and planned development sites. The results are displayed in a series of tables, maps and charts in Chapter 5 which describe and quantify the percentage of land availability and examine employment density in each of Nelson's industrial zones.

4.2.3 Key Informant, Focus Group Interviews and Analysis

Due to the exploratory nature of significant sections of this research it was decided that qualitative research in the form of key informant and focus group interviews was essential for gathering relevant information in regard to this topic (Gray, 2009). These qualitative methods were used to explore the issues identified in the literature review and provide information relating to the research objectives.

The selection of key informants occurred prior to and during the fieldwork period conducted in Nelson. Two methods of gaining key informants were used including web based research or purpose sampling to gain a starting list of key informants which then grew through the use of snowball sampling. Initial web based research was based around Neuman's (2011) criteria of sourcing key informants who were familiar with the local context, involved in the field, as well as understanding the people and processes occurring in the field.

Snowball sampling was used to expand the initial base of key informants contacted prior to entering the field. Snowball techniques generally occur through the referral to other potential key informants made by those already participating. As indicated by Singleton Jr. and Straits (2010) this is an effective way of gaining research participants as those within a certain community or associated with particular industry generally have regular contact with others also involved within these spheres.

In total nine people were interviewed in a series of eight scheduled interviews, along with an added focus group which consisted of an additional eight participants. The key informants were selected by the two methods either based on their direct involvement in Nelson industry, local planning, education, local government and economics. Table 2 provides and outline of the key informant participants and their role in the Nelson community relating to industry.

Table 2: Key Informants and their roles

Key Informants	Role
Key Informant 1	NMIT Trades Tutor
Key Informant 2	Consultant Planner
Key Informant 3	NZ Trade & Enterprise
Key Informant 4	High-Tech Business Owner
Key Informant 5	Nelson City Councillor
Key Informant 6	Port Nelson Infrastructure Representative
Key Informant 7	Industrial Land Developer
Key Informant 8	Tasman District Council Planner
Key Informant 9	Nelson City Councillor

Semi-structured interviews were undertaken with all key informants during field research. Bryman (2001) defines this style of interviewing as a series of questions which follow a general interview structure, however this sequence may vary and further questions can occur in response to significant replies. Semi-structured interviews were decided to be more appropriate for this study due to the variety of key informants, many of whom came from a range of different backgrounds. This approach to questioning creates a less formal setting through which a more exploratory approach could be taken. As described by Yates (2004) a semi-structured style of interviewing allows the interviewer to probe further into discussion points if the key informant has knowledge or particular interest in a certain area. This allowed the interviewer to explore new avenues of information presented by key informants during the interview process. General questions were presented to all informants relating to the role of industry in Nelson's economy and importance within the compact city scenario. Questions were then tailored to the specific roles of the informants such as employment, planning, land development, protection and intensification issues. A summary list of questions asked is included in Appendix 3.

The focus group interview took a similarly semi-structured approach. According to Neuman (2011 p. 459) "the focus group is a special qualitative research technique in which people are informally interviewed in a group discussion setting." The aim of the focus group is to gather a range of people or experts to discuss and at times debate their views or understanding on a particular topic. A focus group was selected as a useful way to gain an understanding of Nelson City Council's planning staff views on the importance of industry, how industrial land is currently protected, whether it needs more protection and the potential for council encouraged intensification practices. Although not all the planners

involved in the focus group had direct involvement with planning for Nelson's industrial areas, their input was sought on how industry affects their particular areas of focus, such as bio-diversity or infrastructure. As the interviewer, it was important to facilitate discussion and involve those who may not be as forth-coming in the discussion as others. This is an important component of focus group interviewing as indicated by Neuman (2011).

Qualitative Data Analysis

Analysis of qualitative data is a key component of the research process consisting of searching for patterns, insights or concepts within the large body of information collected (Yin, 2014). This process allows key themes and ideas to present themselves, which ultimately begin to formulate the results of the research undertaken. The key informant and focus group interviews were transcribed and with key themes being identified during the coding process. The coding process was in line with Neuman's (2011) three staged coding system which in order includes open, axial and selective coding techniques.

Open coding involved a first scan over the information obtained from interviews, identifying key themes and arguments made by the key informants. The second process of axial coding involved organising a set of initial codes or concepts and grouping themes in the transcribed interviews into themes determined by a colour coding. Finally, Neuman's (2011) technique of selective coding was used to scan previously determined codes for the generalised arguments or ideas derived from the interviews. This process was an essential task in organising the structure of the following Chapter 5 in which the results of the Nelson case-study are presented in a series of six key themes.

It was found useful to complete the transcribing and early analysis as quickly as possible after each interview. As discussed by Bryman (2001) this process allows the researcher to understand the emerging themes and further explore these in the future interviews. This process resulted in the interviewer's growing knowledge throughout the interview process which resulted in better interview questioning and discussions in the next round of interviews which subsequently resulted in better interview results.

4.3 Limitations

Awareness of limiting factors which have influenced the research process is an important consideration during the research process. While some limitations are a result of decisions made by the researcher, sometimes there are limitations which are outside of their control. As a researcher it is important to try and reduce these limitations and prevent them from negatively affecting the research results (Bryman, 2001). In the case of this research, limitations were considered early in the research process such as the choice of a single case study and limiting the scale of the research to one region. A recognised limitation of the research was the constrained research period. During the planning of field work, 10 days were set aside as a suitable amount of time to complete the scheduled interviews. In hind-sight some extra time would have been preferred, however this was supplemented by email contact and other forms of communication with a number of people unable to be reached while in Nelson. One issue that did arise with several of the informants was understanding the role of industry in the new service economy and possibilities for intensification. If the research was to be repeated perhaps further clarification of such concepts would be useful.

4.4 Positionality

In order to avoid bias and to ensure that data is collected in an objective manner, Neuman (2001) recommends that the researcher separates his own values from the research findings.

Despite aiming to remain neutral in all aspects of the research process, there are a number of factors which may have influenced the way this researcher conceptualised and processed the information acquired. A significant influence on my position as the researcher is that I was raised in Nelson City and have considerable ties to the area. This positionality has both positive and possibly negative implications for this particular research. A concern in relation to this research is that I may hold bias or pre-conceived opinions on the issues explored in the Nelson context.

However, this research is not only providing a case study example but is exploring an issue in a location important to the researcher. Therefore, every effort was made to remain objective in interviews and the information gained has been carefully processed with results aiming to inform the city. Prior knowledge of Nelson region has assisted in understanding the relevance of the issue in Nelson along with gathering quality information. Knowledge

of the location of industrial zones, the activities within and surrounding them, has been invaluable to the study. Local knowledge also aided in the identifying of quality key informants and allowing effective snowballing techniques to occur. It has also enhanced the ability to discuss relevant issues with key informants and refer to specific localities and activities occurring in Nelson. Similarly, my past employment in the engineering industry may also be viewed as affecting my positionality in relation to this topic. Again this positionality can be viewed both positively and negatively.

Having practical knowledge of the engineering industry has aided in the understanding of the topic and its current relevance. It has assisted in discussions with key informants, which included a number of individuals involved in industry related activities. It has also given myself, as the researcher, a general understanding of what occurs in industrial areas, the industrial services those areas provide along with some understanding the requirements and issues faced by industrial businesses.

4.5 Ethics

Consideration of ethical practices is an important and fundamental part of any research process. The rights and privacy of respondents are an inherent part of gaining ethical research which provides fair, honest research results. As explained by Yates (2004 p.159) "over the last few decades the emphasis on participant's rights has grown over the value of the research." In other words "The rights of subjects overrides the rights of science". This emphasises the importance that the conclusions drawn within any body of research are of an ethical nature, due to the ability of written work to ultimately influence understanding and the knowledge base of a particular subject (Dowling, 2000).

Prior to undertaking qualitative research, ethical approval was gained from the University of Otago Ethic Committee. Consistent with the requirements of the Ethics Committee, before the beginning of each interview participants were provided with an information sheet and consent form which contained details on the research being undertaken along with what was required of them as participants. The majority of participants were emailed these documents on acceptance of the interview to ensure they had sufficient time to go over the detail of each document. A number of participants requested a broad question layout to gain a better understanding of what would be asked of them.

With participants understanding the ethical considerations of the research all spoke freely and openly about information relating to the subject of Nelson industry. This confidence ultimately led to more insightful and in-depth information acquired in the interviews which contributed to better research results.

4.6 Conclusion

This chapter has outlined the single case study research design and methods applied in this thesis referencing this approach to relevant theoretical literature on research methods. In some respects this is quite a complex methodology as it incorporates data from an industrial land availability report completed as part of a 2016 summer internship with the Nelson City Council at the beginning of the research period. However, the inclusion of this quantitative analysis fulfilled the descriptive element of the research design by providing an accurate picture of current industrial land availability in Nelson and enabled the calculation of specific categories of availability. The explorative elements of the research design, which employed qualitative analysis in the form of key informant and focus group interviews along with relevant document analysis, enabled the investigation of key themes identified in the literature review. This mixed method approach added to the comprehensiveness of the results which are presented in Chapter 5.

Chapter 5 Research Findings

5.1 Introduction

This chapter presents the findings from the Nelson case-study using the research methods outlined in Chapter 4 including document analysis; quantitative industrial land availability analysis; and qualitative interviews. The first section of the chapter presents the findings of the analysis of five of Nelson's regulatory and non-regulatory documents as illustrated in Figure 5, the aim of identifying the Nelson City Council's commitment to compact city and sustainable models of development and recognising key issues related to urban growth and industrial land.

The results derived from the industrial land use analysis, key informant and focus group interviews are presented in the second section as a series of six themes. These six key themes were identified in the literature review in Chapter 2 and are synthesised with the issues identified in relation to the Nelson context presented in Chapter 3.

5.2 Document Analysis

The documents analysed in this first section of the results are as follows:

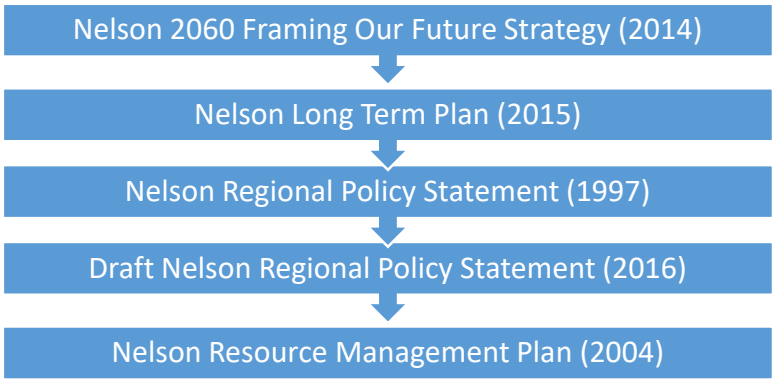

Figure 6: Nelson City Council Regulatory and Non-Regulatory Documents

The analysis of these documents was particularly relevant to this research as it provides an insight into the regional and local Nelson planning framework within which industrial land, industrial activities and developments are considered and controlled.

Nelson 2060: Framing Our Future 2014

In 2014 the Nelson City Council adopted the Nelson 2060 Strategy. The strategy is a non-regulatory vision for Nelson created in close conjunction with the community and their vision of what Nelson should resemble in 2060. As a long term strategy it illustrates the strong sustainability goals of Nelson city. However, it also confirms Leigh & Hoezel's (2012) point that growth management strategies do not give due consideration to the importance of industry.

This vision has been refined into four central themes and 10 goals which aim to guide the Nelson City Council in the development of local policy. Theme One presents the vision for Nelson to develop as a sustainable city based around high amenity values and connectivity (NCC, 2014 p.48). To ensure this, the theme highlights the importance of Nelson maintaining a compact urban form with a strong emphasis on a defined centre. This is coupled with a reduced reliance on fossil fuels with the development of efficient transport options and preserving close proximity of services to the city centre. In keeping with the sustainable nature of the strategy, Theme Three refers to the importance of developing business and industry around sustainable models. The theme also promotes the desire to attract innovative business to the city and to increase the education and employment opportunities which attract people to remain in Nelson (NCC, 2014 p.52). There is no mention made of the influence of industry on these key features of a sustainable city within this theme.

Goal 7 directly refers to Nelson's current industry and aspirations for the future but mainly refers to industry broadly in relation to the region's economy. While forestry, fishing and horticulture are recognised as highly important to the economy, this goal does aim to explore and encourage new industry which fits in with Nelson's creative culture and other attributes. The goal also highlights the importance of establishing better ties between learning institutions, research organisations and the employment sector to grow both local business and learning (NCC, 2014 p.26).

As a long term strategy it has illustrated the strong sustainability goals of Nelson City. However, it also illustrates Leigh and Hoelzel's (2012) point that sustainability strategies often do not give due consideration to local industry.

Nelson Long Term Plan 2015-2025

In 2015, as a requirement of the Local Government Act 2002, the NCC produced the Long Term Plan 2015-2025. This document is informed by the Nelson 2060 strategy and also presents a series of goals to provide direction for the Council to work towards for the current and future needs of the community. The document was created in conjunction with the Tasman District Council to ensure shared regional outcomes and provides an overview of major projects, service and activity statements and how the Council proposes to fund these activities over the next 10 years. The information in the plan relates to transport, water supply, wastewater, storm water, flood protection, environment, social, parks and active recreation, economic and corporate activities.

The Long Term Plan begins by presenting a number of community outcomes. Of relevance to this research is the innovative and sustainable economy present in Nelson is referred as a significant community outcome. This outcome highlights the importance of Nelson's adaptable economy and the benefits to the city of having a wide range of high-value industries and business. This outcome also refers to the importance of maintaining high quality employment and education opportunities while recognising the significance of small and locally owned businesses (NCC, 2015 p.19). However, as planning document it provides no specific directives in relation to industry, industrial land or employment and industry.

The most relevant chapter in the Long Term Plan in relation to this research is that on local economics. This chapter outlines the Council's role in the local economy and introduces the roles of groups such as the Nelson Regional Development Agency. While there is little reference made directly to industry, the Council states its aims to facilitate economic development for the benefit of Nelson which can be broadly related to local industry. This involves estimates of funding made available by the Council to support local business and the broad goals of encouraging business growth in the city (NCC, 2015 p.150).

Regional Policy Statement 1997

Section 59 of the Resource Management Act 1991 requires all Regional Councils in New Zealand to create a Regional Policy Statement (RPS). As a unitary authority, the Nelson

City Council (NCC) has developed Nelson's RPS as part of its regional responsibilities. The purpose of an RPS under the RMA of 1991 is to outline the resource management issues relevant to a specific region. The document also contains the local authority's response to these issues in the way of objectives, policies and methods. The current Nelson Regional Policy Statement (NRPS) was implemented in 1997 and is presently under review. The new Draft RPS will be referred to in the next section.

Within the current NRPS two chapters in particular are relevant to this research within the Nelson context. Chapter 6 on urban expansion outlines the considerations of the NCC in relation to urban growth and associated issues. One significant issue that will be referred to throughout this results chapter is Nelson's limited supply of land suitable for development. The NRPS states "The Nelson urban area is sandwiched between hills and coastline with limited land readily available for urban expansion. These physical constraints pose real limits to expansion" (NCC, 1997 DH1.1).

Industrial land use is specifically referred to in Chapter 4 entitled Underlying Philosophy. This section largely highlights cross boundary considerations and issues between Nelson and the nearby Tasman Region. Industry is recognised as an activity which has cross boundary significance due to the "provisions for activities in one jurisdictional area influencing land use needs in another area" (NCC, 1997 UP1).

The NRPS Infrastructural Chapter 14 mentions the fragile nature of local transport routes and outlines a number of issues surrounding this issue (NCC, 1997, IN2.1). A particular issue relevant to this research is the importance of land transport links to major facilities such as the Port and Airport along with what are referred to strategic industries such as the ENZA store, fisheries and forestry. Specific policies relate to the operation and maintenance of land transport systems which link to these particular locations. The policy direction also 'discourages dispersed development' ensuring that any decision regarding the location of any development gives due regard to minimising adverse effects on local transport systems (NCC, 1997 IN2.3.1). Other sections of the RPS which are relevant to industry, but less so to the scope of this research, relate to discharges, waste management and water allocation.

While policy within the RPS can be broadly considered to relate to industrial land and Nelson's industrial zones, there is no direct reference made to these areas. Despite this, the

Draft RPS, which has recently been released to the public for feedback, appears to provide much greater consideration.

Draft Regional Policy Statement 2016

The Draft NRPS aims to outline the vision for how Nelson will grow and develop over the life of the Nelson's second generation plan, "Whakamahere Whakatu Nelson Plan", which will replace the Nelson Resource Management Plan (NRMP) in the near future. Compared with the current NRPS the Draft NRPS appears to provide a much more focused and directive piece of legislation over the topics of consideration. These topics include *tangata whenua*, energy and infrastructure, amenity, economic wellbeing, natural hazards, landscape, bio-diversity, land, coastal environment, water and air, while also outlining cross boundary issues.

Of relevance to this research, the Draft NRPS clearly outlines the goals of a compact, sustainable city while also making specific reference to local economics, industrial areas and employment. These themes surface early in the document's vision statement and proceed to be considered within relevant chapters. In direct relation to Nelson industry, the vision statement presents the goal to "retain the current size of Nelson's industrial areas… while continuing to develop and provide for local industry-based employment and economic development" (NCC, 2016 p.9). The importance of ensuring that industry location and growth matches the requirements of the wider Nelson/Tasman region is also presented.

As with the current NRPS, two chapters provide the majority of information relevant to the themes explored in this research. Chapter 2, Infrastructure and Energy, contains policy relating to sustainable urban form and maintaining functional transport infrastructure. This chapter contains specific policies focusing on achieving a compact urban form in Nelson City and ensuring the most efficient use of existing infrastructure (NCC, 2016 Policy 2.6; 2.7). This involves constricting development to the current urban areas and preventing unnecessary outward spread of urban activities. Industrial development is specifically listed as one of these activities.

Chapter 4, Social and Economic Wellbeing, presents clear policy directed at industry. Specific objectives aim to ensure the protection of industry from encroachment of

"incompatible activities", while enabling intensification "to support industry-based employment and economic development" (NCC, 2016 Policy 4.4). The following policies aim to address the "finite nature of industry" in Nelson City, promoting the accommodation of industry within Nelson's industrial zones and restricting encroachment. The location of industry is also included in these policies directing industry to remain within Nelson's industrial zones to ensure the adequate provision of infrastructural services but also promote the benefits of industrial activities co-locating. A clear regulatory method linked to this policy requires the Council to develop controls and consent requirements to govern industrial and employment activities and the use of industrial zoned land.

In contrast to the previous planning documents the Draft RPS provides a strong policy response to industrial land and related transport issues within the region. It clearly provides for the protection of current industrial zones, and recognises the importance of industrial as referred to in the literature (Dempwolf, 2009).

Nelson Resource Management Plan (2004)

The Nelson Resource Management Plan (NRMP) NCC has been constructed to fulfil the requirements of the RMA 1991 for all local authorities to create a District Plan which effectively manages resource use and development in their particular locality. The NRMP provides a set of guidelines and controls which aim to ensure the principles of the RMA are achieved within Nelson City. In relation to this research, the current NRMP is Nelson's principle regulatory document which provides resource management rules and regulations specific to industrial activities in Nelson and the City's industrial zones. It is a first generation Plan and presently under review. However, it does provide strong policies and rules for the protection of industrial land from encroachment.

Chapter 10 of the NRMP provides the policy information on Nelson industry. The shortage of Nelson's industrial land is referred to prominently at the beginning of this chapter (NCC, 2004 INd.1.). The first objective and series of policies relate to the efficient use of resources relating to industrial zoned land within the city (NCC, 2004 IN1). Specific policies highlight the importance of preventing non-industrial activities encroaching upon the industrial zone (NRMP IN1.1), with one of these policies referring directly to retail encroachment (NCC, 2004 IN1.2). Specific policies also protect the port and airport activities, ensuring they have primary rights to be the main operator within the areas they are located in (NCC, 2004 IN1.3 and IN1.4).

The following objective and series of policies relates to amenity of industrial and adjoining areas (NCC, 2004 IN2). A significant amount of the policy in this section relates to environmental and cross boundary effects such as discharges and noise. However, there are a number of policies relevant to this research. A specific policy of interest relates to the port and the need to limit its effects on adjacent areas through the use of main routes which "can cope" with a higher level of traffic volume (NCC, 2004 IN2.3). Another relevant policy works to limit incompatible activities in industrial zones which may be attracted to these areas due to their large lot sizes or central location (NCC, 2004 IN2.4). Other relevant policies relate to industrial streetscapes which require industrial sites to maintain a pleasant streetscape by setting land aside for landscaping for example (NCC, 2004 IN2.5) and service constraints which aims to prevent industry development where the required infrastructure is not present (NCC, 2004 IN2.6).

Following on from the broader objectives and policies, the NRMP contains an extensive list of rules specific to Nelson's industrial activity. These rules regulate specific activities which occur in Nelson's industrial zones and have clear links with the objectives and policies referred to above. Specific rules relevant to this topic are referred to in the following table.

Table 3: Nelson Resource Management Plan Industry Related Rules

Rule Title	Rule Reference Number
Restriction of other activities in the industrial zone	INr.20, INr.21, INr.22
Port and Airport exceptions	INr.23, INr.24
Buildings and structures - height	INr.27
Outdoor storage	INr.34
Parking, loading and access	INr.35, INr.36
Network utility – roads	INr.52

(Source NCC, 2004)

Other rules found within the industrial rules relate to issues such as noise, discharge, environmental concerns and amenity.

Summary

This section has analysed the key planning documents of the Nelson City Council which provide the framework determining the level of protection industrial land and industrial activities receive in the region. The analysis provides input into the research objectives by

indicating Nelson's level of commitment to sustainability goals, recognition of the importance of industry in urban spaces and specific detail on current levels of industrial land protection. The NRMP (2004) provides the most significant mechanisms for protection of industrial land containing regulatory policy to ensure the security of industry in the region's industrial zones. The Draft RPS contains significant recognition of issues relating to Nelson's industrial zones including limited land availability and risk of encroachment, containing higher level policy addressing these issues. This is a significant improvement from the current RPS which has limited information referring directly to industry. This is a similar trend in the Nelson 2060 vision and the LTP which are strongly focussed in relation to sustainable, compact city goals but the broad nature of the documents prevents them commenting directly on local industry.

5.3 Thematic Analysis

The following section presents the results of the qualitative research derived from key informant interviews combined with quantitative data on industrial land availability. Results will be presented according to the six themes represented in Figure 6 below.

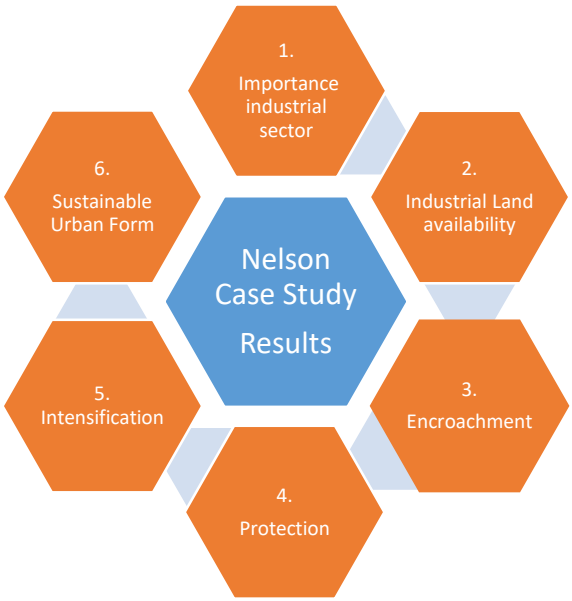

Figure 7: Nelson Case Study Key Themes

5.3.1 Importance of the industrial sector

One of the key themes which arose during the literature review (Howland, 2010; Leigh and Hoezel, 2012) and which was explored with key informants was the continued importance

of the industrial sector in the modern city. This section records the results of key informant and focus group interviews relating to the recognition of the importance of industry, industrial zoned land and industrial services to Nelson's economy. Also examined was the importance of the industrial sector to local employment and start-up businesses in the city.

Economic Importance

Interviews with key informants illustrated that they have a significant and informed understanding and consideration of the contribution industry makes to the Nelson's economy. Table 4 summarises the responses when Key Informants were asked to consider whether industry is still important to Nelson as a modern city.

Table 4: Key Informant Responses on the Economic Importance of Industry

Key Informant 1	"A main driver here. Nelson has a very strong industrial background"
Key Informant 2	"Absolutely… and with a growing population you still have that service industry that is growing regardless."
Key Informant 3	"Absolutely critical."
Key Informant 4	"An absolute function…the life blood of the city."
Key Informant 5	"Massively important… it is very much part of our identity."
Key Informant 6	"Everything is very much like an ecosystem, it's all joined together we are not operating here for our own benefit as an island."
Key Informant 7	"It will still be an important part our Nelson economy absolutely. It's how we adapt to changes in the industry sector (that's important)."
Focus Group	"Industry is such an economic driver for the city."

While industry was determined to be a key function to the city the wide range of industrial activities Nelson is involved in was referred to by the majority of key informants as being of critical importance. Relying on a mixture of forestry, fishing and horticulture, along with a number of other smaller industries was considered to have created a resilient economy according to Key Informants 5 and 7.

> "Many cities in New Zealand our size rely on one industry. We have got forestry, fisheries, horticulture, a little bit of manufacturing and we have got the Port." (Key Informant 5)

> "We are lucky here with forestry, horticulture, the fishing industry and the port. We have a good core of industries which create stability as those sectors might fluctuate." (Key Informant 7)

A number of key informants, including Key Informant 3, highlighted the importance of these core industries to the economy in comparison to other activities such as retail and tourism. In his opinion retail was a good source of jobs in the city but provided little to the economy. "It is just consumptive (retail), nothing is produced… it isn't a big economic earner."

Key Informant 3 acknowledged the importance of tourism to Nelson's economy but explained that, in comparison to industry, its contribution to GDP per capita was low. He had a similar opinion on the wine industry which he recognised as having a positive effect on local businesses in its development stage through the use of local labour. However, "once set-up the majority of earnings from wine tend to go offshore."

While industrial activities were identified as contributing significantly to the Nelson economy, the Port was considered by all key informants as an essential industrial zone. Port Nelson is described in Chapter 3 as the major export hub of the top of the South Island of New Zealand with export services used by all major industrial activities in Nelson. Key Informant 6 stated "the city can't exist without primary produce and part of what comes with that is having a functioning port."

The local and regional significance of the Port was raised by a number of key informants including Key Informants 1, 2 and 6. Key Informant 6 referred to recent Environment Court proceeding over reverse sensitivity issues which highlighted the understanding of the Port as a key function with respect to Nelson.

> "The Environment Court supported this (Port Nelson) through the noise variation process and reverse sensitivity issues recognising the Port needed to operate 24 hours otherwise it will be uncompetitive. That has some significant flow on effects for everyone including the economy."

Industrial Services

The importance of industry in relation to the provision of local services essential to the efficient functioning of any city was highlighted by Howland (2010) in the international literature. During the interview process Key Informants 1, 2 and 5 discussed the importance of these industrial services remaining within close proximity to the CBD.

These key informants felt that planners need to consider the services which are required by the general public and allow for those to remain within the nearby industrial zones. Key Informant 1 stated "That would be the first thing to consider. What do the people need? They need good facilities, they need good infrastructure, and they need good access."

A key consideration for Key Informant 2 and 5 was efficient access to industrial services to meet local demand. The value of having nearby industrial services within close proximity to the city was expressed by these key informants.

> "It is incredibly efficient to be able live close to town, to access services within walking distance of the city, plumbers, electricians and other skilled trades. I think it is important that industry is not too far from where people live, from where they go to work."

While these particular services provide for the general public, Key Informant 1 had a clear understanding of the importance of industrial services to other sectors of the economy. Different sectors all require the assistance of services located within Nelson's industrial zones at some stage in their existence, whether it be related to construction, manufacturing and production, service maintenance or other similar services. Key Informant 1 referred specifically to the proposed gondola and mountain bike park which is currently an exciting talking point amongst the Nelson public. The construction of the gondola and associated activities will require the services of companies located within Nelson's industrial areas. Key Informant 1 explained this was a prime example of how other sectors such as the tourism industry require inputs from industrial related firms.

Employment and Industry

Analysis undertaken during the context chapter identified the significant contribution industrial activities make to local employment in Nelson. This was also a common theme which was identified in the literature review with industrial zones being labelled as zones

of employment (Howland, 2010; Dempwolf, 2009). These ideas were confirmed during the interview process with virtually all key informants referring to the prominence of industrial based employment within Nelson. Key Informant 1 also highlighted the significant number of school leavers entering industrial and trade based courses after leaving school.

According to Key Informant 1 the demand for qualified employees in industrial and trade based activities is high in Nelson. Around 85% of students entering relevant courses at the Nelson Marlborough Institute of Technology (NMIT) are recent school leavers with the majority of them fining employment locally after completing their studies. Demand has required NMIT to expand class sizes in the past with the majority of those courses full every semester.

> "They are taking apprentices which we cater for at NMIT, both in engineering, automotive and construction, and also our pre trades course in automotive. The pre trades are all full." (Key Informant 1)

All Key Informants provided an understanding of the importance industrial based employment has in Nelson. Key Informants 6 and the Focus Group explained that companies such as Talley Fisheries, Sealord's, Gibbons Construction and ENZA are some of the biggest employers in Nelson, all of which are located in Nelson's industrial zones. The importance of primary industry such as forestry, fishing and horticulture to the Nelson economy has led to significant employment within these sectors along with a wide range of associated industrial activities and services.

> "Industry is massively important (in Nelson) because that's where jobs come from." (Key Informant 5)

A relevant finding from the literature review was the fact that industrial activities provide employment for both lower educated and skilled workers while also providing higher wages than other sectors. This is important in the Nelson context which has been found to have a high number of workers employed in low skilled and industrial based jobs. Key Informant 1 supported this stating that the industrial sector in Nelson provided "better jobs and better living conditions for local people." He referred to the quality workmanship and national recognition Nelson has in certain industrial sectors such as engineering. "That trickles down into good wages and successful businesses."

The impact of Nelson's limited industrial land and the effect this will have on employment in the city over time was discussed with key informants. Key Informants 3, 5 and members of the Focus Group indicated there is a likelihood that new employment opportunities within industrial based activities will occur increasingly outside of the Nelson boundary. Focus Group 1 attributed this to the recent plan changes which have occurred in the Tasman region rezoning a large area for industrial purpose in Richmond west. Members of the group indicated that the impact of this will be determined by whether people wish to live closer to where they're working with some evidence of this occurring already.

> "With the Richmond west industrial area rezoning, they (Tasman District Council) did a whole lot of residential rezoning for workers accommodation so they have rezoned a swag of more affordable residential zones."

The likelihood of Nelson losing its "employments zones" concerned both Key Informant 4 and 7 in relation the issues of employment sprawl and related issues. Key Informant 4 was particularly concerned with greater stresses an already struggling transport infrastructure. Key Informant 4 and 7 both referred to the flow-on effects that reduced industrial employment could potentially have on Nelson. These included not only the distancing of industrial services from the city, but potential effects on other employment sectors as spouses employed in these sectors may also relocate.

> "Employment out of Nelson City will all add to the vehicles on the road going back and forth but also adds to the difficulty of keeping service shops filled in Nelson City."

This adds another factor contributing to the potential for employment sprawl.

Business Incubation and Innovative Industries

Industrial zones are considered important for business incubation and the development of innovative industries (Bronstein, 2009; Hutton, 2004). Findings from key informant interviews reflected the international research on this topic. It was established from the key informant interviews that Nelson's industrial zones provide lower rents and appropriate space for many start-up businesses than the CBD. These zones also provide more appropriate buildings, access to transport hubs and to clusters of related activities for start-up businesses.

A key consideration in the literature was the ability of industrial zones to provide for innovative, high-tech and knowledge based companies. This view was supported by Key Informant 5 in relation to the Nelson context. “I don’t think the idea of industry as the big polluters is Nelson’s future, but I do think Nelson has to be as welcoming as possible to smart tech, high tech and added value companies.”

Industrial land has accommodated a number of innovative companies in Nelson including the company owned by Key Informant 4 which produces high tech aviation communication and tracking devices. Key informant 3 and 7 also highlighted a number of other innovative engineering and manufacturing businesses located in Nelson including many of which are related to primary industries. These included XLAN, a company using European sourced technology to produce cross laminated building products for sustainable residential. Nelson is also leading in innovative steep hill country forestry harvesting technology.



Figure 8: Example of innovative research facility in Port Industrial Zone.

As a major developer of industrial land in Nelson, Key Informant 7 agreed that “certainly those start-up businesses need a space that is not too expensive…. They can go into the light industrial areas where the rents are definitely cheaper than in the CBD or city fringe areas.”

Affordable accommodation was a key consideration of Key Informant 4 whose business has been located in the Port Nelson industrial zone since 2001 where costs per square metre are not as high as in the CBD. Reducing costs is important to ensure a start-up business can

remain competitive within local and overseas markets and had allowed him to employ an extra employee which would not have a possibility if located in a more expensive centre.

How location within an industrial zone provides ready access and transport links was also discussed by Key Informant 4, compared to being located in the CBD or the city's commercial zone.

> "We don't have lots of people coming to visit us so there is no need for us to be right in the city. Most of our business is export so it is all done over the phone. The couriers are coming in and out. It's easy for them, it's easy for transport links. I guess that is another benefit of industrial areas."

It was also agreed that for many of Nelson's innovative businesses, central city spaces did not provide the appropriate facilities or space. Industrial zones provided a more suitable location for these businesses. Attention was drawn by Key Informant 4 to the opportunities for expansion over time which industrial buildings provide, which is often not the case with office or commercial space.

> "I've been able to expand within the same building as the business has grown. Whereas if I had taken offices in town we would probably have had to change offices several times by now."

Key Informant 4 also discussed Industrial buildings as more appropriate spaces for SMEs (small and medium size enterprises) in relation to their testing operations and activities and that it is important to realise industrial spaces are not just about "trucking and moving goods".

While Nelson's industrial space provides for a range of start-up businesses, a number of key informants believed greater encouragement of these types of industries would be a huge benefit to Nelson. High-tech, innovative industries could be significant contributors to the local economy in the future. Key Informant 3 stated:

"We lack globally competitive industries. There are a few very exciting innovative industries here but many of the large players are heavily involved in primary industries such as forestry and so on. These sectors won't last forever. We must get into higher value industry."

Key Informant 3 also believed there is a lack of promotion and understanding of the extent industrial land could contribute to attracting some of these types of industries and opportunities had been lost in the past to encroaching activities such as retail.

> "I think we should be targeting these businesses, creating business parks, technology parks or whatever you might call them and in a coordinated fashion."

Summary

This section has presented the results from Key Informant interviews relating to the importance of the industrial sector to Nelson. Overall key informants strongly confirmed findings in the literature review in relation to the importance of industry and industrial services to the economy. There was also recognition of the role of industrial zones as employment zones and their value for local business incubation.

5.3.2 Industrial Land Availability

One of the objectives of this research is to establish the current situation in Nelson in regard to industrial land availability. This section will include quantitative data obtained for the Industrial Land Supply study completed for the Nelson City Council (Keyse, 2016) which included aerial map analysis, property improvement data, employment density data and site visits. This analysis presents an estimate of the absolute maximum amount of industrial land Nelson has available which consists mostly of infill of existing sites and small plots of vacant land. Key informant data will also be presented to assess the understanding held by interviewees of the availability of industrial land for further development.

Industrial Land Supply Findings

The Nelson Resource Management Plan identifies six industrial areas within the Nelson region. These include: Port Nelson, Vanguard/St Vincent, Tahunanui, Nelson Airport, Nayland Road South and Saxton Road

For the purposes of this study Nayland and Saxton have been combined together, as well as the Airport and Tahunanui due to their close proximity and interconnectedness. Therefore this thesis will refer to four zones:

- Port Nelson
- Vanguard/St Vincent
- Tahunanui
- Nayland South

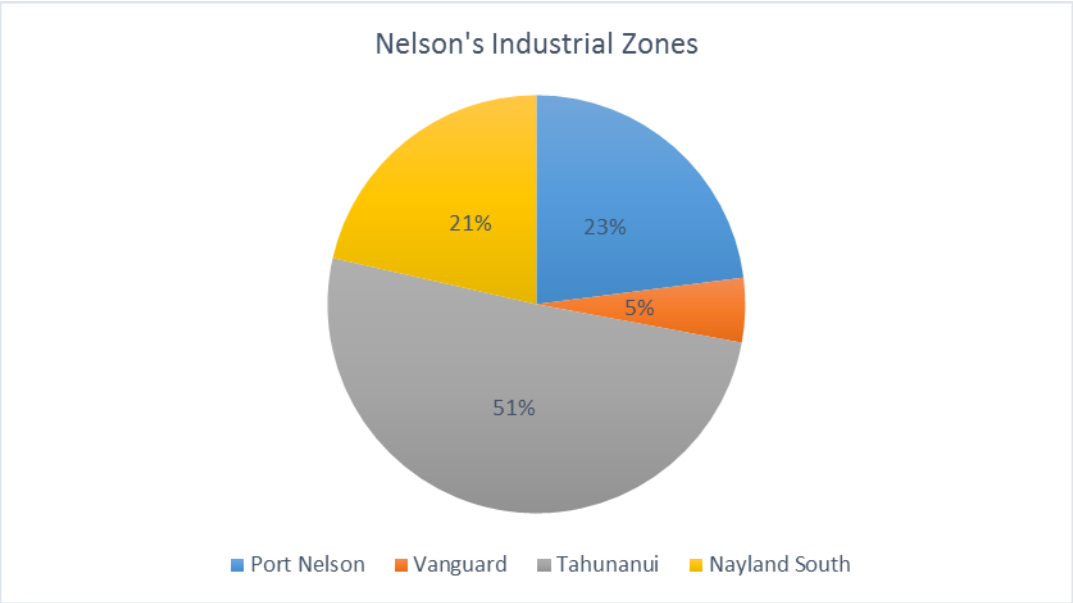

Figure 9: Nelson industrial zones by percentage of total land area.

According to Nelson City Council (NCC) GIS data, Nelson currently has approximately 310.49ha of industrial zoned land. Over the four industrial areas the division of land is:

- Port Nelson – 71.3ha
- Vanguard/St Vincent – 15.49ha
- Tahunanui – 157.1ha
- Nayland South – 66.6ha

Figure 9 provides an illustration of the relative size of the four industrial zones.

The following results detail industrial land availability in each of these four industrial zones with the aid of a series of maps and charts resulting from the application of the methods outlined in Chapter 4.

As described in the methodology the total potential land supply was calculated from properties identified by the criteria vacant land, vacant storage, vacant building, underutilised land and planned development.

Port Nelson Industrial Zone

Description: Located on the Port Reclamation Land off Haven Road as shown in Figure 10 This zone includes Nelson's marina area, Talley's and Sealord factories, port associated log and container yards, petroleum storage areas and wharf space. It covers an area of 71.3ha and is the second largest industrial zone in Nelson.

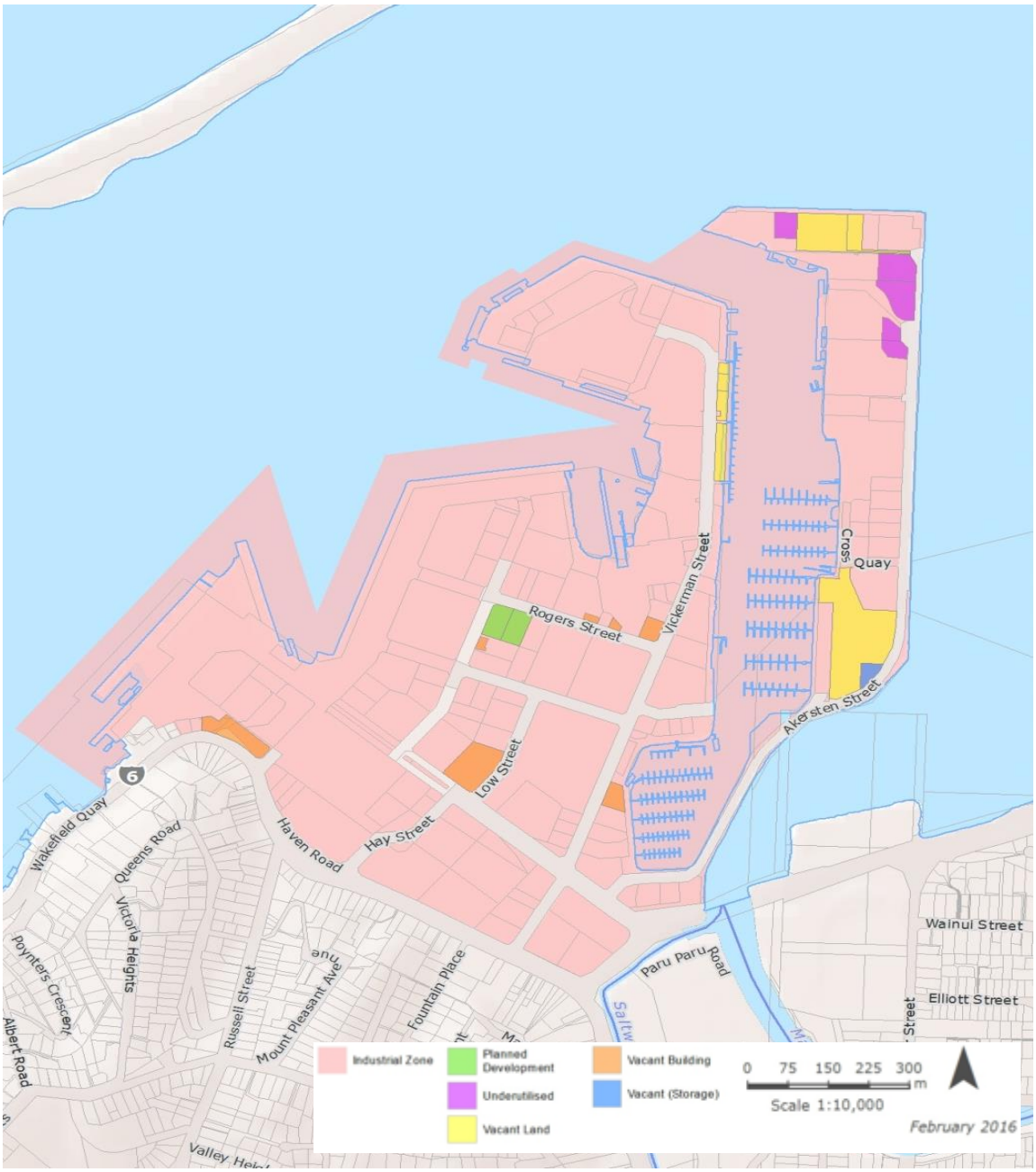

Figure 10: Port Nelson Industrial Zone (Source: NCC, 2016)

Table 5: Port Nelson Industrial Zone Land Availability

Criteria	Number of Properties	Land Area
Port Vacant Land	7	2.76ha
Port Vacant Land (storage)	1	0.10ha
Port Vacant Building	7	1.21ha
Port Underutilised Land	3	1.07ha
Port Planned Development	2	0.40ha
Total Potential Supply (Port Industrial Zone)	**20**	**5.54ha**

(Source: Keyse, 2016)

Supply: Total potential supply was calculated at 5.54ha which represents 7.77% of the total land within the zone.

According to the analysis of GIS data Port Nelson has 122 properties within the Port industrial zone. A total of 20 properties were identified as containing land potentially available for future industrial development as listed in Table 5 above. Seven of these properties have been considered as purely vacant due to no development present on those particular sites. As a total these vacant properties equated to 2.76ha and are spread throughout the industrial zone. One property with an area of 0.10h was also identified as vacant of any development but was in use for storage purposes.

Three properties were considered developed but contained areas of underutilised land. All of these properties were situated in close proximity to each other. The total land area of the underutilised portions of land within these sites equated to 1.07ha. Seven vacant buildings were identified during site visits. Three of the properties had obvious for sale or lease signage whereas the other four were considered likely to be vacant on observation. The total area of vacant buildings and associated land equated to 1.21ha. Two sites with obvious future planned development were identified within the Port industrial zone totalling 0.40ha and were identified due to evidence of surveyor markings or development signage.

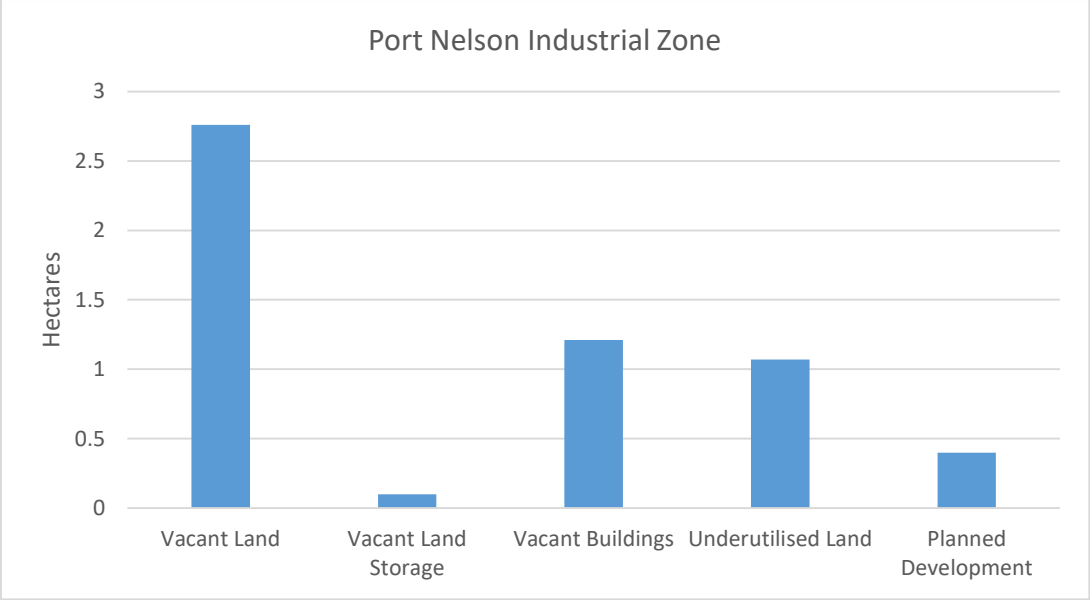

Figure 11: Port Nelson industrial land availability by type

As can be seen from the above Figure 11 vacant land makes up the largest proportion of available industrial land in the Port zone followed by vacant buildings and underutilised land. Sites identified as planned development or vacant storage sites contribute to the smallest pockets of useable land.

Vanguard/St Vincent Industrial Zone

Description: Located around the Vanguard and St Vincent Street area, this zone covers an area of 15.49ha and is the smallest of Nelson's industrial zones and the closest to the CBD. Activities occurring within the zone include light industry such as small engineering firms, mechanical and panel beating workshops, car dismantlers, WOF outfits, retail including a Harvey Norman store and a number of residential properties.

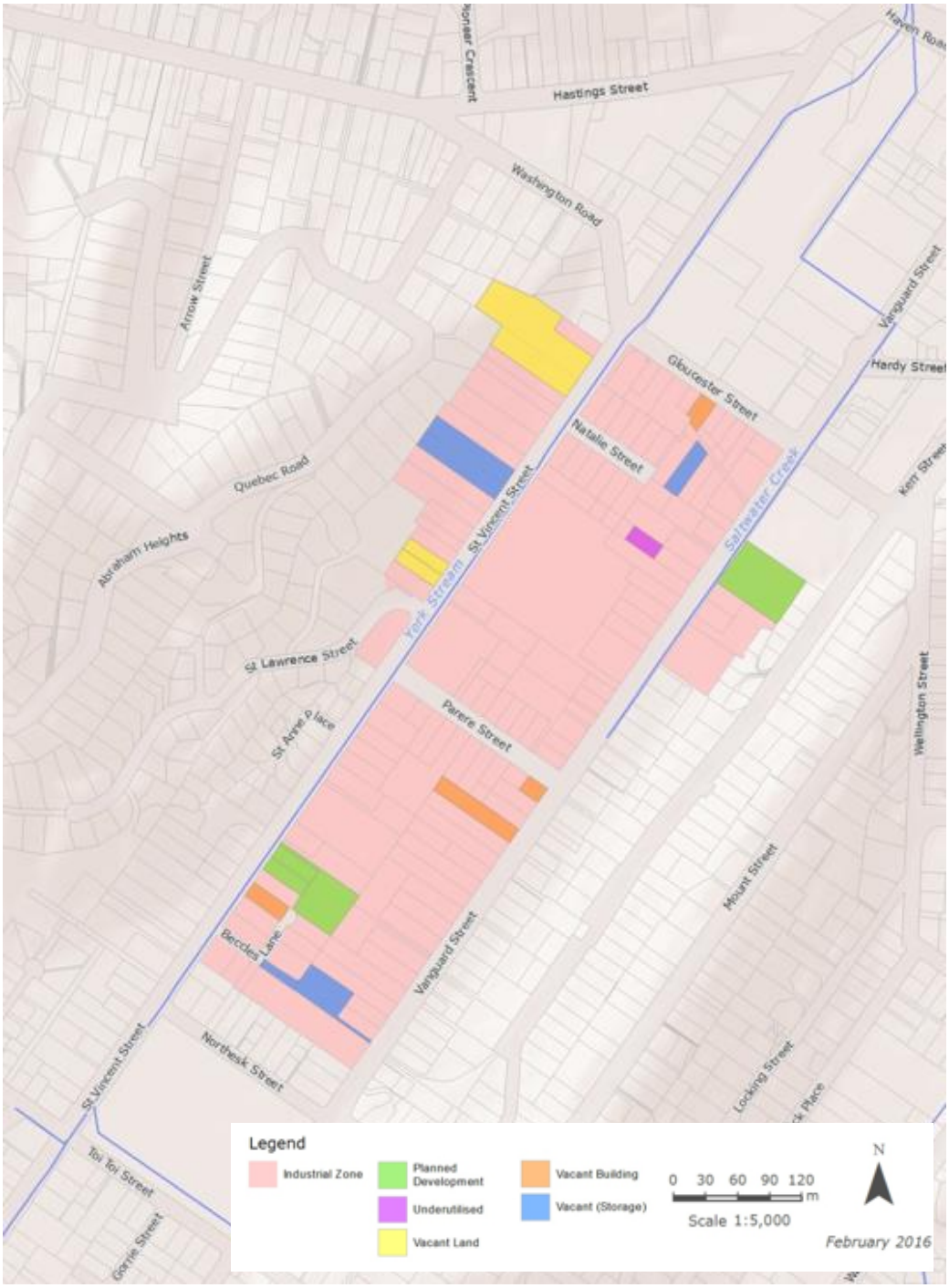

Figure 12: Vanguard/St Vincent Industrial Zone (Source: NCC, 2016)

Table 6: Vanguard/St Vincent Industrial Zone Land Availability

Criteria	Number of Properties	Land Area
Vanguard Vacant Land	3	0.20ha
Vanguard Vacant Land (storage)	4	0.38ha
Vanguard Vacant Building	4	0.29ha
Vanguard Underutilised Land	1	0.05ha
Vanguard Planned Development	4	0.68ha
Total Potential Supply (Vanguard Industrial Zone)	**16**	**1.60ha**

(Source: Keyse, 2016)

Supply: Total potential supply was calculated at 1.60ha which represents 10.34% of the total land within the zone.

The Vanguard industrial area contains some 109 properties. Of that number 16 properties were identified as containing land potentially available for future industrial development as listed in Table 6 above. Three properties were highlighted as vacant land. The total area of vacant land, equates to 0.20ha. It is important to note all of the vacant property's land areas have been calculated regarding the useable land on the site due to a portion of each of these properties being too steep to develop. Four properties were also considered vacant (storage) with a total land area equalling 0.38ha. Two of the vacant (storage) properties contained portions of undevelopable land due to steep terrain at the rear of these sites. Therefore the developable area of these sites has been quantified, with the unusable land discounted.

One property was considered underutilised with an underutilised area of 0.05ha. Four properties were identified as being vacant buildings, three being advertised for lease and one considered vacant on site inspection. Two of the vacant buildings had leases for only half of the building so calculations have taken this into account. The total land area of the properties equated to 0.29ha. Four properties were identified as vacant but with future planned development totalling 0.68ha.

21 properties within the Vanguard industrial area were also identified as residential properties totalling around 1.47ha.

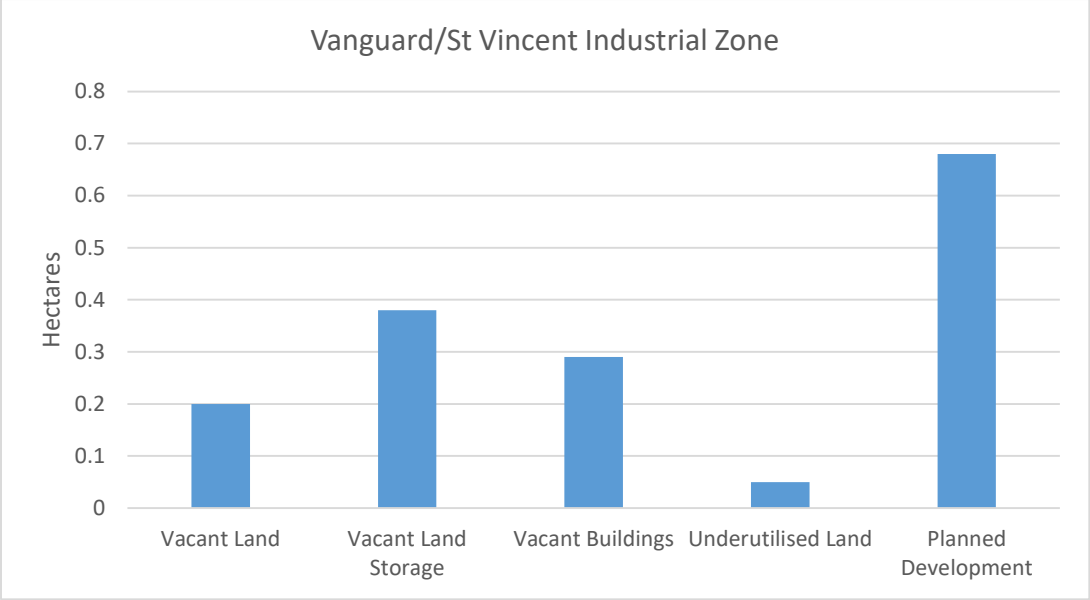

Figure 13: Vanguard/St Vincent industrial land availability by type

As shown in Figure 13 underutilised land makes up the smallest proportion of available industrial land in the Vanguard industrial zone which is to be expected given its overall size. Planned development makes up the largest proportion.

Tahunanui Industrial Zone

Description: Nelson's largest industrial zone covering an area of 157.1ha and is situated approximately six kilometres from the CBD. Activities within the zone include a number of manufacturing businesses, larger engineering firms, warehouse food storage businesses and a large wood processing plant at the centre of the industrial zone.

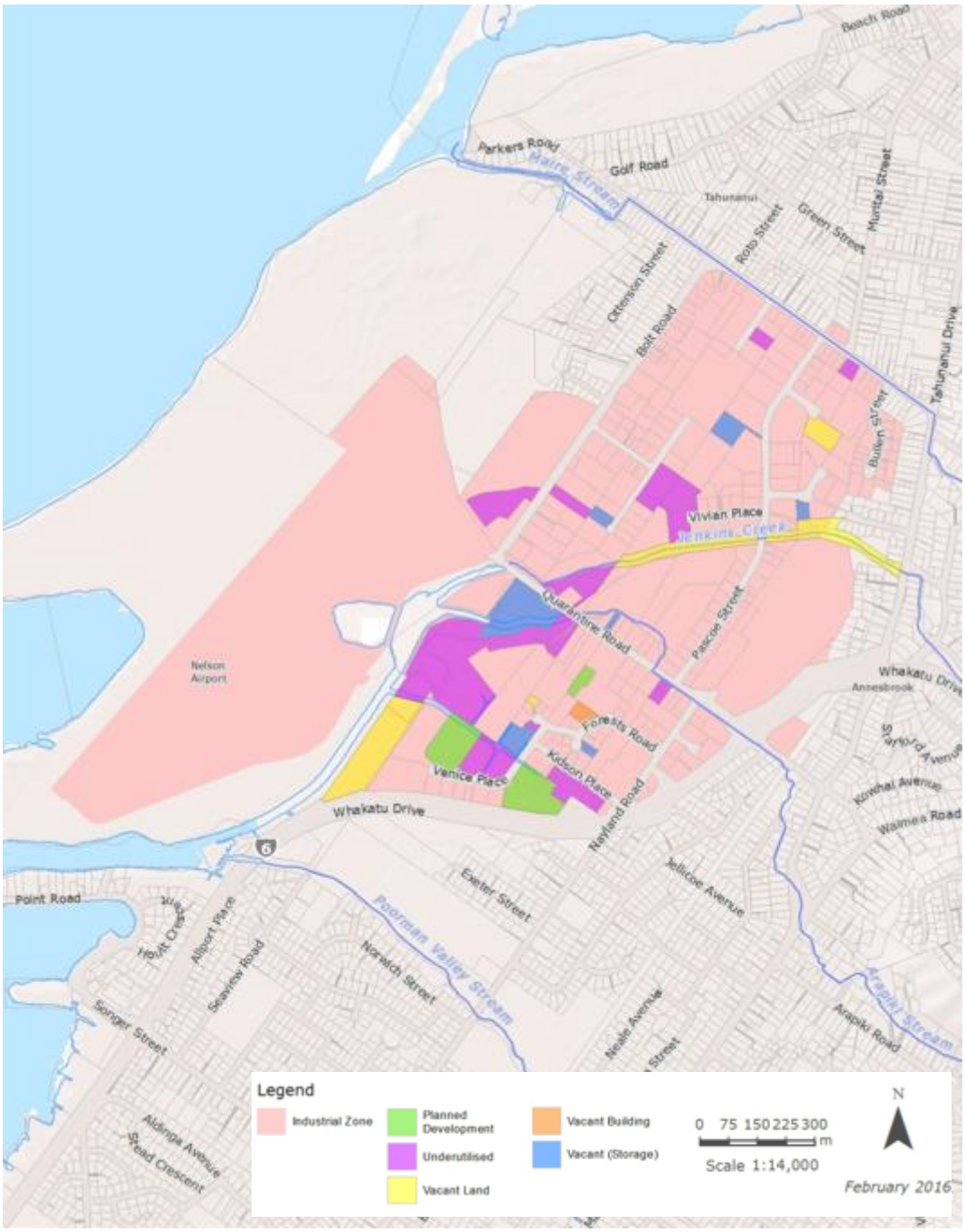

Figure 14: Tahunanui Industrial Zone (Source: NCC, 2016)

Table 7: Tahunanui Industrial Zone Land Availability

Criteria	Number of Properties	Land area
Tahunanui Vacant Land	5	3.20ha
Tahunanui Vacant Land (storage)	8	3.35ha
Tahunanui Vacant Building	2	0.02ha
Tahunanui Underutilised Land	13	8.21ha
Tahunanui Planned Development	3	3.16ha
Total Potential Supply (Tahunanui Industrial Zone)	**31**	**17.94ha**

(Source: Keyse, 2016)

Supply: Total potential supply was calculated at 17.94ha which represents 11.42% of the total land within the zone.

The Tahunanui Industrial zone has 236 properties within its boundaries. Of that number 31 properties have been identified as containing land potentially available for future industrial development as listed in Table 7 above. Five properties within the area have been considered vacant land altogether totalling 3.20ha. Eight properties were also considered vacant (storage) totalling 3.35ha.

13 properties were deemed underutilised totalling 8.21ha. Two vacant buildings for sale were also identified within a single industrial complex totalling 0.02ha. A final three properties were identified as having future planned development totalling 3.16ha.

Site visits revealed 16 residential properties were found within the Tahunanui industrial zone totalling around 1.31ha.

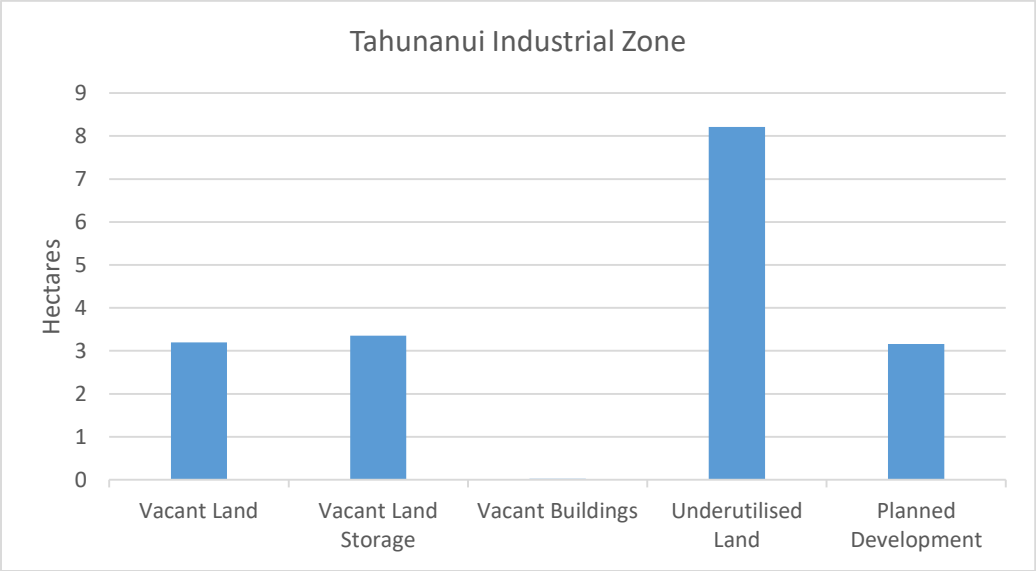

Figure 15: Tahunanui industrial land availability by type

Results in Figure 15 illustrate the lack of vacant buildings in this zone, while underutilised land represents the highest proportion of available land. There are nearly equal proportions of vacant land and storage and planned development.

Nayland South Industrial Zone

Description: Centred between Nayland Road and Main Road Stoke, intersected by Saxton Road and is Nelson's second largest industrial zone covering 66.6ha. The area contains Nelson's more newly developed industrial land, especially at northern and southern extents of the industrial zone. The area includes activities such as the large ENZA apple factory, an extensive light industrial area around Echodale Place, big box retail such as Bunnings Warehouse, Place Makers, the meat works and the meat works and Honda site near the Richmond boundary.



Figure 16: Nayland South Industrial Zone (Source: NCC, 2016)

Table 8: Nayland South Industrial Land Availability

Criteria	Number of Properties	Land Area
Nayland South Vacant Land	7	1.25ha
Nayland South Vacant Land (storage)	5	0.49ha
Nayland South Vacant Building	5	0.32ha
Nayland South Underutilised Land	3	1.49ha
Nayland South Planned Development	3	1.66ha
Total Potential Supply (Nayland South Industrial Zone)	**23**	**5.21ha**

(Source: Keyse, 2016)

Supply: Total potential supply was calculated at 5.21ha which represents 7.82% of the total land within the zone.

The Nayland South industrial zone consists of 137 properties of which 23 were identified as containing land potentially available for future industrial development as listed in Table 8 above. Seven of those properties are vacant with a combined area of 1.25ha. Five properties were identified as vacant (storage) at a total of 0.49ha.

Three properties were deemed underutilised. Total underutilised land was quantified at 1.49ha. Five properties were also identified as vacant building of which three were for lease and the other two appeared empty on site inspection totalling 0.32. Three vacant sites were also identified as being prepared for future development at a total of 1.66ha.

Site visits revealed three residential properties all on Saxtons Road which make up 0.54ha of the Nayland South industrial area.

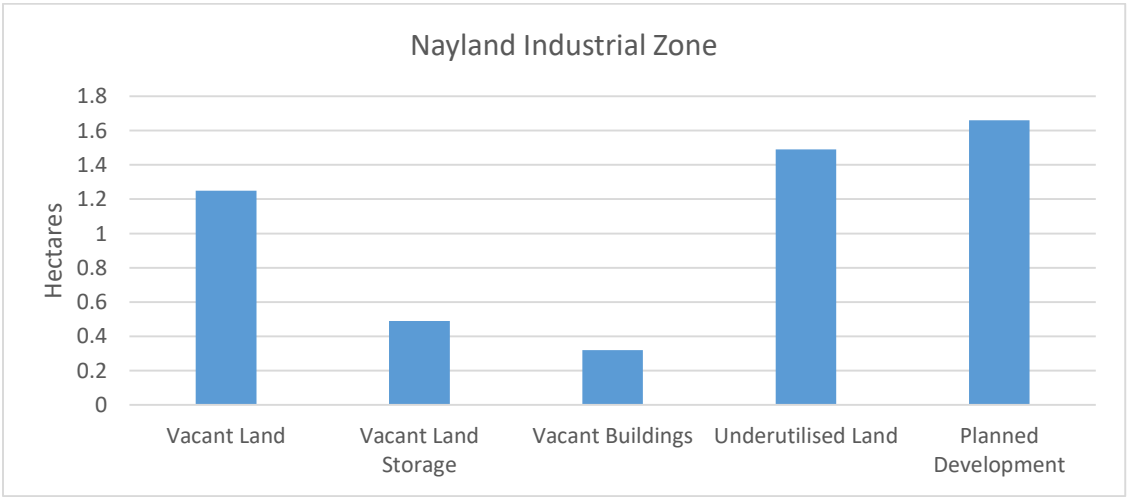

Figure 17: Nayland South industrial land availability by type

As can be seen in Figure 17, this zone contains the largest proportion of available industrial land of all types. Vacant buildings make up the smallest proportion.

Industrial Zones Employment Density Findings

Employment density data of industrial properties was analysed to assist with determining the utilisation of existing areas. It was found that because of the range and diversity of industrial activities operating within the industrial zones, employment density did not give a clear indication of land availability or underutilised space as it would for residential or commercial properties. On further investigation through site visits it was confirmed that certain industries were labour intensive such as engineering workshops, others required large areas of land such as timber yards whilst others again required building space for warehousing and factory based operations. Factory based operation as in figure 18.



Figure 18: Large scale building intensive industry.

This confirmed Gilmore's (2015) findings and is an important feature which needs to be understood when considering the possibilities of industrial intensification. The analysis also proved useful for identifying areas of encroachment of non-industrial activities into industrial zones.

Having said that, employment density data did aid in confirming some industrial supply observations made in the previous section and was useful in directing site observations. The mesh block areas with low employment density have generally been identified as containing significant areas of vacant or underutilised land.

For the analysis, each of Nelson's industrial areas was broken down into their mesh block areas and densities calculated for each of these mesh blocks. While good data was available for many of the mesh blocks, a number of anomalies were apparent to other non-industrial activities dominating within those mesh blocks. The most obvious of these anomalies was in the Vanguard industrial zone, which contains New World supermarket whose large staff skews the industrial employment density data considerably.

It must be noted that non-industrial activities occur in many of the industrial areas and are included in the employment densities for each zone. Future study on retail and commercial activities in Nelson's industrial areas may give more precise results, however these activities are not likely to greatly affect density statistics apart from cases such as large supermarket or retail development which will be highlighted in this analysis.

Also worth noting is that residential areas are contained in many of the mesh blocks analysed. For the purposes of this analysis it was assumed there is very limited employment occurring out of these residential properties and if so the scale is too small to affect the density statistics significantly. The following series of maps are used to highlight the mesh block and employment density statistics of each of the Nelson industrial zones.

Port Nelson Industrial Zone – Employment Density

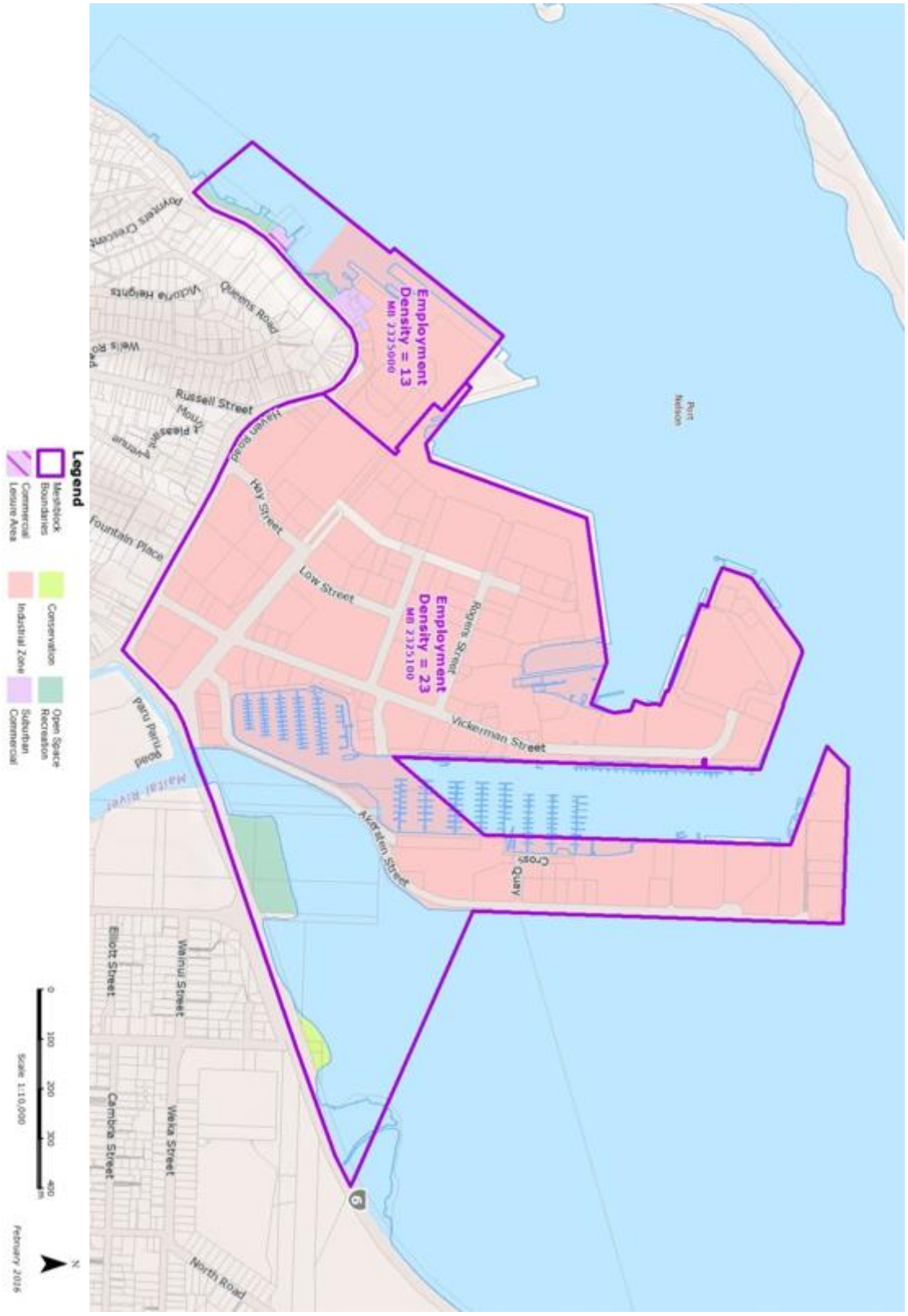

Figure 19: Port Nelson Industrial Zone – Employment Density (Source: NCC, 2016)

The Nelson Port industrial zone consists of two mesh blocks as shown in the above map. Both of these mesh blocks are considered to be of a low employment density with MB 2325000 highlighted as very low at 13 employees per hectare. However, this is predictable within the port setting as wharf space, loading zones as well as log and container areas are essential to the Port's function and have not been identified as underutilised or vacant space during land supply analysis. MB 2325100 was identified as the mesh block with the greatest number of underutilised or vacant properties within the industrial zone. With the utilisation of these areas, MB 2325100 could possibly increase to a medium employment density rating; however employment density potential is expected to remain reasonably low in comparison with that of the other industrial zones.

Vanguard/St Vincent Industrial Zone – Employment Density

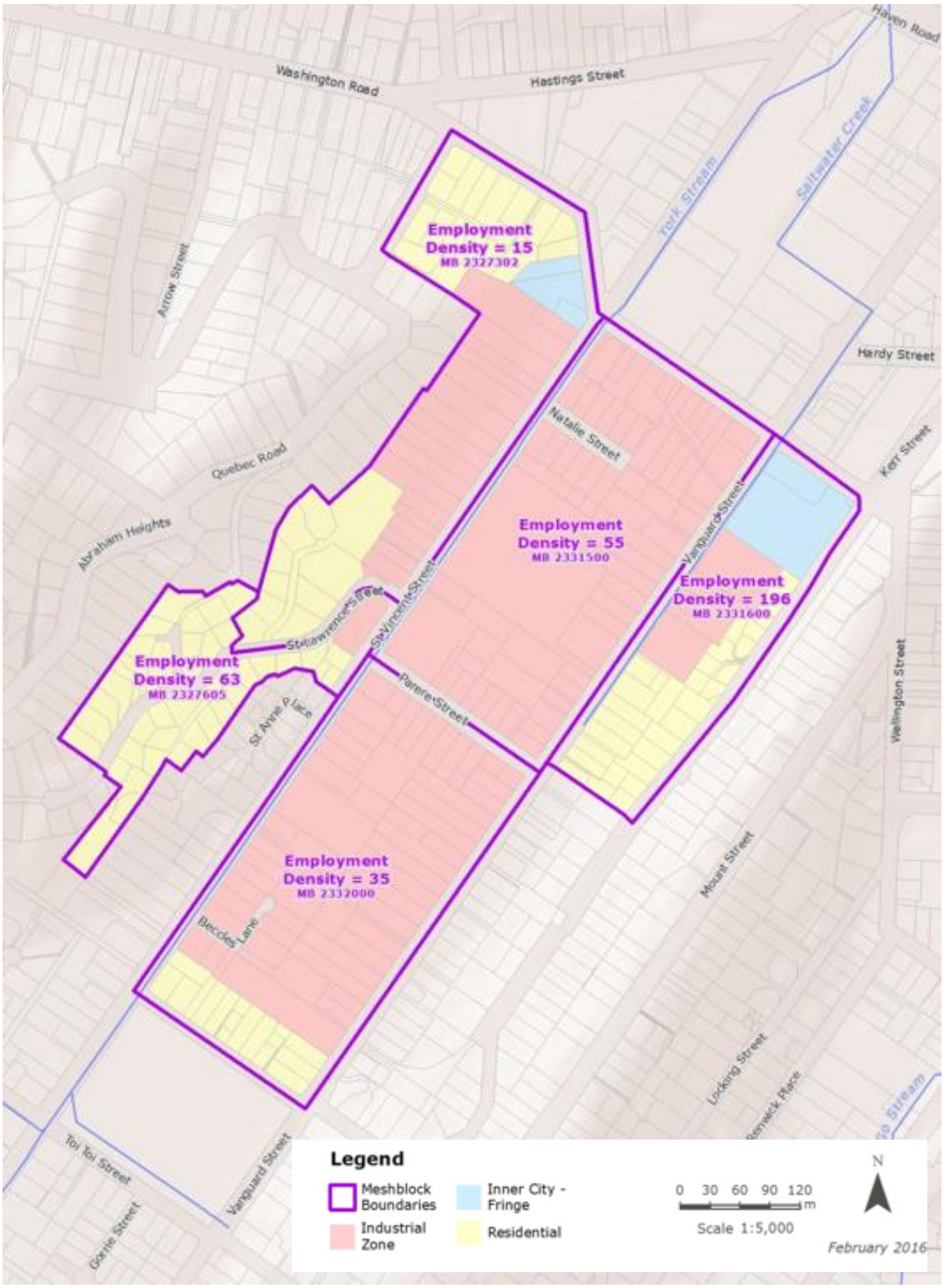

Figure 20: Vanguard/St Vincent Industrial Zone – Employment Density

The Vanguard industrial zone consists of five mesh block areas. The mesh blocks range from very low to high employment densities. As indicated earlier, MB 2331600 has been ruled out of this analysis due to the situation of the New World supermarket, significantly affecting the data. The remainder of the industrial area is made up of small light industrial properties which provide for a high employment density rating in MB 2331500 and 2327605. It must be noted that MB 2331500 does however contain the large Harvey Norman store which affects the data for this mesh block. MB 2332000 and MB 2327302 both have the lowest employment density numbers of the industrial zone with MB 2332000 rated medium and MB 2327302 rated very low. This is consistent with the findings of the previous land supply observations as these areas both have the greatest number of identified vacant or underutilised properties in the industrial zone. With further utilisation of these identified areas, it is expected both of these mesh blocks will significantly increase in employment density.

Tahunanui Industrial Zone – Employment Density

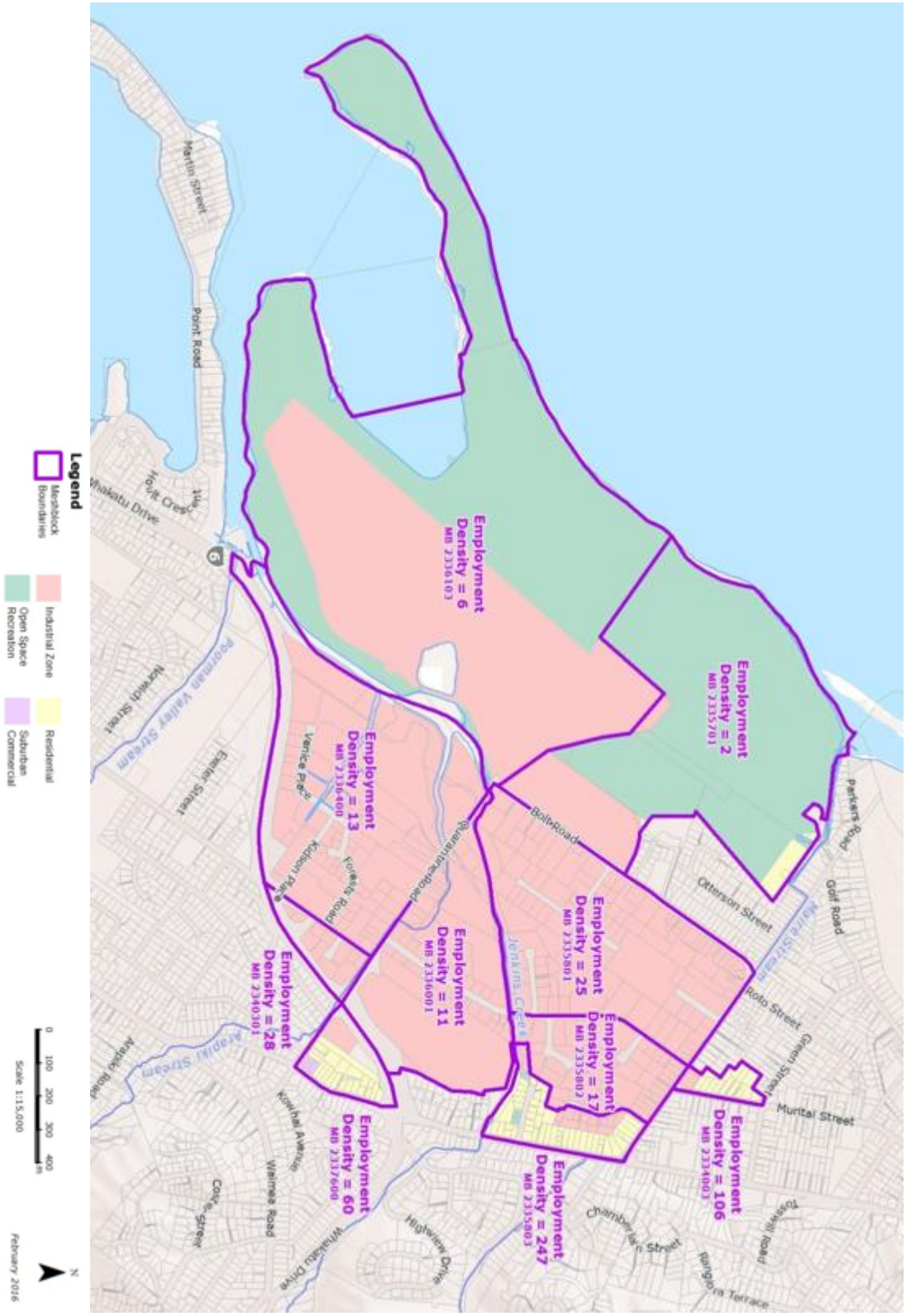

Figure 21: Tahunanui Industrial Zone – Employment Density (Source: NCC, 2016)

The Tahunanui industrial zone consists of ten mesh blocks, the largest number of all of the industrial zones. These mesh blocks range in employment density from very low to very high. MB 2336103 and MB 2335701 are both dedicated to airport and golf course activities with employment density ratings predictably reflecting these activities. The employee per hectare rating of MB 2336001 has also been largely ignored in this section of the report due to the influence Mitre 10 Mega and the Speight's Ale House will have on the mesh block employment data.

The mesh blocks with the lowest employment densities are situated at the centre of the industrial zone and contain solely industrial zoned land. Industrial employment densities are likely to be kept low by the large South Pine log yard a significant number of retail activities in MB 2336400 and the log processing plant found within MB 2335801. The employment density statistics for MB 2336400 are also kept low by the large space of vacant and underutilised land identified in the south west corner of this mesh block. It is within these mesh blocks that the majority of the 30 properties identified as vacant or underutilised are situated. While MB 2335801 and MB 2336400 may only increase in employment density slightly if log processing and retail activities remain in this area, the employment density of MB 2336400 is likely to greatly increase with the better utilisation of land.

Nayland South Industrial Zone – Employment Density

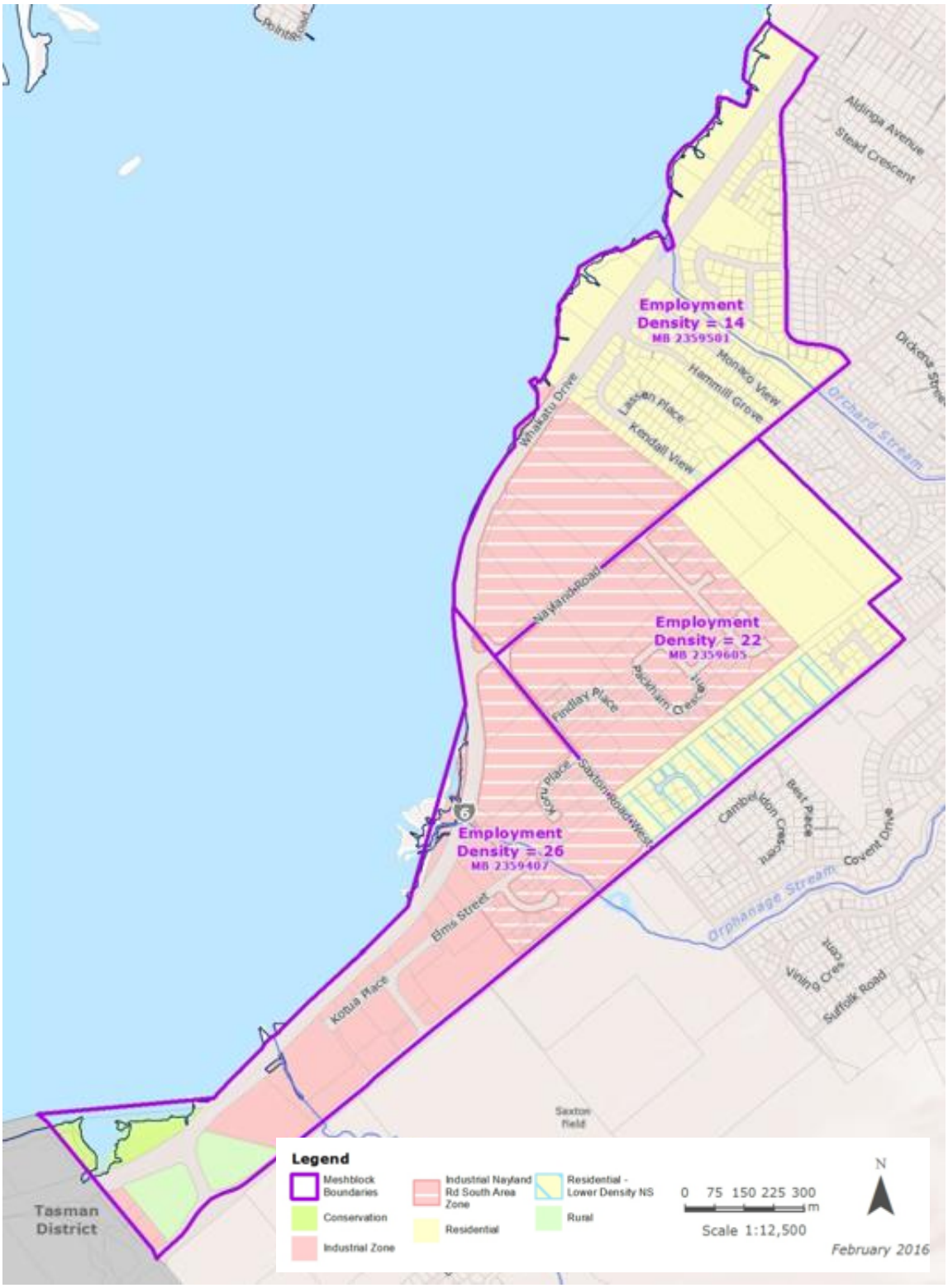

Figure 22: Nayland South Industrial Zone – Employment Density (Source: NCC, 2016)

The Nayland South industrial zone consists of three mesh block areas. Employment density statistics are low across all of the mesh blocks, however it is important to note the Nayland South industrial zone has seen the greatest amount of development since the 2013 census as it is the newest of Nelson's industrial zones. Therefore, density statistics for this zone may have increased in recent time. This is most likely true in mesh blocks MB 2359605 and MB2359407. MB 2359501 is expected to be consistent with 2013 statistics as the whole block has been the long term site of the ENZA Fruit factory. Densities within this mesh block are low as although the ENZA factory has considerable factory space, large loading zones and storage areas these areas were deemed utilised and not available for future development during site visits.

MB 2359605 has been identified as the mesh block with the most vacant and undeveloped land with the remainder of identified land being found in MB 2359407. Despite this, the largest vacant site within the mesh block has obvious plans for development which will likely help raise employment density in the area. MB2359407 employment statistics are considerably skewed by a number of big box retail stores along Saxton Road West such as Place Makers and Bunnings Warehouse. The employment density of this area is also likely to be kept low by the large Honda site which consists of mostly car storage areas which were deemed on site visits as being essential to that activity.

Industrial Land Availability Results summary

This review of Nelson current industrial land supply has found there is approximately 30.29ha of industrial land available to be developed or better utilised within the four industrial zones studied, Port Nelson, Vanguard, Tahunanui and Nayland South industrial zones. This represents only 9.76% of Nelson's total industrial land area.

A total of 3.32ha of residential activity was also identified within the industrial zones, which has been quantified separately from the industrial land supply total.

Two industrial land demand reports prepared for the Nelson City Council by Telfer Young (2005) and Duke and Cooke (2007) were used to identify land demand per annum. These reports found that approximately 5ha per annum is needed to satisfy current land requirements.

Based on this demand rate, 30.29ha equates to a potential supply of approximately 6 years.

Employment density data was also analysed to assist with identifying future potential for more efficient use of land or intensification of industry. This data was useful for providing a clearer picture of activities within zones. It also highlighted the diversity and range of types of industrial activities and how the number of employees differed across activities.

Land Availability Qualitative Results

Interviews with key informants illustrated that there is a significant recognition of the current lack of industrial zoned land within the Nelson regional boundary. This was largely understood to be due to Nelson's topography which constrains much of the city's urban growth affecting all land use activities including industry. Key Informants 2, 4 and 6 presented common responses relating to the lack of flat land suitable for industry and the only development possible being more efficient use of land and intensification.

Key Informant 7, an industrial land developer with property portfolios in both Nelson and Tasman provided a precise summary of the situation,

> "Nelson City is currently a bit tight. Light industrial not so bad. We call light industrial a 1000 - 1500 square metre site. You can put a 500-800 square metre building and a small office (on that). That is quite available. Tahunanui has no larger blocks. I think it is an issue. So anything over 10,000 square metre blocks, 2500 square metre buildings is going to Richmond."

He was also critical of the Council being slow to make decisions regarding land it owns.

Key informant 8 provided an informed historic insight into land availability in the region and acknowledgement of this as a cross boundary issue between the Tasman and Nelson District Councils.

> "Going back 20+ years or more it was acknowledged by both councils that Nelson City in particular was facing a potential scarcity of urban industrial space. I recall a process back in 1994 when the two councils agreed to have a recognition of the need to provide adequate industrial space as a cross boundary issue in our respective regional policy statements which were the first generation RMA documents in progress at that time."

He also discussed the Tasman's District Council's response to a combined industrial land stocktake in 2005 and the subsequent development of the 250 hectare business park on in Richmond West.

Nelson Port area is one industrial zone recognised as having significant restrictions due to limited land availability on the port reclamation area. It is the industrial zone which potentially can expand if further reclamation works are explored.

Key Informant 6 representing the port discussed the inevitability of reclamation.

> "It's probably inevitable going forward. Even around the non-industrial area, marina expansion will probably need more land at some point. We probably need that now. "

Efforts at the Port are currently focused on intensifying land use and better utilising less productive areas of land. As explained by Key Informant 6, the Port is currently exploring infill options due to the high monetary cost of further reclamation along with the significant resource management issues which would arise.

While discussing Nelson's land availability issues, the majority of key informants referred to the Richmond West industrial land development. Key informants 7 and 8 believed that this would considerably lessen the pressure on Nelson's limited industrial space and provide for future industrial development outside of the city. Respondents such as Key Informant 2 were not concerned with industrial development outside of the Nelson City boundary stating "so what goes to Tasman from Nelson is only going to be 15 minutes away…. as a consumer or workers that is not a great distance to go."

However, Key Informants 4 and 7, along with members of the Focus Group were wary that if not managed properly, issues relating to employment sprawl, loss of central industrial services and transport issues, with particular reference to Port access would arise. Key informant 4 was particularly concerned with the effect the movement of certain industries out of the city could have on already struggling transport infrastructure. He believed extra strain would be placed on Nelson's transport network by commuting workers, people leaving the city to access industrial services, companies relying on cross service relationships as well as companies requiring port access. Key informant 7 confirmed this viewpoint,

> "And as the city grows light industrial is going to get slowly pushed out. I think it is an issue if we don't have good infrastructure to access the port etc. So if you took more industry out of the city to Tahuna or Richmond and that becomes a big traffic jam of logging trucks or cargo trucks coming into the city… that isn't great!"

Summary

Results from interviews of key informants and the focus group show a high level of understanding of the constraints on available industrial land in Nelson and also the level of concern which exists. The results confirm the findings of the land availability analysis of the limited amount of industrial land available for the future. A range of opinions existed on whether it was important for industry to remain situated within the city boundaries and these are explored further along with Nelson's transport infrastructure issues in the sustainable urban form section of this chapter.

5.3.3 Industrial Zone Encroachment

A key theme explored during the field research was whether significant levels of encroachment of non-industrial activities were occurring in Nelson's industrial zones. It was identified in the literature that intrusion of non-industrial activities has a significant effect on industrial land availability and industrial zones. Leigh and Hoelzel (2012) warn that once industrial land is gone it is difficult if not impossible to regain it. There is also evidence of other issues such as reverse sensitivities identified by Key Informant 6 which can occur when other activities locate within industrial zones. This section contains the results of questions put to Key Informants on encroachment in Nelson's industrial zones. Observational research in the form of site visits was also undertaken within each of Nelson's industrial zones to identify if examples of encroachment were present.

Identification of Encroachment

Interviews revealed that all key informants could identify examples of non-industrial activities occurring within Nelson's industrial zones. Further investigation of the examples provided confirmation that encroaching activities were present in all of Nelson's industrial zones and included a range of activities including retail, commercial and residential.

Key Informant 8 provided evidence of this stating that:

> "The Vanguard and Tahunanui precincts in particular are a bit of a mosaic of end-users with some commercial, residential, legacy industrial and with some recent plan changes there is pressure in terms of large format retail which is demanding use out of that space."

Large scale or big box retail was a talking point of a number of key informants throughout the interview process including Key Informant 2, 3 and 4 along with the Focus Group. Key Informant 2 identified big box retail as the "biggest threat" to industrial land as it tends to proliferate on the urban fringe due to the larger lot sizes required while still remaining in close proximity to the CBD.



Figure 23: Retail encroachment in Vanguard/St Vincent Industrial Zone.

The Harvey Norman site in the Vanguard industrial area and the ex-Honda factory site in Tahunanui are two large scale retail sites identified by Key Informants 1, 2, 3, 4 and 7 as well as Focus Group members which use significant amounts of previously industrial zoned land. Site observations and aerial photo analysis determined that Harvey Norman has consumed approximately 1.85 ha in the 15.49ha Vanguard/St Vincent industrial zone. In the Tahunanui industrial zone the ex-Honda site which contains Mitre 10 Mega and the Speights Ale House, with further retail development to occur in the future, has consumed 9ha of the 157.1ha zone.



Figure 24: Legacy residential in Vanguard/St Vincent Industrial Zone.

Both Vanguard and Tahunanui industrial zones show evidence of residential activities occurring within the industrial zones. Key Informant 7 states "we are finding some industrial land is being converted to residential. As residential grows, industry loses out." Observations made during site visits to each industrial zone determined that the majority of residential encroachment, as described by Key Informant 8 are legacy developments. Quantitative analysis determined that residential properties took up approximately 3.32ha across Nelson's industrial zones and equated to 40 individual properties.

Key Informant 6 provided specific information relating to encroachment in the Port Industrial zone. He identified the recreational activities and the local marina on the Maitai Reclamation as essentially encroachment. With that has come marina based industries, along with other industrial activities which are not specifically related to the Port's function. "We've had the likes of Placemakers on the reclamation along with a few other retailers… you've got a motel down Vickerman Street and you've got some restaurants with the marina activity right there."

Encroachment Issues

It was clear from the key informant interviews there was a mixture of opinions when it came to the impacts of encroachment. At times key informants indicated encroachment was a threat to industry but seemingly in contradiction provided specific examples when they

also supported particular non-industrial activities and their location within Nelson's industrial zones. This was particularly evident when discussing the Vanguard/St Vincent industrial zone. Key Informants 1, 3 and 7, several of whom strongly supported the protection of industrial land and services, viewed this particular industrial zone as a city fringe zone where other activities could be included.

When discussing non-industrial activities within the Vanguard/St Vincent industrial zone Key Informant 1 stated "I actually think it (Harvey Norman) is a drawcard for Nelson…the right mix would be a blend of all services. As it is now, it is better to have an eclectic mix, otherwise the same warehouse after warehouse kills the area and people won't come into the city."

Key Informant 7 also referred to the Vanguard/St Vincent industrial zone as a transitional or city fringe zone where he expected to see a mixture of activities. "The CBD has got its function, then what we call city fringe round the outside is where you find the big box retailer and a mix of light industrial around Vanguard Street, then a heavier industrial band, with the port – that's the type of thing that tends to happen."

As examined in the previous section, the heavier industrial band, including the Port industrial zone, has had examples of non-industrial activities present within these zones. Key Informant 6 explained that the recreational activities which included the marina and public slip way facilities are all activities supported by the Port Nelson. This includes the associated motels, restaurants and marine sales and services type businesses.

Key Informant 6 explained that from an operational perspective beyond a certain distance from the wharf it becomes uneconomic to store cargo. It is in these areas that other industrial activities not directly related to Port function, such as the marina and associated activities and a small amount of retail creep have developed and may compromise future port activity.

Other key informants had greater concerns about the effect non-industrial encroachment is having on Nelson's already scarce industrial zoned land. Despite agreeing with the placement of a few big box retail in stores on the city fringe Vanguard/St Vincent industrial zone, Key Informant 3 stated "changing an industrial zone to retail for big foot print stores is only justified if there is still enough industrial land."

Key Informant 4 had strong views against encroachment of retail and commercial activities into Nelson's industrial zones to the detriment of the CBD.

> "You only have to look at the likes of Vanguard Street and Harvey Norman and things like that. Personally I disagree with that. I can see that those organisations want big floor space areas but they should be encouraged or council should drive that they can only do that if they're in the city. Otherwise you end up with what we've got at the moment with several areas in the main streets that are vacant. That's the spaces they should be encouraged to take up in the city rather than eating up land in other zones."

Key Informant 4 referred to time spent in America where he witnessed the revolution of the big box stores removing the focus from the central city and creating dead zones between the CBD and fringe areas where they tend to be located.

> "The Council in its planning needs to look at how we get those big box companies to stay close in town rather than dragging shoppers away from the small shops. The small shops still need to survive otherwise you just end up with this American thing with big box strip malls and everything else is gone. Harvey Norman could be a three storey building in town. It doesn't need to be single storied with a huge land area."

By locating these sort of stores in the central city, key informants recognised the benefits for both the CBD, area in terms of retail and drawing people to the city, along with the consolidation and protection of Nelson's limited industrial land.

5.3.4 Industrial Land Protection

A key theme which was explored in the document analysis and also with key informants was the level of protection industrial land has in Nelson from rezoning and the wide-spread encroachment of non-industrial activities. While the previous section outlined some examples of encroachment, observation research highlighted that Nelson still has very distinct industrial zones despite pockets of encroachment. The Document Analysis found that there was some strong legislative protection written into documents such as the Nelson Regional Management Plan (NRMP). However, interviews with key informants were aimed at determining the attitudes of local consent planners and other concerned parties

towards industrial protection and exploring why some encroachment has been able to occur.

Current Protection

Key informant interviews revealed that those key informants with a good understanding of Council processes, including Key Informants 2, 6, 7 and the Focus Group, agreed that there was significant protection of industrial zones within the Nelson City Council regulatory documents. Members of the Focus Group indicated that there is a clear plan response within the NRMP which works to limit non-industrial activities in Nelson's industrial zones. This response allows for the maximising of opportunities for a wide range of industrial activities to take place in those areas.

Focus Group respondents made it clear that the strong directives surrounding industry in the NRMP determined the actions taken by consent planners within the Council. "The wording in the plan rules are pretty strong… (the consent team are) pretty hard on other activities and their use of industrial land they definitely pick up on that, they're pretty picky." The Council Planners who made up the Focus Group felt that there should be no lack of clarity in the community about the rules relating to the industrial zones and that these zones will continue to exist into the future. "There's never really been any suggestion that we will be changing our zoning."

The stance held by Council with regards to industrial land within the city appears to have been recognised by key informants involved with development in Nelson's industrial zones. Key Informant 2 who works as a local consultant planner indicated that the Council is not responsive to non-industrial activities occurring within the region's industrial zones. She indicated that pursuing non-industrial activities within Nelson's industrial zones is a difficult task under current regulations and attitudes held by the NCC.

> "There is protection within the regulations… industrial land is under pressure and if you wanted do something out of zone you would go into it knowing you were not going to have an easy ride."

A similar understanding was held by local developer Key Informant 7. He highlighted the importance, as a large developer of industrial land in Nelson, of maintaining a close relationship with the Nelson City Council. This included understanding the relevance of

the NRMP and the stance of the NCC in relation to the City's industrial zones. Key Informant 7 was very aware of the Council's efforts to maintain Nelson's industrial zones for industrial activities.

> "What we would look at in an industrial piece of land depends on what's going on around it. We wouldn't look at bringing big box retail into those areas, we only look at industry and how it relates to other surrounding industrial services. There might be a few things like food and cafes that are needed for the workers but that is the only non-industrial activities explored."

Causes of Encroachment

With key informant responses agreeing that there was significant protection of Nelson's industrial zones shown both in the regulatory legislation and by local consent planners, it was important to further understand why examples of encroachment have occurred. It was made evident by the Focus Group that many of the large scale examples of encroachment such as Harvey Norman and the retail development occurring on the ex-Honda factory site were a result of private plan changes ruled upon by commissioners.

> "The threat is not from the application of consents but private plan changes which are decided upon by a private commissioner."

It was highlighted by Focus Group members that in both of these cases the Council had concerns relating to retail encroachment into Nelson's industrial lands as well as the impacts of retail situating outside of the CBD.

> "In that particular case (the ex-Honda site) Council opposed it but a private commissioner approved it due to perceived demand for large format retail."

The Focus Group was asked how developments such as these could be accepted when there is strong impetus in the NRMP and at the NCC that industrial land is scarce and needs protecting. Members of the Group explained that recent strategic documents had influenced the commissioner's decisions in both the above cases. At times developers have been able to argue their developments fulfil the visions of these strategies even if those activities are not supported in the NRMP. It was made clear by Focus Group members that when such strategies are created it is important that the district plan is updated to maintain the right level of protection.

> "In the heart of Nelson we do a growth strategy and it might talk about how we want to extend the fringe zoning out that way and it might say that we want dirty industry out of the city or less dirty and smaller scale. So then you can sometimes get those plan changes or consent applications to do exactly what is alluded to in the strategy before you've had a chance to reword the plan to make sure that protection is still strong. So that is a method they (developers) use sometimes to try and justify their consent application."

5.3.5 Sustainable Urban Form

Leigh & Hoezell (2012) and Howland (2010) point to the disconnect between the current emphasis on sustainable growth management strategies for the modern city and the continued importance of industrial sectors and the protection of industrial land. Nelson City Council has strong a commitment to sustainable management as seen in the Nelson 2060 (2014) strategic document. This section of the research is aimed at assessing whether key Informants reflected or confirmed these sustainability aspirations and goals of a compact city. Keeping in mind the focus of the industrial sector, it was also the aim to identify issues that exist in practice relating to these goals.

Compact city

In general terms, all key informant expressed positive viewpoints relating to the concept of "sustainability" both from an economic and a personal point of view. However, opinion on the concept of Nelson as a "compact city" ranged from those who were intensely focussed on Nelson City to those who took a broader regional Nelson/Tasman approach.

Key informants 4 and 5 were perhaps the strongest in their commitment to the idea of sustainability and the compact city.

> "I think cities and NZ have to be particularly careful about this because we have the ability to set a particular way of life here that other countries may have lost. I think if people don't support local then local will cease to exist… I think people need to be encouraged to remain and keep that village mentality. (Key Informant 4)

> "I personally think Nelson has got to stop bleeding out across the countryside, across arable land which has for over a century provided us with food… So I wouldn't want to see Nelson's footprint get much bigger. (Key informant 5)

The alternative view to this was expressed by Key Informant 2 who talked of a "regional focus" and most forcefully by Informant 3 who envisages the future of Nelson as an urban area stretching across both Nelson and Tasman Districts with a single authority.

The middle ground between these two extremes is summed up by Key Informant 5 who stated "Nelson and Richmond are part of the same ecosystem, people live in Richmond and work in Nelson and vice versa".

Thinking in terms of the relationship of industry and the concept of the compact city, Key Informant 4 stated "In order for the city to survive you need to allow industry almost in the heart of the city to a certain extent. "

This idea was reinforced by both Key Informants 6 and 7 from an economic perspective and linked to the cost savings involved in consolidation of activities and "clustering". Key Informant 6 discussed the management of the Port Industrial zone in relation to core port activities, support industries and the importance of maintaining activities close to the heart of the Port.

As an industrial land developer with tenants in the industrial zones in Nelson, Key Informant 7 recognised the cost savings of clustering related industries together also commenting "it is important for like activities to cluster as they synergise each other."

Transport Issues

Nelson has key transport infrastructure issues relating to geographical constraints. As described in Chapter 3, Nelson's developing urban form is chiefly linear with the result being it has only two arterial access routes into the city. Key Informant 8 was critical of Nelson City "not being sufficiently active" in the 1980's at providing an adequate transport system. All key informants were well aware of transport's impact on Nelson's ability to develop a compact form. Key Informants 4 and 5 were in agreement that the worst thing Nelson ever did was taking out the rail system in the 1950's.

Transport issues were clearly linked to industry location. Asked to comment on the implications of more of Nelson's industry moving out to Richmond the Focus Groups response was "transport implications" and this was recognised by all key informants.

> "Traffic is a problem therefore if you keep moving industrial areas out, you will increase the traffic problem because everyone is travelling out there to work and things. (Key Informant 4)

Planning issues

A clear result from "non-planner" Key Informants to questions relating to planning for the future of Nelson City's urban form was the desire to see strong direction from the NCC. This was particularly evident relating to industrial land and protection. Both Key Informants 4 and 5 expressed the need for a 50 year plan so that the city had a clear future design rather than being "ad hoc"

Concerns were expressed by Key Informants 1 & 3 over a perceived lack of planning and the influence of market forces on urban form. Key Informant 1 felt that developers could drive how a city looks which might not always be in the best interests of the city, whilst Key Informant 3 felt integrated land use planning was not apparent in Nelson when compared to overseas examples such as in Holland.

From a planning point of view Key Informant 8 explained that the prime focus of both the Tasman District Council and the NCC had been on residential demand over the past decade but they were aware of the need to refine and repurpose existing commercial and industrial land. As yet the two councils do not have a "coherent project defined". He pointed to the newly proposed National Policy Statement on Urban Development Capacity (2015) as perhaps a means for formalising this process.

5.3.6 Industrial Intensification

It was identified in the literature review that intensification referred to the optimisation of land use along with maximising the output of activities occurring in that location. Intensification is relevant to the Nelson context due to the land availability issues within the region's industrial zones. Interviews with key informants aimed to determine whether such practices were occurring in Nelson's industrial areas and whether there was potential for greater intensification to occur in the future.

Evidence of Intensification

Throughout Nelson's industrial zones there is evidence of intensive practices occurring in relation to land use and productive outputs. Key informants 2, 6 and 7 referred to specific examples they had been involved with. Key Informant 6 explained intensification was currently the focus of the Port over creating more useable land through reclamation works. The Port had recently been establishing more efficient storage techniques which allowed for greater quantities of goods to be stored within a consolidated land area. This is important for the Port in terms of utilising the limited land area available but also in terms of economic efficiency. Key informant 6 highlighted that storage too far away from the main wharfs increases transport costs while further land reclamation to increase the Ports land availability is extremely expensive.

> "The alternative here is that we go and find more land, but there isn't any is there? So our only options are going and buying more land outside of the city but this (intensifying) is cheaper than purchasing land, let alone trying to reclaim."

Key Informant 6 provided specific examples of techniques the Port was using to intensify its storage operations. "In our log storage areas we have begun to pave zones and stack logs higher. We used to have 3m book ends and now we have got 6m bookends (which hold the logs). So that is intensifying that land use."

"In our container terminal we are building what we call reefer towers. These allow us to stack refrigerated containers four high instead of two high, which was what we used to do."

Key Informant 2 explained that a number of warehouses which are about to be constructed at the Port had also gained consent to go beyond height restrictions within the industrial zone to further intensify land uses. In recent times the Port had also bought a number of

public roads to expand its storage operations and better utilise the limited land on the Port reclamation. “It’s not rocket science, but again going higher just intensifies the use of that land.”

Key Informant 7, as a local developer of industrial land viewed intensification practices as simply smart business. His company in the development of industrial land, aims to gain the most it can from each pocket of land as maximum utilisation of space provides the greatest return.

> “Best use of land is best value of land, so we are always looking at that, at whether we can redevelop something for a higher return and that is normally a higher intensification.”



Figure 25: Example of multiple tenancy/efficient land use development.

Key informant 7 explained that as a development company they develop sites which fit the requirements of their clients and the activities in which they are involved. When suitable they aim for two or more tenants on a single site to maximise return but also use the land as efficiently as possible (see Figure 25). Key Informant 7 also highlighted that despite building to client specifications, they are interested in future proofing their buildings to ensure the buildings will be useable by future tenants. This was viewed as a potential way of ensuring efficient use of land into the future.

> "We don't like to do buildings that are too bespoke. We are always thinking of the afterlife. It is important for the efficient use of land particularly for Nelson City in which the availability of industrial land is pretty thin."

Issues Relating to Intensification

While discussing industrial intensification, a number of key informants highlighted factors which could be considered a hindrance to greater intensification in Nelson's industrial areas. Key informant 2 and members of the Focus Group referred to NRMP plan rules, attitudes of local developers and the complexity of industry activities in their assessment of the issues which relate to industrial intensification in the city.

In relation to the Plan, Key Informant 2 indicated there were possible modifications which could be made to specific industrial rules to encourage greater intensification and utilisation of land. In her assessment Key Informant 2 referred mainly to rules relating to parking, height limits and landscaping. Site visits to each industrial zone revealed a number of businesses with large parking areas which seemed to be underutilised even during peak business hours. Key Informant 2 indicated that the NCC could benefit from reviewing its parking standards as huge parking spaces were considered a significant waste of prime industrial land.

> "Some areas you look at and there is a huge car park and it is not actually being utilised, it's such a waste of land."

Key Informant 2 also indicated there was some rules in the NRMP relating to height limits which had the potential to restrict greater utilisation of industrial land. By contrast, both Key Informant 2 and 6 referred to the recent consent granted to develop a number of new storage warehouses within the Port industrial area, all of which were well over height restrictions listed in the NRMP. Key Informant 6 believed that the current height restriction of 12m was very low especially when industrial land in Nelson is scarce and an option is to build upwards. This was discussed during the Focus Group where members clarified that industrial buildings could be built beyond the 12m restriction after an assessment during the consent process. The height restrictions was largely to ensure buildings close to zone boundaries or particular activities were not subjected to negative effects.

> "We're about to build a warehouse which is well over height. It got through on a non-notified consent process there. You would probably say that height rule, 12m is unrealistically low anyway for 2016."

Key informant 2 emphasised the importance of plan rules not restricting better land utilisation and intensification. She indicated it is difficult to force intensification through regulatory measures, however encouragement through Council strategies and making sure plan rules do not restrict those wishing to intensify are options available to the NCC.

Another issue highlighted by Key Informant 2 which can have a detrimental effect on the efficient use of land are poor attitudes held by developers. While Key Informant 7 indicated his development company strived for intensive development efforts mainly due to higher returns associated with those practices, it appears not all developers have the same outlook. Key Informant 2 stated that some developers have the intension of making quick money off their investment and gave little thought to best use of land and intensive practices.

> "Some developers buy land with a view to flicking off sections, they do not have that interest. Those who design and build, then tenant and maybe subdivide and sell, want to make as much money as possible so they will think about intensification."

Key Informant 2 also indicated that intensive development is much more difficult within existing industrial zones. While greenfield development can consider the best use of land a lot of business or building owners are constrained by what already exists on the land.

> "It is definitely easier for new developer in a greenfield areas. There's more control over the outcomes if there's one land owner, compared to multiple owners in say the highly developed Vanguard Street area. There a much more limitations."

5.4 Conclusion

Examining the findings of the document analysis, the industrial land availability analysis and key informant interviews, including the focus group, has provided a clear picture of this Nelson case study in relation to the thesis topic. It is apparent that there is a significant level of appreciation of the importance of industry and industrial services, along with existing legislative protection of industrial zoned land. However, Nelson's limited land availability puts extreme pressure on industrial land along with some example of

encroachment. Nelson's sustainable, compact city goals and aspirations are clearly evident in regional regulatory and non-regulatory documents and from within its community. However there is some concern relating to the recently rezoned land made available in the nearby Tasman region and how this may affect industrial sprawl and contribute to further transport issues in Nelson. How these findings compare with those in the literature review and meet the objectives of this thesis will be discussed in the next chapter.

Chapter 6 Discussion

Introduction

Planning for the protection of industrial land and services requires an understanding of the role of industry in the modern city. An awareness of the sustainability issues related to the function and placement of industry in the urban environment is also essential and how these can be addressed in planning documents. This discussion chapter will seek to provide an overall synthesis of the theories identified in the literature review and findings from the case study research in order to discuss each of the research objectives in turn. It will also attempt to suggest whether the international research has been confirmed in this local study.

6.1 Objective 1:
To investigate the continued importance of industrial activities within urban spaces

A small group of researchers were identified in the literature review who argue that despite deindustrialisation and the movement towards a new economic focus, industrial activities remain vitally important within modern urban spaces. In fact, it could be argued that the role certain industries now play in support of the modern city requires their location within the urban environment. Industrial activities provide essential services to the local economy, offer employment opportunities to local populations, while industrial zoned land provides space for business incubation. These ideas were explored in the Nelson case study.

Howland (2010) identifies that industrial zoned land provides space for industrial and back-office services which maintain the local economic base. The services she highlights are amongst those investigated in the Nelson case study. Findings from the research have shown that industrial zones provide an appropriate location for a broad range of trades based and industrial services. These include warehousing, food processing, wholesale suppliers, high-tech manufacturing operations, postal and transport services. Key informants confirmed the role of these industrial services as vital in supporting other sectors of the economy such as the port, tourism and the wine and food industry. Engineering and construction companies were recognised as providing services and invocative solutions for building and housing development essential for local urban growth.

It is argued that industrial areas also provide essential services to the general public (Howland, 2010; Leigh and Hoezel, 2012).) Light industrial zones were seen to provide an appropriate location for local government led services and operations such as waste disposal and infrastructural based activities. These areas also provided services to the public such as auto-repair and household renovation and repair workshops. Key informants confirmed the importance of these services and referred to the efficiency and ease of having them in close proximity to the CBD and residential areas.



Figure 26: Example of back office services in the Nayland Industrial Zone.

Within the Nelson case study there was clear evidence of the contribution local industrial activities provided to local employment. This supported the research by Howland (2010), Bronstein (2009), Nixon (2006) and Dempwolf (2009), who identify industry based employment as another example of the importance of industrial activities remaining within urban spaces. Despite large-scale manufacturing moving off-shore, in the majority of cities there remains a significant number of people employed in industrial activities relating to production, distribution and repair services. Census data indicates that within Nelson, potentially 28.5% of the working population are engaged in industry related occupations. The fact that this is close to the national average indicates the importance of industrial zones for employment throughout New Zealand cities (Statistics NZ, 2013).

In addition, Nixon (2006) demonstrates that industrial based employment provides job opportunities for workers with lower levels of formal education, while generally also paying higher wages than low skilled jobs associated with the service or knowledge based

economy. Industrial based employment was identified in the results as supplying better paying jobs and consequently providing better living conditions to lower skilled workers than other lines of work. Evidence such as this has led to Dempwolf (2009) describing industrial zoned land as "employment zones."

Industrial zoned land was also shown to be essential to the development of new innovative businesses which are an integral component to the development and growth of the knowledge based service economy (Howland, 2010; Bronstein, 2009). Industrial zones provide low-cost space, appropriate buildings with ease of access to transport corridors which are all critical to successful business incubation. Findings from the research confirmed these claims with evidence of lower rents and more appropriate buildings attracting technology and research based businesses to industrial zones in preference to the CBD. This is also explored by Bronstein (2009) who highlights new businesses incorporating technological and scientific research, or high-tech design and fabrication, often require the buildings and facilities industrial zones provide. These larger building spaces, workshop areas and storage facilities with access to efficient freight corridors which are often not available in other urban zones. It should not be overlooked that benefits are also to be gained from the clustering of innovative businesses within urban environments (Hutton, 2004). This includes spatial links with other like mind or related businesses and services and is evident in the cluster of support industries related to Nelson's fishing industry such as fish processing, engineering, boat building, science, research and education.

Summary

Findings from the Nelson case-study and the international literature review covering studies in Canada, United States and Britain, confirm that industrial services provide essential services which support and maintain other sectors of the urban economy. The findings also confirm the importance of industrial zones as "employment zones" and essential for business incubation and innovative clusters of industry.

In this respect, it is important to understand that certain industries have adopted a new role within local economies. These industrial activities are essentially servicing the service economy, with urban industry not competing with new economic activities but in fact providing vital support to them. Industrial zoned land also contains a number of activities which provide essential services to urban populations. As such it is crucial that these

industrial services remain within urban areas in close proximity to the sectors of the local economy they support and remain accessible to the general public.

6.2 Objective 2:
To explore how industrial land related issues challenge the goals of the sustainable city

The key aim of this objective was to assess how industrial land issues impact on the sustainability goals of a city. As explored in the literature, sustainable urban forms aim to counter the sprawling, low density urban expansion which is recognised as both energy and land intensive. Growth management strategies are a policy response aimed at instilling more sustainable urban growth patterns within existing urban environments (Jabareen, 2006). However, it is a concern that such policies have a "blindside" in relation to industry (Leigh and Hoezel, 2012).

Smart Growth policies often fail to acknowledge the continued importance of industrial activities to modern urban economies and urban populations as discussed under the first objective. Instead, urban containment policies are associated with the conversion of relatively inexpensive industrial zoned land to mixed use commercial, retail or residential activities. Howland (2010) argues that Smart Growth advocates often view the displacement of industry as a vital step towards creating a "liveable community". Such an oversight or lack of awareness of industry in planning policy can lead to issues which will ultimately jeopardise the goals of a sustainable city.



Figure 27: Timber yard within close proximity to urban centre.

One of the most significant issues identified during this research which will compromise sustainable city ideals is the potential displacement of industry to the urban periphery. While many industrial activities such as heavy industry or industry requiring large land areas can be suitably located on the urban periphery (see Figure 27), other forms of industry require a closer connection with urban areas. Movement of inappropriate industry outside of the urban area has the potential to result in industrial sprawl (Hutton, 2004). Industrial sprawl can create a wide range of issues relating to transport, energy consumption, inefficient infrastructure, along with access to employment and services, all of which counter the goals of the sustainable city. As found in the results, Nelson has an extremely limited future supply of industrial space, although vacant industrial land is available beyond the region's boundary. Whilst it may be appropriate for certain industries to relocate, other industrial activities should remain close to the urban centre and economic hubs. Analysis of Nelson's industrial zones identified industries which required a more central location due to services they provided to the public or local businesses, the ease of access to the port or their role in urban clusters of industry as described by Hutton (2004).

Industries such as these moving outside of the urban area can have significant impacts on transport networks and infrastructure. Nelson already has key transport infrastructure challenges relating to geographical constraints with only two arterial access routes into the city. Key informants and the focus group were clearly aware of the relationship between industry location and transport issues, recognising that the further relocation of industry

away from the city and its port would put increased pressure on an already constrained transport network.

In addition, it is evident that the distance of certain types of industry from the urban centre creates both employment and service sprawl. Leigh and Hoezel (2012) point out that employment sprawl occurs when the distance between workers and their place of employment becomes greater. This finding is very relevant to Nelson, where 28% of the population work in industry related employment. Similar employment statistics are presented by Bronstein (2009) and Gilmore (2015) in relation to their American and Canadian examples indicating the potential impact the dislocation of industry could have on urban containment.

Reducing job sprawl and the spatial job to housing balance is a significant focus of smart growth. However, industrial zones as zones of employment must be taken into consideration if strategies such as this are to be successful. Similarly, service sprawl can threaten compact city goals if both industrial services and local populations are distanced from the services they require. For industrial activities this can mean the increased distance from transport hubs including port or airport facilities, while the public may lose easy access to simple services such as auto-repair workshops. Again, efficient access to services is a focus of urban sustainability, however as Leigh and Hoezel (2012) point out industrial services must be included in the understanding of services.

A key characteristic of Nelson which became apparent during this research was that proximity to industrial and trade based services was much valued by residents and business owners alike. However, in order to maintain a compact city ideal such as Nelson's, cities must be very mindful of the pressures on current limited land availability. As argued by Howland (2010), growing commercial, retail and residential demand creates an inevitable pressure on industrial land in urban areas. Encroachment of these activities has seen significant reduction in industrial land in the American cities examined by Leigh and Hoelzel (2012). While Nelson has a considerable commitment to local industry, evidence of encroachment is still present within the city's industrial zones. Key informant interviews and observational research identified pockets of retail and residential encroachment within all of Nelson's industrial zones. Informants regularly referred to a number of industrial sites where hectares of industrial land had been converted to big box retail through private plan change processes.



Figure 28: Example of encroachment in the Tahunanui Industrial Zone

Encroachment such as this creates pressure on Nelson's already limited supply of industrial land. Research found that of the 310.49ha of industrial zoned land in Nelson, just 30.29ha remains available. Given current demand this equates to a supply of approximately six years. Nelson is not unique in its limited land availability. According to Dempwolf (2009), many cities are in danger of approaching zone threshold levels especially with recent emphasis on compact urban designs. However, it is evident even cities with significant amounts of available industrial space should also be wary of zone encroachment. Leigh and Hoelzel (2012) refer to rezoning or encroachment of industrial land as much like the conversion of agriculture land. Once it is converted to other uses it is difficult if not impossible to regain.

Howland (2010) identifies that the lack of regard to encroachment and industrial rezoning in many cities is due to negative perceptions of industry. Many people, including planners and government officials, often conceptualise industry as a redundant economic contributor of a bygone era associated with unpleasant industrial spaces and environmental degradation (Leigh and Hoelzel, 2012, Howland, 2010). While industry was held in a largely positive light by key informants in Nelson, some evidence of this perception was still evident in the research findings.

Summary

Industry has it place within the modern sustainable city, but issues related to industrial land can jeopardise sustainability goals. Pushing industry to the urban periphery through pressure from rezoning and encroachment only creates issues counter to urban sustainability goals. The potential for this can be seen in the Nelson case study. As argued by Leigh and Hoezel (2012), there is no reason why popular growth management strategies such as Smart Growth cannot give more consideration to the impacts and requirements of industry. This reduces issues relating to transport, energy consumption and inefficient infrastructure, along with access to employment and services and promoting more consolidated urban centres. All of these features are contained in the goals of urban sustainability.

6.3 Objective 3:
To consider the opportunities for industrial intensification in growth management strategies

Intensifying the use of urban space is considered the means to achieving a compact urban design by containing urban sprawl. As identified in the literature review, while the intensification of residential and commercial zones has received considerable focus, the intensification of industrial areas has had less attention. Intensification of industry provides the opportunity for more efficient use of exiting industrial land. More efficient land use results in increasingly compact industrial zones, which could reduce industry's footprint in some urban spaces while in others, limit the need for expansion into areas on the urban periphery. Intensified industry sits comfortably within the sustainable goals of smart growth strategies and helps counter negative perceptions of industry's relevance in the urban environment.

The manner in which intensity and density are often used interchangeably in urban planning discourses to describe similar outcomes is not appropriate within the industrial context. This is because many industrial activities cannot be intensified through merely intensifying built form, as with residential or commercial activities, As explained by Gilmore (2015), certain industries are land intensive and some are job intensive, while others are building intensive. The wide range of industrial sites and activities evident in Nelson industrial

zones provides an illustration of how industrial intensification is more complex than that of residential or commercial intensification. This may also be a reason why industrial intensification may be overlooked in growth management strategies.

Like other cities reaching zone thresholds, Nelson provided a relevant case study into industrial intensification due to land availability challenges occurring in the city's industrial zones. Throughout Nelson's industrial zones a number of examples of intensification were identified in relation to land use and productive outputs. Intensive practices were discussed by key informants as a positive response to land availability issues and also presented smart business solutions in regard to efficient land use.

Port Nelson, for example, has recently established more efficient storage techniques which have allowed for greater quantities of goods to be stored within the port industrial zone. This was achieved through utilising vertical rather than horizontal expansion. Key informant interviews revealed that this was important for the Port in terms of utilising the limited land area available but also in terms of economic efficiency by centralising activities which limit transport costs. Greater land use was also achieved through the purchase and redevelopment of a number of underutilised public roads within the Port industrial zone.

Qualitative research in Nelson identified there is an incentive for land and business owners to maximise utilisation of space to gain maximum returns from developable land. Multi-tenancy and the future-proofing of buildings were found to be two options presently used by land developers. Multi-tenancy was identified during the key informant interviews as a positive way of gaining greater intensity on a single industrial site. While not appropriate for all types of industrial activities, this can be effective in light-industrial zones. An added incentive for land or building owners was the income security multi-tenancy provides through the surety that if one tenant leaves, revenue can still be gained from the rest. Future proofing of buildings ensures that utilisation of land remains high as different industrial activities occupy buildings over their lifetime. In regard to building owners, it also means their building is appropriate for a wider range of industrial activities making it more desirable to future tenants.

Although the benefits of intensifying industrial activities are obvious, a number of barriers can hinder its development. Gilmore (2015) points to such barriers as site specific constraints and design and regulatory barriers. Site-visits within Nelson's industrial zones

identified a number of sites with challenging topography, small or poor locations and difficult access which would make intensification difficult. Design constraints such as floor area ratio, building strength and ceiling heights were discussed during key informant interviews, as issues involved in retro-fitting existing buildings. Key informants also referred to plan rules in relation parking space, landscape rules and height limits which, although in place to address compatibility issues with surrounding areas, can be viewed a limiting intensive development. For example, Nelson currently has an industrial height restriction of 12 metres which was considered low by a number of key informants. However, Nelson City planners, as participants in the Focus Group, indicated that flexibility existed within the resource consent process and that building heights were assessed in terms of potential negative effects on surrounding areas.

Summary

Intensification of industry is a topic which has received little attention but is becoming increasingly important as a smart growth strategy for local authorities. This research has shown that intensification is a key method for the more efficient use of industrial land. It is a means of ensuring that industrial development can continue within urban spaces and limit the need for dislocation to the urban periphery. As such it can also improve the perception of industry's ability to sit comfortably in the urban environment.

6.4 Objective 4:
To investigate current regulatory and non-regulatory legislation in relation to protection of industrial land

The most effective measures of protection in relation to industrial land and activities identified during this research are within local regulatory legislation. Within the New Zealand planning legislative framework local district plans provide the specific policy and rules which have the greatest influence on local industrial zones.

Implicit in planning for industrial land protection are policies for the protection of encroachment, alignment of transport infrastructure and reduction of compatibility issues. Also important is the recognition of employment zones and support for intensification.

Zoning rules are the key mechanism available to local planners to address industrial land availability issues and protect industrial land from encroachment from other activities. However, it is also crucial that this commitment is followed through to higher level documents such as regional policy statements, long term plans and local strategies.

Nelson's principle regulatory document, the Nelson Resource Management Plan 2004 (NRMP) is a good example of a first generation district plan under the Resource Management Act 1991. Document analysis established that the NRMP provides clear recognition of local issues relating to industrial land availability providing specific policies referring to the importance of the prevention of encroachment and also protecting key main operator rights in specific areas.

However, research findings indicated that despite the NRMP having policies with the intention of preventing the encroachment of non- industrial activities, retail encroachment was evident in industrial zones. The reason for this type of encroachment was explained as the result of private plan changes. Recent strategy documents relating to the future development of the heart of the city were used by developers to take private plan changes to commissioners for ruling. This highlights the need for inclusion of the importance of industry in urban spaces to be included in all planning strategy documents not just within the policies and rules of the district plan.

The location of industrial areas and their alignment with local transport systems is also important within planning documents if cities are to achieve sustainable goals, as discussed previously. Policy outlining compact city ideals for the most efficient use of existing infrastructure and preventing unnecessary outward spread of urban activities needs to specifically include industrial development and link industrial land to the transport infrastructure. Such examples do exist within Nelson's planning framework. Nelson's Regional Policy Statement 1997 outlines issues relating to Nelson's fragile local transport routes and the importance of the link to major facilities such as the port and airport and strategic industries. The Draft Regional Policy Statement (2016) provides strong policy direction to discourage dispersed development and minimise adverse effects on the local transport system. Closely linked to transport infrastructure is the need to recognise industrial zones as employment zones and to include policies to protect the spatial relationship between employees and the workplace.

While it is accepted that not all industry is compatible within urban spaces, those industrial activities that should be retained must be successfully situated in proximity to other areas. Planning documents generally have quite specific objectives and rules relating to industrial zones and adjoining areas. These relate to environmental and cross boundary effects such as discharges, noise and maintaining a pleasant streetscape with landscaping. The reduction of compatibility issues with commercial or residential areas is necessary to allow industrial zones to sit comfortably within urban spaces. However, some flexibility is also required in favour of the industrial activities. This was demonstrated with the Port Nelson industrial area which is sited in close proximity to high value apartments and tourism activities.

The previous objective has discussed how intensification as a smart growth strategy can be applied to industry and results from the Nelson research has shown this is happening in a market driven, ad hoc manner. Clear policy direction in support of industrial intensification, as in the Draft Nelson Regional Policy statement, is an additional mechanism which would further protect industrial land.

Finally, for effective protection of industrial land to occur it is important for local planners to understand the issues and ideas explored in each of the previous objectives. Industry remains an important contributor to the modern city as it continues to provide essential local services while also adapting to support focuses of the new economy. Industrial zones are often more extensive, employ more people and have more significant impacts on local transport networks than other zones in the local environment however they often feature less in local planning strategies. In Nelson over 310ha of land is zoned industrial while 28.5% of the population are employed in industrial based services and yet industry is only referred to briefly in long term plans and strategies and then only in relation to the local economy. A greater awareness of the overall impact such an extensive zone and its related activities is more likely to lead to a city achieving its urban sustainability goals.

6.5 Objective 5: To develop a method for analysing industrial land supply

As discussed under Objective 4, effective industrial protection and zone management stems from local authorities having a greater awareness of the issues and opportunities which are present within their industrial zones. The aim of this objective was to create a simple

quantitative method which could be used by local authorities to gain a greater understanding of industrial land availability in their cities. As identified by Howland (2010), a significant starting point in achieving effective zone management is determining local land availability. Awareness of industrial land availability provides local authorities with a base of information which can influence local planning and legislation. It also provides a starting point from which to initiate further research resulting in greater understanding and more effective management.

The land availability method was established due to lack of an existing standard approach for quantifying local industrial land supply. A mixture of local New Zealand and international documents, as well as land studies were investigated to gather appropriate methods of analysis. These documents included urban growth management strategies and plans, industrial land surveys as well as business land capacity and intensive practice reports. All of these sources contained elements of this method developed but did not provide a comprehensive approach. The method is outlined in full in Chapter 4 and uses aerial map analysis, property improvement value data, employment density data and site observations to identify vacant and underutilised properties.

From this identification of vacant and underutilised properties a total land supply figure can be quantified. The method was tested in case study area of Nelson as part of a study undertaken for the Nelson City Council (NCC) and successfully calculated total potential supply as outlined in the results. From this desktop and observational research preliminary judgements regarding industrial land can be constructed. For example, in Nelson it was determined there was a lack of industrial land available for future development as industrial zones reach threshold levels. By understanding local land supplies and the potential management issues, further investigative research can follow. The NCC identified an updated demand study would be the likely next step in their assessment of local industrial zones.

Completing a land availability survey is an effective method of developing a greater understanding of industrial activities occurring within local industrial zones. It leads to an understanding of clusters and the interconnection between industrial activities and the areas of the local economy they service, as explored by Hutton (2004) and Howland (2010). A more comprehensive view of the industrial zones in a city allows consideration of the placement of industry in relation to ease of access to services. In the case-study, for

example, certain industries were identified as being appropriately placed in relation to their activities and their spatial placement in the city, whilst others were occupying land less efficiently.

Industrial intensification was examined in Objective 3 as an option for the more efficient use of industrial land in relation to a city's sustainability goals. Without an understanding of land availability issues and the current use of industrial land, such a concept is difficult to implement.

From building a knowledge base, beginning with investigations into industrial land supply, subsequent findings can positively influence local policy documents. These include broad level strategies and visions such as growth management strategies and address the issues examined in Objective 2 relating to the lack of consideration of industry (Leigh and Hoelzel, 2012). Key informant interviews revealed that the land availability study detailed in this thesis, which was completed for the NCC, has guided the contents of the new local growth management strategy which is set to be released in the near future. As well as broad level policy, influence can filter into regulatory documents including local district plans. At a practical level, the application of rules for the protection or more efficient use of industrial land would benefit from a more comprehensive picture of a city's industrial zones.

Summary

The aim of this objective was to develop a simple industrial land availability method that could be used as a starting point for further investigations into industrial land issues within the urban landscape. The method developed proved successful in establishing an initial base of quantitative data relating to industrial zones. It also provided the lead in to other research including qualitative investigations which would add depth of understanding for planning practitioners. Throughout this research it has been argued that a more comprehensive understanding of industrial activities and need for the protection of industrial land is required for cities to achieve their sustainability goals. This method for analysing industrial land availability provides a step towards achieving these goals.

6.6 Conclusion

In conclusion, industry remains an important contributor to the modern city as it continues to provide essential local services while also adapting to support focuses of the new economy. As such it is crucial that these industrial services remain within urban areas in close proximity to the sectors of the local economy they support and remain accessible to the general public. Industrial zones are often a significant spatial feature of the urban landscape. They employ a large percentage of the working population and have a considerable impact on local transport infrastructures. If not given due consideration in planning policy, issues related to industrial land and placement of industry can jeopardise the sustainability goals of a city. This research has shown that industry can fit into sustainability models if appropriate industry remains centrally located and measures such as intensification are employed. This can also improve the perception of industry's ability to sit comfortably in the urban environment.

Chapter 7 Conclusion

Industrial zoned land and industrial activities within cities throughout the world are facing a number of challenges which could potentially see industry displaced from urban environments. Deindustrialisation and the notion of the sustainable city have put pressure on local industrial zones along with the perception that industry is a redundant economic contributor associated with unpleasant industrial spaces and environmental degradation (Leigh and Hoelzel, 2012, Howland, 2010). Supporting this claim is the inadequate coverage of industry in popular growth management strategies such as Smart Growth and Compact Urban theories which influence urban development and local planning legislation worldwide. Despite this, there is evidence that industrial activities remain vitally important to a city's sustainable development and for ensuring the positive function of local economies (Howland, 2010).

The aim of this thesis was to further investigate the claims made by key authors identified in the literature review that industrial land and industrial services remain vitally important within modern cities. These were explored within the case study of Nelson, New Zealand along with how industrial land related issues challenge the goals of the sustainable city. This involved considering what impacts would occur if industrial activities were pushed to the urban periphery, or beyond, in relation to Smart Growth and sustainable city goals. To examine industry's ability to fit within Smart Growth and sustainable city goals the idea of industrial intensification was explored, along with the importance of regulatory and non-regulatory legislation for protecting local industrial land. Finally, an industrial land supply method was developed as a practical starting point for local authorities to improve industrial zone management. The five research objectives established proved essential for directing the range and scope of the research within the single case study approach chosen.

Nelson New Zealand was selected as a relevant case study as it provides an urban area which has a considerable industrial base, however also has a strong community and local government aspirations towards sustainability. Topographical constraints have placed considerable pressure on land use, including industrial development where zone thresholds are near maximum. This creates an environment where careful planning is required to protect industry from encroachment if it is to remain within the urban boundaries and to ensure land-use efficiency is maximised. Nelson provided a significantly different case

study example to many of the large metropolitan cities referred to in the literature such as Metro Vancouver (Gilmore, 2015). Its industry is on a considerably smaller scale than these large centres, while New Zealand generally has not had the degree of industrialisation of larger developed countries. Also, New Zealand economics have not moved as swiftly to a knowledge or service based economy, with Nelson providing a good example of a city still servicing a primary industry hinterland. Despite this, many of the issues linked to these overseas examples are evident within the Nelson case study. These include issues regarding land availability, encroachment and loss of industrial land. In the Metro Vancouver statistics such as industrial employment are very similar to those found in Nelson. Therefore despite scale differences, Nelson provides a compact study area which has uncovered relevant findings for other New Zealand cities and abroad.

The mixed method approach employed within the case-study research worked well to cover the broad scope of the research. This included analysing relevant literature along with completing qualitative, quantitative and observational research. A thorough literature review placed the research issue within the current body of literature, drawing out key themes which solidified each research objective investigated in Nelson. Quantitative and observational research established an in-depth understanding of Nelson's industrial activities, while developing a successful methodology for quantifying industrial land supply. This also provided the researcher with a strong platform of information from which to conduct key informant and focus group interviews. The qualitative research was successful in confirming conclusions drawn from the quantitative and observational research.

The research methodology was successful in providing a comprehensive set of results from which to draw conclusions and allowed the researcher to obtain a better understanding of the issues investigated from the various findings. However, as Neuman (2011) observes, the mixed method approach did prove to be a complex and time consuming approach.

7.1 Key Findings

The overall finding that emerged from this research was the need for the reconceptualisation of industry in the modern city. It is an idea which was referred to by a number of researchers investigated in the literature review (Dempwolf, 2009; Gilmore, 2015) and which became increasingly apparent as this research progressed and findings from all five objectives were synthesised. With a change in perception of the role of industry in the modern economy and its place within the sustainable goals of a city, planning for the protection of industrial land would be more assured. A lack of awareness or oversight of industry, on the other hand, may unintentionally threaten the protection of industrial land and undermine sustainability goals in the city.

The Nelson case-study confirmed the findings of international studies in Canada, United States and Britain that industrial services provide essential services which support and maintain other sectors of the urban economy. Industrial zones were shown to provide an appropriate location for a broad range of trade based and industrial services which are supporting other sectors of the economy, local government activities and providing services for the general public. These industrial activities were seen to be supplying a significant proportion of the population with comparatively well paying, skilled employment. At the same time, new innovative businesses, which are an integral component to the development and growth of the knowledge based service economy, were seen to be reliant on industrial zoned land for low rent and appropriate locations within the city's industrial zones.

Therefore industry has it place within the modern city, but a key finding of the research was that issues related to industrial land have to potential to jeopardise sustainability goals. Pressures from encroachment and rezoning can be seen to push industry to the urban periphery and create issues related to inefficient transport networks, employment sprawl and reduced access to services. Greater consideration of industry in growth management strategies and coordination with regulations within the District Plan can reduce these issues and promote a more consolidated urban centre.

Intensification of industry was identified as an increasingly important smart growth strategy for local authorities to pursue as a key method to ensure more efficient use of industrial land. More efficient land use results in increasingly compact industrial zones and reduces industry's footprint in some urban spaces while in others, limits the need for expansion into areas on the urban periphery. A key finding of the research was that

intensified industry sits comfortably within the sustainable goals of smart growth strategies and helps counter negative perceptions of industry's relevance in the urban environment.

A final key result was the development of a simple method for analysing industrial land availability. This was successful not only in establishing a method for quantifying potential future supply but by incorporating observational research, it also enabled a more comprehensive understanding of the complexity of issues relating to industrial sites and activities. As such it proved to be a useful as the lead in to other research, including qualitative investigations, which would add depth of understanding for planning practitioners. These key findings have led to the following recommendations:

7.2 Recommendations

While these recommendations are directed at Nelson planners and decision makers specifically, it is recognised that the city already has a strong commitment to sustainability goals and the indications are there within the Draft Regional Policy Statement that a future direction has been set which is more understanding and inclusive of the role industry. In addition, these recommendations can be more widely interpreted within other contexts.

Recommendation 1: Nelson should recognise their completed land availability study as a significant first step in achieving better industrial zone management. From this study further research should follow including the demand studies indicated during focus group interviews. This will further develop the understanding held by the NCC of the issues and requirements which face local industry.

Recommendation 2: Nelson should ensure that the policy trends outlined in the Draft Regional Policy statement filter down into the new *Whakamahere Whakatu* Nelson Plan which will replace the Nelson Resource Management Plan in the future. This includes the strong directive in Chapter 4 restricting encroachment and promoting intensive, best land use practices as a response to Nelson's limited land availability.

Recommendation 3: Nelson should recognise the ability of intensified industrial zone in promoting sustainable urban designs. Therefore industry should be further recognised within documents such as the Nelson 2060 strategy and the Long Term Plan with the same sustainable aspirations as outlined for other zones.

Recommendation 4: Nelson should be aware that the recent industrial rezoning which has occurred in Richmond is not necessarily quick fix for industrial land availability issues in the city. With the spread of essential industrial activities to the urban periphery there is the potential for industrial and employment sprawl to occur causing considerable stress on Nelson's fragile transport network.

Recommendation 5: Nelson should see the Richmond rezoning as an opportunity to consider appropriate industrial distributions. This provides the opportunity for certain industries currently found close to the centre city to move to a more suitable industrial zone. This process would involve collaboration with the Tasman District Council to explore policy options or non-regulatory incentives for these industrial businesses to relocate and not simply rely on industrial distribution to be determined by market forces.

Recommendation 6: Finally, all recommendations stated in this section would be more effectively achieved with greater collaboration between the Nelson City Council and local industrial developers, land and business owners. While it is understood this already occurs with a number of local developers, it seems a more holistic collaborative approach would enable a valuable exchange of ideas resulting in more effective zone management.

7.3 Final Statement

This thesis has highlighted the issues and pressures in relation to industrial land availability and the protection of industrial services. It has added to the evidence that industrial activities remain vitally important to a city's sustainable development. In addition findings and recommendations have been presented that will assist with planning and policy initiatives to ensure sustainable and more efficient industrial zone management. Future research could focus on several areas which were touched upon during the research but were not able to be pursued in the time available. These include investigating collaborative processes with the industrial stakeholders in order to pursue mechanisms for appropriate industry distribution and further industrial intensification processes. Initiatives such as these would bring increased focus and awareness on this important zone and its related activities within the modern sustainable city.

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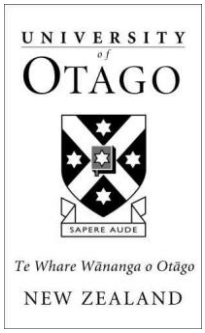
Appendix 1



Planning for the protection of industrial land and services in the sustainable city – a Nelson, New Zealand case study

INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide not to take part there will be no disadvantage to you and thank you for considering my request.

What is the Aim of the Project?

The aim of the project is to establish whether planning in Nelson City is taking into the consideration the role that industrial land and industrial services play in the economic wellbeing of the city. In particular it seeks to establish the current situation relating to industrial land availability and protection in Nelson, while considering the potential for industrial intensification. The research process will undertake a review of relevant planning legislation, along with exploring the importance of industry within the Nelson context in relation to economics, education, employment, transport and urban form.

Nelson provides a useful case study to examine industrial land protection as topographical constraints limit the ability for the city to expand its industrial space. With mixed use, commercial, retail and residential encroachment posing risks to local industrial land, protection of industrial zones is required if industrial services are to remain within the city. Industrial land intensification has been identified as a possible way in which Nelson can better utilise its limited industrial space.

What Types of Participants are being sought?

The project will be recruiting stakeholders with knowledge about Nelson industrial zones and activities. These stakeholders will include Council staff, private planners, business owners, port officials, economic development and commercial organisations and educational institutions.

What will Participants be asked to do?

Should you agree to take part in this project, you will be asked to either participate in an interview or focus group meeting.

The interview questions will be broadly set prior to the interview. The interview questions will cover a broad range of topics depending on the participant, and could vary when presented, for example questions for the council policy planner will differ slightly from questions aimed at business owners. As a result, the 'interview' is more of a discussion on key themes and will depend on the way in which the interview develops. For the interviews although the Department of Geography is aware of the general areas to be explored in the interview, the committee has not been able to review the precise questions to be used.

Interview participants will be asked for their permission to audio record the interview and they will be offered the opportunity to see the transcript. They will also be told they are free to end the interview at any stage, or to decline to answer any question or line of questions that they are uncomfortable with. Around eight participants in will be individually interviewed, with two focus groups meetings also planned.

What Data or Information will be collected and what use will be made of it?

The interview will be transcribed, and the digital files (both audio and transcriptions) will be stored in a password protected folder that only the researcher and their supervisors will have access to. Key personal details will be removed, and the researcher will be required to observe the strictest confidence.

Once the raw data is analysed, selected quotes may be used in academic publications, conference presentations, or to support further research proposals. Your identity will be protected as far as possible by using an anonymous identifier (e.g. a pseudonym, or number). Occasionally, someone who is very close to the context of the study or to you may identify you simply through your comments. We will take every care to ensure this does not happen, but please be aware that sometimes it is unavoidable.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity.
You may request to view any publications that use quotes made by yourself. Personal information will only be kept for record keeping purposes, to provide you with follow-up information if requested. Otherwise, it will be destroyed as soon as practicable or at the completion of the research. Data obtained as a result of the research will be retained for at least 5 years in secure storage.

Can Participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:-

Researcher		Supervisor
Matt Keyse	or	Professor Etienne Nel
Phone: 0273652267		Phone: 03 479 8548
Email: matt.keyse@gmail.com		Email: etienne.nel@otago.ac.nz
		Department of Geography/Te Iho Whenua

This study has been approved by the Department stated above. However, if you have any concerns about the ethical conduct of the research you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (ph 03 479-8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix 2

Planning for the protection of industrial land and industrial services in the sustainable city – a Nelson, New Zealand case study

CONSENT FORM FOR PARTICIPANTS

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project at any time without any disadvantage;

3. Personal identifying information [e.g. contact details, audio recordings and associated transcripts] will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. Interviews will be undetaken using an open-questioning technique. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. In the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.

5. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

I would like to have an opportunity to view my transcript: Yes ☐ No ☐

If yes to the above, please provide an email address: _____

I agree to take part in this project.

....
(Signature of participant) (Date)

.....
(Printed Name)

Appendix 3



SAMPLE QUESTIONS/TOPICS OF DISCUSSION

Note that interviews will take an open-ended format. The topics discovered within each will largely be shaped by the knowledge and experiences of the interviewee, with question foci adapted as appropriate. However, listed below are some lines of inquiry that will form the foundation of key informant interviews:

- What are the key economic factors driving industrial development in Nelson and how do these interact with the availability of industrial land in the city?
- In your opinion, how does current legislative and policy frameworks provide for/limit the protection of industrial land and industrial services in Nelson City relating to sustainable city ideals?
- What are your perceptions of the proposed changes to the RMA and how they might affect industrial zones?
- What are the key challenges which effect industrial land zoning and the services within them?
- How has the Nelson City Council developed systems to manage industrial land and industrial services in the city? How would you rate their success?
- In your view what steps should the Nelson City Council take to better manage industrial land and industrial services within the city's industrial zones?
- How do you see Nelson City progressing in terms of management of industrial land and industrial services over the next 10 years? What steps do you think should be taken?
- In your opinion is there potential for industrial intensification to occur in Nelson City industrial zones?