A New Zealand Superblock:
Smart Planned Development

by

Mehdi Kabul

A thesis
submitted to the Victoria University of Wellington
in fulfilment of the requirements for the degree of
Master of Architecture

Victoria University of Wellington
2017

i. Abstract

Wellington city's forecast, for the period 2011-31, is that the urban population will increase by 20,000 residents, including 60% increased demand for rental properties. This research investigation focuses on sustainable means of increasing housing density in the face of ever-increasing urban sprawl.

The research proposes that Wellington City Council's *Smart Capital* (2010) initiatives for urban expansion infrastructure projects—with aims to attain progressive urban growth with desirable characteristics—are good on some levels, but remedies such as infill and intensification that encroach on urban green spaces are unsustainable. The encroachments caused by urban sprawl can damage both environmental design characteristics and, the well-being of inhabitants. The thesis proposes that smart planned development (SPD) principles, when sustainably maintained, can be an effective alternative urbanisation method to WCC's *Smart Capital* propositions. This investigation proposes a theoretical formulation supporting the construction of superblocks within New Zealand, using SPD as a process. For example, Lincolnshire Farm in Wellington is a site exemplar whose proximity and size would permit the city to construct alternative spatial configurations, in the form of a modified superblock for the New Zealand context.

The Modern Movement reflected on the viability of superblocks of urban housing for population growth. Historically, these superblocks when built were problematic due to the detrimental attributes of automobiles, densities, and metropolitan expansions. This thesis proposes ways to mitigate these difficulties by merging relevant components of three environmental approaches: 'Ecological Design' principles by Sim Van der Ryn; 'Green Urbanism' principles by Steffen Lehmann; and framework of 'Green Transit Oriented Development' proposed by Robert Cervero and Catherine Sullivan. Once relevant aspects of these principles are assimilated, the research examines them within the context of Kevin Lynch's principles for a good city form (GCF), to help contribute to the development of new sustainable criteria for superblocks in New Zealand.

As case studies, the comparative methodology of this investigation evaluates the achievements of Woodberry Down in London, Discovery Bay in Hong Kong, and Linked Hybrid in Beijing, and Hobsonville Point in Auckland.

Keywords: smart planned development, superblock, sustainability.

ii. Acknowledgements

I would like to acknowledge academic supervisor, Daniel Brown, for his patience and ongoing support through the course of study. The staff at Victoria University of Wellington assisted in composing the research study into a reasonable thesis through their positive efforts and guidance.

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vi. Definitions and Terms

Ecological Design (ED):

The principles that minimise environmental impact and integrate living (ecological*) and technological processes in sustainable design,¹ as outlined in the book, *Ecological Design*, by Sim Van Der Ryn and Stuart Cowan.

Good City Form (GCF):

‘As defined by Kevin Lynch’ GCF is theorised conditional to design experimentations that include eight objections, five dimensions of performance as well as efficiency and justice, and including assessment criteria², by ‘pursuing particular spatial patterns’³ in design, architecture and urban planning.⁴ These spatial patterns affect and influence the environment and behaviour of inhabitants and comprise the social capital of any location (Refer to section, *Smart Planned Development*).

Green Urbanism (GU):

The fifteen principles of GU as defined within the book, *The Principles of Green Urbanism* by Steffan Lehmann.⁵

Megablocks:

A relatively larger parcel of land than a superblock (≥ 250 ha), consisting of an assortment of superblocks (e.g., commercial, educational and residential) situated preferably on the outskirts of a city, typically beside a major road or highway or mass rapid rail (MRR).

Mixed-use:

Refers to developing structures and communities that have a mixture of commercial and residential uses.

¹ Sim Van der Ryn and Stuart Cowan, *Ecological Design* (Washington, D.C.: Island Press, 1996), 3-32. *Ecological design promotes regeneration that includes repair and regeneration of the living tissue.

² Kevin Lynch, *A Theory of Good City Form* (Cambridge, MA: MIT Press, 1981), 73-455.

³ Emily Talen and Cliff Ellis, “Beyond Relativism: Reclaiming the Search for Good City Form,” *Journal of Planning Education and Research* 22, no. 1 (2002): 38.

⁴ Ibid.

⁵ Steffan Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability* (London: Earthscan Ltd, 2010), 212-246.

Smart Planned Development (SPD):

The process of implementing a superblock through government, investor and entrepreneur partnerships, on leased or owned property with financial and environment paybacks that are nurtured by achieving social and density parameters of an urban environment (Objectives of ‘SMART: specific, measurable, achievable, relevant and timely’⁶).

Superblock:

An assemblage of commercial (blocks, towers and podiums), residential (houses and apartments), amenities (clinics, kindergartens, shops and retail), streetscapes and landscapes. A parcel or subdivision that comprises <40ha of land area with infrastructure that provides the superblock under arrangement from either the council in inner-city limits or the public-private partnership (PPP)⁷ within megablocks.

Transit Oriented Development (TOD):

The Institute for Transportation and Development Policy defines eight key principles (Walk—Cycle—Connect—Transit—Mix—Density—Shift) that go towards creating a TOD.⁸

Transit village:

‘An organising principle for creating places – built environments, social environments, and economic environments—that embrace and evolve around mass transit system’.⁹

⁶ Ministry for the Environment, “Waste Assessments and Waste Management and Minimisation Planning,” *A Guide for Territorial Authorities* (2015). Ministry for the Environment. <https://tinyurl.com/jhhd95v>, 27.

⁷ Tingting Liu and Suzanne Wilkinson, “Large-Scale Public Venue Development and the Application of Public-Private Partnerships (PPPs),” *International Journal of Project Management* 32, no. 1 (2014): 88-91.

⁸ Institute for Transportation and Development Policy, “TOD Standard,” 2.1 (2014). Despacio. <https://tinyurl.com/zamzgsv>, 1-28.

⁹ Michael Bernick, *Transit Villages in the 21st Century*, ed. Robert Cervero (New York: McGraw-Hill, 1997), xi.

vii. Abbreviations

Dwelling units per hectare (du/ha)
Ecological Design (ED)
Energy Efficient Design (EED)
Form-based Code (FBC)
Floor area ratio (FAR)
Good City Form (GCF)
Greenhouse gases (GHG)
Greater London Authority (GLA)
Green Transit Oriented Development (Green TOD)
Green Urbanism (GU)
London County Council (LCC)
Medium Density Residential Area (MDRA)
Ministry of Business, Innovation and Employment (MBIE)
Ministry for the Environment (MfE)
Organisation for Economic Cooperation and Development (OECD)
Public-private partnership (PPP)
Renewable Energy (RE)
Resource Management Act (RMA)
Smart planned development (SPD)
Transit Oriented Development (TOD)
Waste Management and Minimisation Plan (WMMP)
Wellington City Council (WCC)

1. Introduction to Research

1.1 Problem Statement

According to the Wellington City Housing Accord, 2014, the two-year target for the total number of consented sections and dwellings was 2,500 homes. However, the actual number of dwellings and sections consented at the end of year two, in June 2016, resulted in a total of 1,626 homes. Wellington city experienced shortages of 875 homes:

Wellington is New Zealand's third largest city with around 200,400 residents and it is estimated that there will be around 246,692 people living in Wellington city by 2043. The City has some 77,466 dwellings and the population is expected to grow at a rate of 0.7% per annum until the year 2043. The number of households in Wellington is also expected to increase by almost 21,388. This means that approximately 715 dwellings a year need to be built to keep pace with population and household growth in Wellington. ...there is a housing shortfall of around 3,842 dwellings.¹⁰

Even though experts sometimes disagree with WCC's policies, the council continues to respond to urban population growth by expanding the metropolitan urban limits (i.e. exacerbating urban sprawl) or through infill and intensification initiatives that can at times compromise farmlands, green spaces, parks and reserves (Figure 1-1).

One problem is that the construction industry through technological innovations (such as prefabrication, and others) has progressed rapidly, but the government does not yet have a plan in place that can enable expansive new housing projects to occur in a sustainable way that maximises the amount of biodiversity in urban settings. Another problem is that the housing affordability factor determined by the median house prices scores at 5.8 index points and is categorised as severely unaffordable.¹¹ This investigation proposes that a modified superblock form of urban expansion, when re-conceived for the New Zealand context, might provide strategic and viable alternatives conducive to environmental sustainability.

¹⁰ Wellington City Council, "Wellington City Housing Accord," (2014). Wellington City Council. <https://tinyurl.com/zercjyk>, 1.

¹¹ Andrew Macleod, "Wellington City Housing and Residential Growth Study," *Final Planning Assessment and Recommendations* (2014). Wellington City Council. <https://tinyurl.com/zggwdzu>, 1-28.

Figure 1-1 GWC region's proposed—Urban structure plan (2008)

From: GWRC. 2008 p. <https://tinyurl.com/jyfhda4>

The National Policy Statement (2016) of the government of New Zealand has forecast a population increase of 6.4% from 2013 to 2023 for the Greater Wellington Region.¹²

The Real Estate Institute of New Zealand (REINZ) offers in-depth analysis for houses and apartments within various urban precincts and rural regions of New Zealand. Table 1-1 REINZ for Wellington (2016 – 17) provides the prevalent prices for real estate in Wellington that include houses and apartments from March 2016 to February 2017.¹³ As an example, the

¹² Ministry for the Environment and Ministry of Business Innovation and Employment, "Proposed National Policy Statement on Urban Development Capacity," *Consultation Document* (2016). Ministry for the Environment. <https://tinyurl.com/j9ad5z5>, 1-38.

¹³ The Real Estate Institute of New Zealand, "Market Facts - District: Wellington (9) Zone: (All) Dwellings (Incl. Apartments) Medians over One Month," (2017). The Real Estate Institute of New Zealand. <https://tinyurl.com/h7ek9qz>, 1.

median price of real estate properties in the month of February 2017 was \$520,750, which was a concern for first home buyers and is beyond the viable incomes of most Wellingtonians.¹⁴

Table 1-1 REINZ for Wellington (2016 – 17)

Period	Med. Sale	No. Sale	Med. Days	% Diff. Previous	Total \$ Sales	Total Nat. \$ Sales	% Nat. Sales
Mar 2016	\$459,000	1,149	24	1.77%	\$594,099,763	\$5,929,997,815	10.02%
Apr 2016	\$455,000	920	29	-0.87%	\$461,210,976	\$5,254,752,806	8.78%
May 2016	\$465,000	873	27	2.20%	\$451,254,507	\$5,648,002,219	7.99%
Jun 2016	\$455,000	816	28	-2.15%	\$438,928,354	\$4,997,368,268	8.78%
Jul 2016	\$450,000	712	27	-1.10%	\$360,230,360	\$4,508,884,903	7.99%
Aug 2016	\$461,000	765	24	2.44%	\$399,817,184	\$4,572,452,661	8.74%
Sep 2016	\$480,000	810	26	4.12%	\$436,665,387	\$4,675,003,619	9.34%
Oct 2016	\$477,000	745	27	-0.63%	\$398,337,317	\$4,326,653,064	9.21%
Nov 2016	\$500,000	743	26	4.82%	\$408,158,054	\$4,937,712,004	8.27%
Dec 2016	\$530,175	846	26	6.04%	\$483,918,210	\$4,141,022,177	11.69%
Jan 2017	\$460,000	444	38	-13.24%	\$237,587,725	\$2,546,523,165	9.33%
Feb 2017	\$520,750	736	29	13.21%	\$416,275,677	\$3,794,435,823	10.97%

From: REINZ. 2017. webpage. <https://tinyurl.com/kbgjs3e>

The table is outlined as categories for period, median sale, no. of sales in median days, median days, percentage of difference with previous, total sales, total national sales and percentage of sales.

To counter this demand, Wellington City Council resolves to supply land for property developers by rezoning the existing land use (Table 1-2).

Table 1-2 The ratio of dwelling types and urban design controls (2008–12)

Housing Type	No. dwellings 2008 – 2012	Percentage New Dwellings	UDS target
Greenfield	760	23%	34%
Infill / Medium Density	1258	38%	30%
Central City / Apartments	1269	39%	36%
Total	3,287	100%	100%

From: Macleod. 2014. p. 51.

A summary of land and dwelling combinations that have acquired building consent by WCC. This also maps actual vs UDS target, showing that the intention is to create much more suburban greenfield housing, as yet, not met.

¹⁴ New Zealand Housing Foundation, “Housing New Zealand ” New Zealand Housing Foundation. <https://tinyurl.com/go2dbdx>.

1.2 Research Question and Proposition

The principal research question posed by this thesis is:

Can a modified version of mixed-use high-density superblocks help contribute to reducing urban sprawl within New Zealand in ways that also encourage environmental sustainability?

A typical New Zealand city comprises a designed urban plan with a central business district (CBD) of less than five kilometres in radius. These CBDs are surrounded by suburbia based on principles of the ‘garden city movement’, which accommodates one of the lowest population densities in urban planning.¹⁵ Research shows that best practice sustainable urban development should seek to yield natural resources in appropriate quantities and should be able to be modified for context-specificity about availability and supply capabilities.¹⁶

This research investigation proposes that a new and modified approach to superblocks can achieve these objectives. Superblocks can be defined as mini-cities within a megablock or city respectively.¹⁷ It is possible to achieve higher densities and address economic, environmental and social issues efficiently because of the compact size of the superblock, which permits versatile context-specific design opportunities.¹⁸ These opportunities include segregated pedestrian (above podium level) and motorised (at ground level) zones for movement and circulation within a superblock.¹⁹ Kjersti Monson defines the most suitable superblock pattern of construction as <40ha,²⁰ while a megablock is >250 or <750ha. While a superblock could take three to five years from conceptual design to realisation, a megablock might be feasible as a design planning concept over a three to four decade period, which provides scope for continual reassessment of community and sustainability needs.²¹

¹⁵ David Turner, “Planning for Higher Density: Concepts of Privacy in Auckland’s Culture of Housing” (Doctor of Philosophy, University of Auckland, 2010), 1-136.

¹⁶ Sim Van der Ryn, *Culture Architecture and Nature: An Ecological Design Retrospective*, ed. Richard Olsen. (New York: Routledge, 2014), 7-10.

¹⁷ Steven Holl Architects, *Linked Hybrid*, podcast audio, A Documentary Style Promotional Video, 10:48, accessed May 31, 2016, 2006, <https://tinyurl.com/zfqvdzm>.

¹⁸ Scott Dunn and Walter Jamieson, “The Relationship of Sustainable Tourism and the Eco-City Concept,” in *Eco-City Planning: Policies, Practice and Design*, ed. Tai-Chee Wong, Belinda Yuen, and Charles Goldblum (London: Springer Science+Business Media B.V., 2011), 94-99.

¹⁹ Robert Cervero and Catherine Sullivan, “Green Tods,” in *Sustainable Urbanism and Beyond: Rethinking Cities for the Future*, ed. Tigran Haas (New York: Rizzoli International Publications, Inc., 2012), 127.

²⁰ Kjersti Monson, “String Block Vs Superblock: Patterns of Dispersal in China,” *Architectural Design* 78, no. 1 (2008): 47.

²¹ Planning Decisions Unit, “Woodberry Down Estate - Kick Start Site One,” *PDU/1826/02* (2008). Greater London Authority. <https://tinyurl.com/jfjdgp4>, 1-15.

Superblocks are composed of buildings and podiums together with courtyards, landscapes, and streetscapes. These superblocks comprise varying fabrics, functions, and styles that integrate public and private spaces. An urban superblock is typically designed as a commercial/vehicular zone at ground level, with a residential green space above at podium level(s). An outer fringe megablock combines high-density superblocks, which perform as a mixed-use development. The commercial/vehicular zones typically would be located at the entrance(s) together with the car parks, along with a junction for green vehicles that could access the superblocks. The superblocks could comprise detached and semi-detached houses with residential towers and perimeter blocks as well as hotels and plazas for leisure and convenience shopping activities, including healthcare, schooling, and sporting amenities.²²

The modernist experiments with superblocks were on the whole unsuccessful. A typical modernist superblock is London County Council's Ferrier Estate (1969-72 to 2005-12), which is currently undergoing regeneration processes and has been renamed Kidbrooke Village. This post-war housing estate was held responsible for dilapidated conditions from unhealthy buildings that led to crime, domestic violence, and drug addiction. The newly regenerated village will comprise 4763 homes on a 55ha site at <87 du/ha when finished in 2030.²³ This suggests that there are both strengths and weaknesses to the original modernist concept of superblocks.

WCC has conducted several working papers on 'miniaturised or compacted suburbia' with regards to urban intensification and infill housing. WCC's working paper 6 (2006) includes 'cost of infill housing' as both advantageous and also detrimental for social and environmental aspects that affect the inhabitants within the built environments. This working paper recommends increased suburban densities of infill housing as 50-70 dwelling units per hectare (du/ha) for medium density. New Zealand's Resource Management Act (1991) defines amenity values as:

Amenity values means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes.²⁴

²² Monson, "String Block Vs Superblock: Patterns of Dispersal in China". 46-53.

²³ Joanne Preston, "From Ferrier Estate to Kidbrooke Village: Decoding a "Place in the Making"," architectsocialhousing. <https://tinyurl.com/hylum4g>.

²⁴ Parliamentary Counsel Office, "Resource Management Act 1991," no. Reprint as at 1 March 2017 (1991). Published under the authority of the New Zealand Government. <https://tinyurl.com/mhqewn9>, 31.

In relation to this definition by the RMA, Anna Bray Sharpin notes the negative impacts of residential infill in New Zealand's cities as loss of amenity values. According to Sharpin:

These are culturally defined, and can vary between individuals, between types of stakeholders, and over time (Parliamentary Commissioner for the Environment, 1996:1). Importantly, this means that different groups of stakeholders will have different experiences of infill. Two key groups, who often have quite divergent experiences of infill, are the neighbours of infill and the residents of infill.²⁵

Architect David Turner's (2010) research investigations confirm:

As a percentage of total expansion capacity in 2004, infill sites in the ARC's [Auckland Regional Council] "easy-to-do" category offer a significant, but diminishing, resource. The more difficult sites remain undeveloped and the development costs [become]...progressively higher as the more difficult sites are tackled. Although the ARC estimates that 25% of total regional growth can be accommodated by small-scale infill projects there is doubt that all of this potential can be brought to fruition. Of infill sites remaining undeveloped...70% are not in nodal areas [and]...will not be developed for a miscellany of other reasons.²⁶

Furthermore, Turner states the negative outcomes as:

...significantly altering the natural ecology and largely removing the possibility of productive gardens. Private vehicles, mostly originally located on the perimeter of the block now penetrate to the central spaces, and dominate both visually and aurally. Distances between houses are reduced, affecting standards of privacy and increasing perceptions of crowding. Impacts affecting the whole environment are the result of a collective decision..., rather than reconsideration of the choice of house type to suit higher levels of density.²⁷

On the positive side, infilled built environments save infrastructure and building costs for urban environments, in comparison to typical urban sprawl development.

²⁵ Anna Bray Sharpin, "Urban Development Strategy Working Paper 6: The Social and Environmental Effects of Residential Infill Development in New Zealand," ed. Peer Reviewed by Paul Kos, Planning Department (Wellington City Council, 2006), 15-22.

²⁶ Turner, "Planning for Higher Density: Concepts of Privacy in Auckland's Culture of Housing". (2010), 212.

²⁷ Ibid., 214-215.

Figure 1-2 Operational cost (2014–15)

From: WCC. 2015. p. 26.

WCC's operational expenditure by strategic area of spending.

WCC's annual operational cost for 2014–15 to maintain infrastructure within the precinct is illustrated in Figure 1-2. This chart reflects a total expenditure of \$434.3 million that is used to fund the council and group annual expenses. These costs were categorised and further subdivided to account for every resident on a daily surcharge and calculated as rates of \$5.95 per person per day for the financial year 2014–15²⁸ (Figure 1-3). This could be one of the reasons WCC opts for green urbanism (GU) principles as a growth initiative solution.

²⁸ Wellington City Council, "Wellington City Council", 2014/15 Summary Annual Report (2015). Wellington City Council. <https://tinyurl.com/hjl9m9e>, 21-28.

COST PER STRATEGIC AREA PER RESIDENT PER DAY

STRATEGIC AREA	TOTAL COST (\$m)	COST PER RESIDENT PER YEAR \$	COST PER RESIDENT PER DAY \$
Governance	14.9	74	0.20
Environment	143.2	716	1.96
Economic development	42.9	215	0.59
Cultural wellbeing	19.1	95	0.26
Social and recreation	103.3	517	1.42
Urban development	37.3	187	0.51
Transport	53.9	269	0.74
Council	19.7	99	0.27
	\$434.3	\$2,172	\$5.95

Figure 1-3 Cost per strategic area per resident per day (2014 – 15)

From: WCC. 2015. p. 27.

University of New South Wales Professor of Planning and Associate Dean of Research Robert Freestone comments on Sir Ebenezer Howard’s garden city movement planning theory as:

The central planning principles of Howard’s theory—of low density development, high standards of accessibility, an incremental building process, and private ownership—embrace economic spatial, and social dimensions; significantly, these principles matched the ambitions of all the participants in the suburbanisation of New Zealand cities.²⁹

Urban dwelling densities are better evaluated in relation to their unique contextual scenarios, as occurred with the inception of the garden city movement within New Zealand. Hence, Auckland City Council decided on maintaining half the effective densities in comparison to the United Kingdom and this has largely developed into the prevailing architectural and constructional building typologies for New Zealand.³⁰

Turner explains the acceptable density objectives of Auckland Regional Council and provides statistics as an example of ongoing density variations in intensified neighbourhoods from 1970 to 2005 to curb urban sprawl (Table 1-3). Turner has outlined the negative implications of such density intensifications, which include economic, environmental and social characteristics

²⁹ Turner, “Planning for Higher Density: Concepts of Privacy in Auckland’s Culture of Housing”. (2010), 134.

³⁰ Ibid., 133-215.

within urban environments. These characteristics are discussed as implications of intensifications to curb urban sprawl and have been presented by Turner as an exemplar of 17 dwellings per hectare (du/ha) for single-story suburban house typologies, which include increasable net densities of 7 du/ha.³¹

Table 1-3 Typical density increases (1970 – 2005)

	Site area (hectares)	Number of units	Net density dph	Total floor area (m ²)	Occupancy rate	M ² per person	Total population	Off-street parking	% site impermeability	Total footprint (%)
1970	5.18	51	10	5610	3.7	28.9	194	102	23.7	12.6
2005	5.18	88	17	9680	2.8	40.3	246	175 (est.)	36.3	19.9
Change		+ 37	+ 7	+4070m2	- 24%	+11.4	+52	+73	+53%	+58%

Colour-wash on table from: Turner. 2010. p. 214.

Statistics of a typical neighbourhood block (e.g., Maybury Road, Tamaki) with increases in acceptable density for intensification or as redevelopment in urban areas.

1.3 Methodology

This thesis proposes to address the research question by merging relevant components of environmental approaches: ‘Ecological Design’ principles by Sim Van der Ryn; ‘Green Urbanism’ principles by Steffen Lehmann; and framework of ‘Green Transit Oriented Development’ proposed by Robert Cervero and Catherine Sullivan. Once relevant aspects of these principles are assimilated, the research methodology examines them within the context of Kevin Lynch’s principles for a good city form (GCF), which can contribute to the development of new sustainable criteria for superblocks in New Zealand.

As case studies, the comparative methodology of this investigation evaluates the achievements of the Woodberry Down in London, Discovery Bay in Hong Kong, Linked Hybrid in Beijing, and Hobsonville Point in Auckland.

³¹ Ibid., 207-215.

The objective of the thesis investigation is to develop criteria for urban environmental sustainability within the New Zealand context. Both growth patterns and urban environments have to establish a proportion or scale as balanced conceptions in relation to ecological (small-scale typology) or technological (megastructure) sustainable approaches. These attributes are attained through balances of ‘physical and social ecology’ as well as architecture and environmental sustainability. Therefore, the thesis evaluations seek to assist in integrating a formula that is context-specific to meet requirements for the inhabitants of Wellington city.³²

The principal aim of this thesis is to investigate alternative methods of urban developments that, if implemented, might reduce the developmental pressures that lead to sprawling urban environments in New Zealand. The initial investigation and assessments were utilised to analyse the potential merits of modified superblocks as prototypes in Wellington using SPD.

1.4 Investigation Site: the Wellington context

The previous Mayor of Wellington, Celia Wade-Brown, stated:

The vision for Wellington is underpinned by four city goals. These goals are based on the city’s competitive advantages—our highly skilled and innovative population; our strong ‘eco-city’ performance; our position as New Zealand’s capital connected culturally and socially to the world; and our compact form.³³

The Greater Wellington Regional Council (GWC) in 2016 accommodated 504,900 residents, with an average population density of 63/km².³⁴ Housing shortages were addressed by WCC in 2014 to avoid major concerns for inhabitants, which include maintaining property values together with reasonably priced housing measures. The GWC permits medium-density residential areas (MDRA) in inner and outer fringe suburbs, and high-density within the central areas and CBD. WCC comprises 70% residential property with the remaining 30% serving as commercial or ancillary amenities and service facilities. HNZ accommodates the underprivileged inhabitant with rent and rent-to-purchase schemes, and from 2001 to 2013 more than 25% preferred renting when compared to owner-occupied households, which also have increased in demand by 10% due to overall increases in residents.³⁵ Even though Wellington

³² Van der Ryn, *Culture Architecture and Nature: An Ecological Design Retrospective*, 1-152.

³³ Wellington City Council, “Wellington Towards 2040: Smart Capital,” (2010). Wellington City Council. <https://tinyurl.com/pl59jz8>, 3.

³⁴ Statistics New Zealand, “Subnational Population Estimates: RC Constituency,” Statistics New Zealand. <https://tinyurl.com/zflq3az>.

³⁵ Macleod, “Wellington City Housing and Residential Growth Study”. 36.

city experienced public sector restructuring from impacts of the global financial crisis (2008-09), the employment opportunities provided for an increased 10,000 residents from 2001 to 2013. WCC's intentions are to allow for an increase of 6,500 inhabitants within the CBD, central areas, and inner suburbs in the next two decades from 2013 to 2031.³⁶ The expectations are to construct 1,000 new multi-person housing options providing accommodation for 3-3,500 residents of demographic groups of 18-24 years of age. They additionally foresee 3-3,500 housing unit increases for 25-70 and 70-and-over groups comprising empty nesters moving into inner-city areas from suburbs. WCC predict an increase of 60% rental properties to meet requirements for varying age groups as short- or long-term inhabitants. At an average, WCC's intentions are to accommodate 750-1100 new dwelling units annually to keep up with demand, for the next two decades.³⁷ Residential households as detached or semi-detached within inner and outer suburban zones encourage low density at >400m², although smaller sections are also subject to review for approvals.³⁸ The broader metropolitan areas (<70km from CBD) still comprise developable land. WCC's intentions are to give in to demands by offering 'underutilised reserve land' for commercially viable suburban houses conditional to the Reserves Act and RMA.³⁹ Currently, the council is issuing building consents to MDRAs and transitional zones, for the town centres as listed:

- Miramar
- Karori
- Island Bay
- Khandallah
- Tawa
- Grafton Down
- Newtown
- Brooklyn

The town centres comprising Behrampore, Churton Park, and Newlands have lesser prospects to construct MDRAs, including Johnsonville and Kilbirnie, which have been consented, but

³⁶ Ibid., 59-60.

³⁷ Ibid., 9.

³⁸ Ibid., 57.

³⁹ Ibid., 36.

lack a transition zone’s capabilities. GWC have allocated percentages as illustrated in Figure 1-4 for the urban population growth’s requirements.⁴⁰

Figure 1-4 WCC's future dwelling construction expectations (2014)

From: Macleod. 2014. p. 49.

The metropolitan definitions outline the expected urban growth with percentage for housing types.

The thesis research specifically investigates a exemplar at Lincolnshire Farm, located 7 km north of Johnsonville, comprising 420ha with mild terrain in comparison to the urban greenbelt. While designing for an actual site is beyond the scope of this investigation, Lincolnshire Farms (bound by State Highway 1, Grenada North, Woodridge / Newlands, and Horokiwi Ridge) represents an appropriate site exemplar for this investigation, because WCC already has plans to develop this 420 hectares parcel for urban housing, and it is a suitable size for a megablock⁴¹ (Table 1-4).

Table 1-4 Lincolnshire Farm—Areas (2006)

Lot No.	Existing Subdivisions	Gross Site Area (ha)
Residential Subdivisions		
RA 02		28.75
RA 03		37.50
RA 04		10.00
RA 05		8.80
RA 06		9.75
Commercial Subdivisions		
EA 03		25.50
EA 04		10.80
EA 05		6.50
Amenities and Recreational Areas		
None		None
Total		137.6

Compiled by author from: WCC. 2006. p. 28-46.

The site investigation only utilises 137.6ha of land from the entire 420ha parcel, for this thesis.

⁴⁰ Ibid., 1-78.

⁴¹ Wellington City Council, "Lincolnshire Farm Structure Plan: Directing Growth and Delivering Quality," (2006). Wellington City Council. <https://tinyurl.com/jel9hvw>, 1-8.

1.5 Scope of Research

A version of a superblock modified for the New Zealand context will be proposed for the exemplar site of Lincolnshire Farm. The comparative analyses investigate four specific case studies to help determine parameters, favourable to the New Zealand context. The comparative methodologies explore economic, environment, social and density parameters.

1.6 Thesis Structure

This thesis sets out a framework by examining precedents of projects and philosophies of superblock planning solutions. The aim of this urban study is to offer proposals to help impede urban sprawl within New Zealand, using mixed-use medium-to-high-density smart-planned superblocks.⁴²

Chapter Two the literature review, reflects on relevant topics relating to superblocks and suburban sprawl and the use of GU for the improvements of superblocks in a New Zealand context.

Chapter Three presents evaluations, derived through a comparative methodology of four precedent superblocks, to test the applicability of the criteria developed from existing precedents on data-sets of parameters as mixed-method evaluations.

Chapter Four looks at ways to develop evaluative criteria for a good city form (GCF). This is proposed by integrating GU principles with the processable implementations of a SPD. As an example, these possibilities enable an affirmative decision-making process, which specifically develops criteria applicable to the New Zealand context.

Chapter Five reflects on the theory and evaluations as site relevant analysis. The analysis comprises the site, Lincolnshire Farms' geographical advantages and constraints.

Chapter Six, applies the investigation results to a local Wellington case study site, Lincolnshire Farm.

Chapter Seven, the conclusion, reflects on the future of a New Zealand superblock within the New Zealand context.

⁴² Kresing Architekten Münster, "Sparda Bank Munster: Symbiosis of Office Architecture and Nature," in *Efficient Buildings: Designing for Business Administration*, ed. Verlag H.M. Nelte (Singapore: Page One Publishing Private Limited, 2005), 210-213.

Summary: Introduction to Research

The chapter outlines the crises problem statement, research question, and approach of the thesis.

2. Literature Review

An in-depth literature review was undertaken of the history of superblocks. This chapter provides a focused summary of the aspects of that study that are most relevant to the aims and objectives of this investigation.

Le Corbusier in the mid-1940s utilised superblocks in the Modern Movement to help accommodate inhabitants of war-torn Europe. This chapter considers how a reconceptualised approach to modernist superblocks might enable a context-specific capital city framework to foster sustainable population growth within New Zealand. The Literature Review is divided into eight sections: *2.1 Introduction to Superblocks*; *2.2 Ecological Design—Principles*; *2.3 Green Urbanism—Principles*; *2.4 Transit Oriented Development—Principles*; *2.5 Green Transit Oriented Development*; *2.6 Good City Form—Review*; and *2.7 Reflections on Modified Superblocks*.

2.1 Introduction to Superblocks

From the mid-1920s to mid-1940s Le Corbusier and other architects promoted megaprojects of superblocks to accommodate displaced refugees in a war-torn Europe, as well as bringing about better living for urban inhabitants. Le Corbusier, a member of the CIAM (International Congresses of Modern Architecture), spoke, wrote, published and proposed projects such as ‘La Ville Radieuse’ (Radiant City). These projects backed the claim that cross-planned towers supplemented daylight and cross-ventilation, and performed better than the prevailing living conditions, and were even better than the skyscrapers in New York.⁴³ The principles also include stacked houses (freehold maisonettes): “machine for living” cities of tomorrow. Le Corbusier’s Unité d’Habitation housing project comprised cross-ventilated interlocked duplex units with a central corridor servicing each overlaid stack of three levels⁴⁴ (Figure 2-1 and Figure 2-2). For urban planning design Le Corbusier recommended a four principles framework:

- We must de-congest the centres of the cities.
- We must increase the density of the centres of the cities.
- We must increase the means whereby traffic can circulate.
- We must increase the area of green and open spaces.

⁴³ Charles Jencks, *Modern Movements in Architecture*, 1977 ed. (Auckland: Penguin Books (N.Z.) Ltd, 1973), 141-166.

⁴⁴ Ibid., 1-28.

Le Corbusier sought to achieve a versatile town planning solution, between the city centre and residential neighbourhoods.⁴⁵ Le Corbusier propagated rectilinear planning, order, sensibility and permanence, classification and choice: to determine “The Great City”, otherwise known as “A Contemporary City” (Figure 2-3).

Figure 2-1 Unité d'Habitation—A typical stack (1947–52)

From: Jencks. 1977. p. 15.

A stack of two interlocked apartments comprising three levels.

Figure 2-2 Unité d'Habitation—section and elevation (1947–52)

⁴⁵ Le Corbusier, *The City of To-morrow and Its Planning*, 2nd ed. (London: The Architectural Press, 1947), 98-117.

Figure 2-3 Urbanism—The Contemporary City (1947)

From: Le Corbusier. 1947. p. 181.

Le Corbusier compares New York with a Great City to define A Contemporary City.

Superblocks possess distinct urban structure, scale, and organisation, forming a culmination of buildings, streets, courtyards, piazzas, with various urban functions and fabrics. The superblocks integrate public and private spaces whereby the built form defines the open space and peripheral condition. The interwar socialist superblocks in Vienna intermingled the public and private space with no specific boundary to determine the open space. Whereas, the bourgeois superblocks also in Vienna had a multi-block layout with a precise definition of the inside (internal open space) and outside areas (public street) as gated communities⁴⁶ (see Figure 2-4). These superblocks were developed using different philosophical constructs that can also be altered to suit the New Zealand context.

⁴⁶ Eve Blau, "From Red Superblock to Green Megastructure: Municipal Socialism as Model and Challenge," in *Architecture and the Welfare State*, ed. Mark Swenarton, Tom Avermaete, and Dirk van den Heuvel (London: Routledge, 2015), 33-36.

Figure 2-4 Socialist superblock—site plan (1924–28)

From: Blau. 2015. p. 35.

Figure 2-5 Vienna's bourgeois superblock (1925–26)

From: Blau. 2015. p. 32.

In 1919, Vienna's 'Gemeindebauten' (Marxist superblock) defined and changed the interwar urban fabric of Vienna, by overlaying a new superblock as a megastructure alongside the existing small-scale urban environment and building typology. These superblocks redefined the city grid up until the early twentieth century and even influenced the bourgeois superblocks that modified the street level interface with access to match a socialist superblock (Figure 2-5).

Architect Karl Ehn with interests in garden city movement and inspired by Otto Wagner designed the Karl Marx Hof project (1927–30). This major project comprised flats for members of the socialist movement and results as an excellent exemplar of socialist public housing superblock. This superblock matched the existing urban scale and interrelated the public and private spatial configurations (Figure 2-6).

Figure 2-6 Karl Marx Hof—plan and perspective (1927–30)

From: Blau. 2015. p. 34.

Unlike the superblocks of CIAM that created unique designs for each block and even strived to design specific furniture, the Vienna superblock prototype designed repetitive and generic modules for buildings and landscape. The superblocks often spanned many city blocks.

Architect Adolf Loos despite being a modernist undertook typological experiments to improve the ‘Red Hof’ perimeter blocks and designed the Terrassenhaus superblock in Vienna with terraced gardens. This unbuilt superblock only made a positive impact on planning during the post-war era⁴⁷ (Figure 2-7).

Figure 2-7 Terrassenhaus superblock—unbuilt project (1923).

From: Blau. 2015. p. 37.

Figure 2-8 Wohnpark Alt-Erlaa superblock—detail and perspective (1968–85)

From: Blau. 2015. p. 42.

⁴⁷ Ibid., 30-36.

The Wohnpark Alt-Erlaa (1968–85) superblock project (Figure 2-8) located in Vienna with 3,000 dwellings was designed by architect Harry Gluck, managed and constructed under a city-owned cooperative, with garden courtyards, facades and terraces. Gluck’s superblock is a model with extensive amenities and is refashioned to promote “the potential of the megastructure to generate collective space in an urban setting”, of the interwar era, with the post-war consumer lifestyle.⁴⁸ Subsequently, Vienna explored new typologies of superblocks on several projects, which categorised high-, low-, and medium-rise building heights, dwelling size variations, spatial and coherent open spaces and interaction with existing heritage buildings.⁴⁹ Gluck’s approaches of creating green superblocks would be better suited for outer fringe developments as a megablock comprising superblocks. The stigmas associated with modernist superblocks raise many concerns and would require appropriate solutions for the New Zealand context. These concerns involve economic and social diversity and lack of TODs connecting to urban centres that cause crime due to isolation and loss of social order.

Figure 2-9 Woodberry Down—site plan (1949)

From: Pepper. 2015. p. 79.

Final post-war housing scheme proposed for LCC.

⁴⁸ Ibid., 38-49.

⁴⁹ Ibid., 35-38.

London County Council (LCC) commenced with a slum redevelopment programme after the Second World War, creating post-war welfare state subsidised superblocks for low- and middle-income homeowners. Lifts were provided for tenant comfort and ease of access, permitting construction for more than ten levels using this innovation.⁵⁰ Woodberry Down superblocks were completed in July 1949, after initial plans in the 1930s, with steel structured framing and fused concrete aesthetics that superseded the brick-faced facades and formed a turning point for inter- and post-war housing schemes in Britain. The site area allocated for Woodberry Down was 18.2ha and comprised modern services, such as heating and amenities of a community centre, schools, library and health clinic, with tree conservation and riverfront walkways within the residential superblock⁵¹ (refer to Figure 2-9 and Figure 2-10).

Figure 2-10 Woodberry Down—Perspective (1949)

From: Pepper. 2015. p. 71.

Technological innovations in lift permitted blocks with more than ten levels.

LCC's approaches for creating housing programmes in addition to GLA's transition towards construction industry pragmatics are good superblock exemplars. The White City project by

⁵⁰ Simon Pepper, "The Beginnings of High-Rise Social Housing in the Long 1940s: The Case of the LCC and the Woodberry Down Estate," in *Architecture and the Welfare State* ed. Mark Swenarton, Tom Avermaete, and Dirk Van Den Heuvel (London: Routledge, 2015), 69-71.

⁵¹ *Ibid.*, 70-73.

LCC undertook designs as a combination of two storey houses, with three tiers of flats above a maisonette and four to five levels of LCC's prototype flats, within typical blocks in a superblock.⁵² These superblocks were coined 'mixed development' over the course of time, by the New Plan Research and Survey Team, that designed these mixed developments for two level houses with green space and high-density superblocks allocated for slum relocation programmes.

English housing consultant and expert Elizabeth Denby pioneered high-rise mixed developments in the United Kingdom. Denby argued for the need for higher density inner-city environments, to reduce sprawl and city limit expansion on the outskirts. Denby also was opposed to LCC's slum redevelopment programmes undertaken, before 1941 that combined houses and high-density blocks as a superblock.

In 1944, LCC decided to decrease the high-density block heights within a superblock, due to lesser demand. This ruling of 1944 was overruled in 1945 and instead chose Denby's 1941 proposal, at the end of war in Europe and a renewed demand for post-war houses in London. LCC managed to construct a total of 19,025 units by the end of 1949, a significant contribution by LCC to the inhabitants of the city of London, which before WWII had used industrial quarters as slum housing. In 1945, after several disputes within LCC, eleven levels were certified as a new policy introduction.⁵³

The Royal Institute of British Architects (RIBA) symposium on high flats in 1955, declared a record of more than 300,000 new houses per annum to have built in the slum clearance programme from 1952 to 1954. This record was successfully attained by changing the war-time building controls and reducing the allocated space to decrease the use of steel in buildings. RIBA constructed and displayed projects of point blocks, Le Corbusier's maisonette blocks, North American high-rise blocks, as well as British and European medium-sized town and suburban areas with improved building services and fire egress.⁵⁴

LCC subsequently was superseded by GLC in 1965 and GLA in 2000. GLA is currently constructing the Woodberry Down regenerations (2013) renamed as Woodberry Park in London Borough of Hackney by Berkeley Homes with new apartment blocks of 25 levels, which will cover the entire property. The council renewed the objectives by allowing the

⁵² Ibid., 72-73.

⁵³ Ibid., 73-81.

⁵⁴ Ibid., 69-85.

private sector to construct and sell to either the residents of social housing or reasonably accept compensate at the current real estate value on the market⁵⁵ (Figure 2-11).

Figure 2-11 Woodberry Park—redevelopment phase (2013)

From: Pepper. 2015. p. 86.

Hong Kong commenced with its first public housing schemes in the 1950s to make provisions for refugees from China, and to reorganise the crowded streets and living facilities in the poorer communities with public funds. These plans of Hong Kong initially influenced by Singapore Improvement Trust (SIT) and ‘housing need’ principles subsequently were reapplied in Singapore by Housing Development Board (HDB) of Singapore.

The old Hong Kong ‘Mark 1’ were practical superblocks comprising low-rise lightweight reinforced concrete structures. These six- to seven-level blocks resembled the nineteenth century or inter-war blocks of “London Labourers blocks or Calcutta ‘chawls’” at 4,000 ppa (9,800 per hectare), instead of the 200 ppa Labourer blocks (490 per hectare) (post-war LCC standard), which were prevalent in London during those periods. The ‘H’ floor plates of the Mark 1 blocks consisted of running spandrel balconies that circumvented a room backed up by each other, with no services. The sanitation facilities included sets of water-closets and water taps at the centrally located building core on each level. The blocks were constructed with reinforced concrete and supported seven levels for habitation. These Government-led ‘laissez-

⁵⁵ Ibid., 85-87.

faire' schemes had managed the construction of more than 10,000 units per annum and reached 23,000 units, reforming the urban fabric of Hong Kong by 1964-65⁵⁶ (Figure 2-12).

Figure 2-12 Mark 1—'H' block axonometric and detail (1954)

Model courtesy HKHA, and photographs from: Author. 2016.

In the early 1970s, the HKHA (Hong Kong Housing Authority) was formed and provided the same small units as SIT (Singapore Improvement Trust) units. HKHA sought examples from SIT to enhance living conditions with better urban planning in Hong Kong to correlate with SIT in Singapore.⁵⁷

Figure 2-13 Wah Fu phase 1 and 2 (1967-70) beside, Wah Kwai Estates (1990)

Model and plans courtesy HKHA, and photomontage compiled from: Author. 2016. p. <https://tinyurl.com/m87g4ca>

These estates comprise examples of HKHA's Old Slab blocks and later modifications through improvements. Wah Fu phase-1 consists of 1) Link D=120°, 2) Link C=180°, and 3) Link F=90° together with Wah Fu phase-2 only comprising 4) Twin Tower blocks. Wah Kwai Estate consists of 5) Trident-4, and 6) Cruciform standard blocks.

Hong Kong progressed further and improved the block floor plates from the 'Twin Tower Block' of the 1960s to the new HKHA designed 'tripod or cruciform' floor plates that

⁵⁶ Miles Glendinning, "From European Welfare State to Asian Capitalism: The Transformation of 'British Public Housing' in Hong Kong and Singapore," in *Architecture and the Welfare State*, ed. Mark Swenarton, Tom Avermaete, and Dirk van den Heuvel (London: Routledge, 2015), 302-308.

⁵⁷ *Ibid.*, 310-311.

supplemented cross ventilation, shading and were site specific (Figure 2-13). The ‘Harmony’ blocks built in Hong Kong had 20 units per floor plate and were designed by architects John NG and John Lambon in 1980 (see Figure 2-14 and Figure 2-15).⁵⁸

These Hong Kong and Singapore superblocks provided housing, impeded sprawl, and sustained biodiverse environments as well as improving urban sustainability. For example, Hong Kong has the fourth highest and Singapore the third highest global population density and both still retain sustainable, biodiverse environments. These successful traits suggest that modified superblocks may have applications for New Zealand when reconsidered in ways that are context-specific.

Figure 2-14 New Harmony—standard block (2000s)

From HKHA. 2016. p. <https://tinyurl.com/m87g4ca>

Figure 2-15 HKHA's Lower Ngau Tau Kok—redevelopment (2011)

From: Glendinning. 2015. p. 314.

Under construction—41/46 levels ‘site specific’ towers based on Harmony type floor plates (left-hand side), replacing 16 levels resettlement slabs.

The Modern Movement reflected on the viability of superblocks of urban housing for population growth. Historically, these superblocks when built were problematic due to the detrimental attributes of automobiles, densities, and metropolitan expansions. Therefore, a ‘strengths and weaknesses’ list is compiled and illustrated in Figure 2-16. This thesis proposes to mitigate these difficulties by merging relevant components of three environmental approaches: ‘Ecological Design’ principles by Sim Van der Ryn; ‘Green Urbanism’ principles

⁵⁸ Ibid., 310-315.

by Steffan Lehmann; and framework of ‘Green Transit Oriented Development’ proposed by Robert Cervero and Catherine Sullivan. Once relevant aspects of these principles are assimilated, the research methodology further incorporates Kevin Lynch’s theories of a good city form (GCF), which can contribute to the development of new sustainable criteria for superblocks in New Zealand.

Strengths:	Weaknesses:
Unite d’Habitation block.	
multilevel unit / universal / utilitarian	Brutalist architecture / community
La Ville Radieuse (A Contemporary City).	
modular / sanitation / urban integration	community / urban characteristics
Astro-Marxist socialist superblock—Rabenhof.	
megastructure / standard / urban integration	community / modular / privacy
Bourgeois superblocks—Bebelhof.	
small-scale / sustainable / urban integration	cultural facilities / modular / standard
Socialist superblock—Karl Marx Hof.	
high-density / landscape / urban integration	Noise / pollution
Terrassenhaus superblocks—unbuilt project (CIAM).	
amenities / open space / terraces	expensive / unbuilt
Wohnpark Alt-Erlaa superblock (Green).	
community / cultural facilities / typology	complex organisation / megastructure
Woodberry Down megablock.	
location / pollution / urban integration	community / cultural facilities / typology
Woodberry Park regeneration (megablock).	
amenities / community / typology	under-construction
Wah Fu Estate phase-1 superblock.	
amenities / community / transportation	architecture / sanitation / typology
Wah Fu Estate phase-2 superblock.	
amenities / community / transportation	perceived density / privacy / typology
Wah Kwai Estate.	
amenities / community / transportation	perceived density / urban integration

Figure 2-16 Superblock’s strengths and weaknesses—New Zealand context (2017)

From: Author. 2017.

2.2 Ecological Design—Principles

The applicability of Ecological Design principles was assessed about WCC’s Smart Capital initiatives. Architects Van der Ryn and Cowan define ‘ecological design’ as “any form of design that minimises environmentally destructive impacts by integrating itself with living

processes” to enhance natural capital.⁵⁹ According to Van der Ryn and Cowan, the five principles of Ecological Design consist of:

Principle 1. Solutions Grow from Place:

ED principles recommend context-specific design approaches. These principles approach problems with local expertise from within the New Zealand context. ED’s solutions result in small-scale individualised approaches. The intentions are to increase awareness of local conditions and address solutions for people of the land. These ecological principles compare with GU principles relating to technological sustainability that recommends a centralised standard approach.

Principle 2. Ecological Accounting Informs Design:

ED principles recommend avoidance of conventional design processes undertaken without careful accounting measures. These accounting measures involve resource depletion and pollution, and other actions including impacts on biodiversity. These measures assess damages and find solutions for valued resources such as water for biodiversity. These ecological principles compare well with GU principles and avoid costly imports of technological equipment.

Principle 3. Design with Nature:

Decomposition comprises a natural process that disintegrates waste to primary component values. This ED principle recommends a natural decomposition process and recreates another form from the disintegration of waste. This ED principle proposes alternative patterns and processes, favouring a living tissue recycle method, by enhancing natural processes in urban sustainability. In more ways than one, that is made context-specific, and beneficial for the ecological environments, including inhabitants. These ecological principles for small-scale operations compare with GU principles that employ industrial-scale closed loop ecosystem processes.

⁵⁹ Van der Ryn and Cowan, *Ecological Design*, 18.

Principle 4. Everyone Is a Designer:

ED principles recommend government, inhabitant, and planner partnerships. These partnerships promote urban revitalizations for the inhabitant's lifestyle improvements. These ecological principles compare with GU principles that promote infills and intensifications.

Principle 5. Make Nature Visible:

Conservation requires protection of natural capital and involves implication assessments to improve cost saving measures. ED principles recommend 'mindfulness' to encourage inhabitants' awareness and ownership of actions. The ED principles propose to make the natural capital's replenishing cycle visible within the daily lives of inhabitants. These ED methods enhance a location through its natural capital attributes. These ecological principles compare well with GU principles that promote technological methods to achieve urban sustainability.

Biodiversity These five Ecological Design principles were developed to protect ecological environments referred as natural capital. "Biodiversity implies a diversity of species, but it also implies a diversity of ecosystems and, ultimately, of regions themselves."⁶⁰ An environmental condition depends on diverse species that interrelate to one another as a complex interrelated system. The problems identified with an ecological environment's life-cycle uncertainties are defined by Van der Ryn and Cowan as:

- Genetic—"...alter the survival and reproductive capabilities of individuals..."
- Demographic—"resulting from random events from survival and reproductions..."
- Environmental—"...unpredictable changes in climate, weather, food supply and the population of competitors, predators," and so forth.
- Catastrophic—"...phenomena as hurricanes, fires, droughts" and so on.⁶¹

Metropolitan expansions can affect an ecological environment's life-cycle by eradicating entire ecosystems and biodiverse communities. Hence, metropolitan expansions require comprehensive assessments before implementations. Sprawl needs to be contained to protect the ecological environment. Urban growth requires an acute understanding of any ecological environment's functional pattern for metropolitan expansion. These functional patterns are important in ascertaining possibilities for megablocks to be constructed and be beneficial. Van der Ryn and Cowan identify ecological environments as core reserves, buffer zones, and wildlife corridors forming inconsistent patterns. These patterns suggest viable construction

⁶⁰ Ibid., 138.

⁶¹ Ibid., 137.

possibilities within the lesser-used reserves, zones and corridors (Figure 2-17). Ecological environments are interwoven using Green TOD principles and can provide sustainable outer fringe megablock possibilities. Alternative spatial configurations as a megablock can help protect ecological environments and assist in identifying better solutions for urban growth.

Figure 2-17 Core reserves, buffer zones and wildlife corridors (1996)

From: Van der Ryn and Cowan. 1996. P. 139.

2.3 Green Urbanism—Principles

The fifteen Principles of Green Urbanism, which are related to Wellington in the descriptions, are:

Principle 1. Climate and Context:

The context undertakes an ever-changing technological application to enhance environmental sustainability together with the adjoining urban revitalisations. It considers the following environments: economic, environmental, social and density aspects.

Principle 2. Renewable Energy for Zero CO₂ emissions:

This paradigm is made possible with technological advances and consists of sustainability applications. However, on occasions, a built form is unable to incorporate this innovative technological application, and solutions may, therefore, have some negative impacts.

Principle 3. Zero-Waste City:

The existing infrastructure within the urban fabric of Wellington does not permit the zero waste city principle to be efficiently employed. A newly designed superblock serves better, for the present-day application of such an initiative.

Principle 4. Water:

Increased footprints of buildings decrease a ground's hydrological cycle and cause subsidence to the land. WCC's central areas permit up to 100% building coverage and resolve issues with storm water reticulation facilities. Moreover, the Te Aro central areas is delineated as flooding zones.

Principle 5. Landscape, Gardens and Urban Biodiversity:

Increased footprints of buildings decrease the biodiversity. However, roof gardens, green walls, and green balconies assist these built environments to a lesser degree.

Principle 6. Sustainable Transport & Good Public Space—Compact & Poly-Centric Cities:

Infill and intensification initiatives to increase population growth may load the urban organisational structures causing traffic jams and requiring expensive infrastructure revitalisation efforts. The urban organisational structures that experience problems, even after infill programmes, are drainage, power, and water supply, including public transport and road widening schemes.

Principle 7. Local and Sustainable Materials with Less Embodied Energy:

Suburban houses commendably are constructed with materials that on most occasions are relevant to the clean and green brand identity of New Zealand. These construction materials, when employed, comprise energy forming sustainable urban environments.

Principle 8. Density and Retrofitting of Existing Districts:

Infill housing programmes when combined with buildings of conventional forming materials, such as asbestos in heritage buildings, can sometimes represent one cause of unhealthy

buildings. These infill programmes increase the risks of building associated illnesses for inhabitants.

Principle 9. Green Building and Districts, using passive design principles:

Infill and intensification initiatives often decrease passive design capabilities and increase dependency on technological sustainability, rather than enabling more ecological sustainability approaches.

Principle 10. Liveability, healthy communities and mixed-use programmes:

Increased density implications should be evaluated as actual, visual, perceived, and interactive to achieve better insights about performance levels from these issues. The performance assessments can help increase liveability for healthier communities within mixed-use built environments.

Principle 11. Local Food and Short Supply Chains:

Increased density can help contribute to shortening the supply chains. However, the existing facilities within Wellington city's urban fabric do not always serve supply chains efficiently; so to modernise requirements may cause additional custom-built expenditure and problems.

Principle 12. Cultural Heritages, Identity and Sense of Place:

Some Heritage buildings might benefit from being relocated to a new environment to enhance identity and cultural significance, rather than allowing them to remain in more dilapidated inner-city areas. These relocations would assist in creating an eco-tourism focused urban environment.

Principle 13. Urban governance leadership and best practice:

Socially deprived communities comprising lack of amenities might increase in number in response to infill and intensification initiatives. In the course of time, these approaches would require more government spending, for the upgrade and upkeep of inner-city areas.

Principle 14. Education, Research and Knowledge:

Knowledge gathering requires advanced technological support, and appropriate premises based on OECD standards to be successful in New Zealand. Future-built alternative constructed spatial configurations can result in much better investment strategies toward urban sustainability.

Principle 15. Strategies for cities in developing countries:

These strategies are considered inapplicable for the New Zealand context, which is an OECD nation. Therefore, Principle 15 is not relevant to this thesis investigations.⁶²

2.3.1 Green Urbanism—Superblocks

In the global environment of the 1990s, visions of Le Corbusier and other pioneering architects had come to realisation. As the lifestyles of inhabitants had changed in the post-industrial digital era, this required urban revitalisation to counter the deteriorating urban and ecological environments.⁶³

Steffen Lehmann (2010) argues that criteria for the ‘Future City’⁶⁴ were established by architects to increase urban compactness, with ‘sustainable’⁶⁵ processes and ‘low-to-no-carbon’⁶⁶ models. These objectives were initiated since the interwar period within inner-city limits to improve living standards and since the 1970s to meet climate change aims in Europe and the USA. These aims were included to make provision for better economic, environmental and social enhancements. GU also considers Green TODs, as an improvement from TOD to enhance these sustainable urban objectives. The proponents of Future City intend to reduce fossil-fuel consumption with improved urban environments to ensure hygiene, water and food are provided within a secure zone, by forming compact cities with shorter supply chains to reduce emissions, traffic and GHG.⁶⁷

The Future City architects defined sustainable objectives of a city with aspects of 1) economic growth, 2) social development and 3) environmental protection, as an essential benchmark to theorise the concept of a ‘Sustainable City’⁶⁸ within these parameters. The ‘Functional City’⁶⁹ of the 1920s was replaced by a Sustainable City concept by Eco-city in the 1990s that allowed further concepts to be established, which branch out as Sustaining Cities, Sustainable

⁶² Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-395.

⁶³ Ibid., 64-70.

⁶⁴ Ibid., 65.

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ Ibid., 64-70.

⁶⁸ Ibid., 65.

⁶⁹ Ibid., 67.

Urbanism, Green Architecture and Eco-city among others.⁷⁰ A few prominent architects with such ideas for this future city relating to GU principles comprise Table 2-1.

Table 2-1 Future City themes—*The Principles of Green Urbanism* (2017)

Concepts	Founder	Year	Country	Relevance
1) Functional City	CIAM	1931	Zurich, Switzerland	Low-cost housing
CIAM thinkers introduced this concept of low-cost housing enhanced by environmental design capabilities. This land-use planning method effectively reorganised cities using function-based zonal segregations and modern-day technological innovations during the interwar period. Most of these methods purposefully are prevalent in New Zealand and used by HNZ and city councils.				
2) Eco-city	Richard Register	1975	California, United States of America	Zero-carbon city
This sustainable city concept introduced better living standards through conserved usages of energy and water considering environmental impacts. The impacts evaluate decentralised food supply chain, waste minimisation, besides carbon dioxide, and methane emissions from built environments. The concept essentially decreases the ecological footprint by reducing carbon emissions, for the inhabitant's well-being. For example, New Zealand's Waitakere City comprises an eco-city principles designed urban environment.				
3) Brundtland Commission Report	UNCED—Agenda 21	1987	Geneva, Switzerland	Sustainable development
This report comprised “Our Common Future” objectives that focused on developing a common world point of view. The approach established methods for multilateral improvements among nations through policy revisions and enhanced international relations. New Zealand participated in providing an opportunity, for the non-government organisations and individuals through this report.				
4) Green Architecture	Brenda and Robert Vale	1991	London, United Kingdom	Energy conscious future
Green approaches efficiently are disintegrated to offer in-depth evaluations, for an energy efficient non-residential buildings. The urban spatial configurations comprise collections of buildings with interacting systematisation, for all live, work and play environments. Many nature-like procedures agreeably attain green architecture environments, for the context-specific New Zealand applications.				

⁷⁰ Ibid., 64-77.

5) Sustaining Cities	Dr Josef Leitmann	1999	New York, United States of America	Environmental planning and agenda
The concept addresses needs of the brown agenda (relating to the 1992 Earth Summit's Agenda 21) that experimented with methods for increasing urban environments. These methods comprise environmental hazards, infrastructure, and pollution, including public utility and waste management. These management procedures comprehensively are aimed at improving global environmental issues occurring from the excessive use of natural resources. These analyses focus on the world's larger cities and significantly are irrelevant to the New Zealand context.				
6) Compact Cities	Mike Jenks and Rod Burgess	2000	Oxford, United Kingdom	Density and compactness
The sustainable development forms mainly focus on population growth and its impacts on urban expansion, for the developing countries. These objectives also address food crises, energy problems and environmental degradations caused by urban growth. The concept technically addresses inapplicable problems, for an OECD nation such as New Zealand.				
7) Sustainable Urbanism	Douglas Farr	2008	California, United States of America	Urbanism and biodiversity
The concept re-evaluates urban planning standards and regulations with alternatives to impede sprawl and unsustainable development. The paradigm seeks to re-organise the built environment and benefit the inhabitants in biodiverse environments. The intentions aim at increasing density and integrating public transportation along with pedestrian-friendly neighbourhoods and local businesses. These high-efficiency levels perform at a neighbourhood scale and are pertinent to the New Zealand context.				

From: Author. 2017.

The theme essentially comprises elements to configure the urban planning designs, for any city as recommended by Lehmann's principles.

These philosophical constructs resulted in green initiated superblocs as future-built urban environments. The Zorlu Eco-city master plan and Linz Pichling superblock are considered, for this GU sustainable cities review (refer to Figure 2-18 and Figure 2-19).

Figure 2-18 Eco-masterplanning as superblocks (2008)

From: Lehmann. 2010. p. 308.

Ken Yeang's Zorlu Eco-city master plan for Istanbul, Turkey (2008). The eco-masterplanning approach is based on bio-integration for the four infrastructure layers: the green eco-infrastructure, the grey engineering infrastructure, the blue water management infrastructure, and the human infrastructure, buildings.

Figure 2-19 Linz Pichling—superblocks (1994–2005)

From: Lehmann. 2010. p. 795.

Thomas Herzog: Eco-district "Solar Architecture", at Linz Pichling Austria (1994–2005), a sustainable development that accommodates over 3,000 residents.

Eco-city's intentions were to help revitalise ecological environments that agriculture, forestry, and sprawl damaged over the course of time. The design objectives resulted in an urban park forming an ecological environment. The site programme incorporates social, cultural, retail and commercial activities. This site design helps preserve biodiversity and enhances green eco-infrastructure processes. A site area of 9.65ha with an entertainment and shopping podium surrounds a courtyard above which four 20-storey towers stand. The above podium residential developments comprise 584 dwellings at <61du/ha.⁷¹

The Linz Pichling megablock (2005) comprises an ecological criterion that realised through a technological sustainability process. The low energy design was initiated in 1990 to avoid the high consumption of fossil fuel and increased GHG releases. The intentions were to allocate housing for 12,000 inhabitants while minimising transport costs. A solar city concept attained these objectives. A biodiverse environment comprising Traun-Donau wetlands appreciated by Austrians circumvents the site. This project's first phase was completed in 2005 on a 35ha site with 1,293 dwellings for 2,942 inhabitants at 37 du/ha. The government document analysis evaluates the overall ecological criteria of this project as satisfactory. This project has managed

⁷¹ Sara Hart, *Ecoarchitecture the Work of Ken Yeang*, ed. David Littlefield (West Sussex: John Wiley & Sons, Ltd, 2011), 232-239.

to minimise the use of resources, reduce earthworks and locate buildings, for the inhabitants to benefit from diversity. The project is applauded for urban planning and valuing site resources while providing human comfort with amenities and preserving water with environmental solutions. This project exhibits a village with ideal methods to integrate town planning expansions in biodiverse environments.⁷²

The fifteen core principles (refer to Table 4-3) of GU that require an integrated approach to establish a Sustainable City by considering the ‘social, economic and environment’⁷³ aspects, are used to evaluate an eco-city as per WCC’s initiatives⁷⁴ (Figure 2-20).

Figure 2-20 GU planning design flowchart (2008)

Reproduction from: Lehmann. 2010 p. 361.

Urban planning design, based on a circular closed-loop eco-system to comprehend a city with GU principles.

The superblock form of construction originated from developments at LCC (London County Council), GLC (Greater London Council), and GLA (1889-2015). These projects will be utilised and reviewed for comparative analyses as urban studies relating to the New Zealand context.

⁷² Jürgen Breuste, “The Concept of Ecocities and Solarcity Linz, Austria, as Example for Urban Ecological Development,” *Laufener Spezialbeiträge* (2012). <https://tinyurl.com/my22k9n>, 17-25.

⁷³ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-213.

⁷⁴ *Ibid.*, 80.

2.4 Transit Oriented Development—Principles

The standards mechanism comprise TOD principles, by Institute for Transportation and Development Policy (ITDP), for the urban development and transport in urban life. TOD's principles are used to assess projects at planning and design stages in ways that are pertinent to each urban environment. The ITDP's eight principles are:

Principle 1. Walk—Develop neighbourhoods that promote walking:

This TOD principle recommends an outer fringe megablock that creates pedestrian friendly neighbourhoods, while inner-city areas integrate pedestrian walkways as shopping streets. These intentions contribute to activity, comfort, and safety together with short distances and directness as prime objectives. The goals aim for 'environmental and psychological benefits' that complement a megablock's objectives.

Principle 2. Cycle—Prioritize non-motorised transport networks:

This principle recommends cycling for 'flexibility', 'local transit', and 'speed'. The megablock's characteristics comprise the cycling principle.

Principle 3. Connect—Create dense networks of streets and paths:

The intentions of this principle are to create a car-free zone with shorter pedestrian and cycling pathways within the megablock. The objectives efficiently are achieved through shorter block lengths that cause the increase of intersections with decreased street widths. These objectives integrate safer pedestrian friendly neighbourhoods through reduced car speed and enhance local businesses through increased social interactions.

Principle 4. Transit—Locate development near high-quality public transport:

The principle's aims comprise incorporations of remote precincts, for the pedestrian's well-being through efficient transit connections. These public transit services comprise 'bus rapid transit' (BRT) and mass transit rail networks, for the use by high-density precincts. The shelters are located within a kilometre radius or 15 to 20 minutes by walk, for the inhabitants with low- to high-capacity rail carriages and road transport systems at interchange stations.

Principle 5. Mix—Plan for mixed-use:

This TOD principle recommends MDRAs (medium-density residential areas) comprising the megablock that promotes interactive density in a pedestrian friendly zone. This megablock's characteristics permit a balanced mix of land uses and resident income levels.

Principle 6. Density—Optimise density and transit capacity:

This TOD principle recommends an increasable urban growth pattern within a compact and dense vertical built environment. This recommendation enhances biodiversity and protects historic as well as the cultural resources. The objectives also foster local transit and services to enhance employment opportunities. A megablock supports the MDRA and TOD’s density aims.

Principle 7. Compact—Create regions with short commutes:

This TOD principle recommends urban environments that consist of compact forms that include activities located in proximity to reduce travel time and distance. The compact principle involves higher investments and standards for the urban planning design to preserve a biodiverse environment. A superblock promotes a neighbourhood scale development resulting in an outer fringe megablock integrated with walking and cycling pathways. These pedestrian pathways direct the inhabitants towards the interchange stations. The MDRA megablock addresses an objective of ‘densification’, for the compact principle. Multi-modal transport and high-capacity transit lines are recommended, for these outer fringe megablock.

Principle 8. Shift—Increase mobility by regulating parking and road use:

This TOD principle recommends decreasing the need for automobiles. The day-to-day inhabitant’s activities accept healthier alternatives of walking, cycling, and high-capacity transit modes, including rented vehicle resulting in enhanced spatial configurations.⁷⁵

2.5 Green Transit Oriented Development

The framework of Green TOD by Cervero and Sullivan comprises green initiatives that derive from ITDP’s TOD principles of urban development for transport in urban life. Cervero and Sullivan recommend Green TOD standards for mobile sources together with GU principles for stationary sources to form the framework for Green TODs’ environmental features. The four principles of Green TOD considered for this review—consist of:

Principle 1. Higher Densities:

Transit infrastructure costs comprise a financial burden for any council. Increased densities assist in reducing the operational costs and recovering financial paybacks. These operational

⁷⁵ Institute for Transportation and Development Policy, “TOD Standard”. 1-78.

cost reductions attract home buyers, and the financial paybacks interest public-private investors.

Principle 2. Mixed Land Uses:

The interrelationships associating amenity, commercial, and residential properties enhance mixed land uses in a megablock. The interrelationships also assist in creating compacted mixed-use built environments, for the convenience of inhabitants. These compacted built environments assist in making provisions with alternative modes of transportation within the megablock zones. Alternative modes for daily commutes comprise bicycles, golf carts, and EVs (lithium-ion electric vehicles), among others, that enhance a community's values. These values for inhabitants assist in reducing traffic noise and air pollution while promoting safety, security, and convenience for the community.

Principle 3. Reduced Surface Parking and Impervious Surfaces:

This Green TOD principle recommends a provision of parking buildings at entrance gates. These buildings reduce surface parking and impervious surfaces. These buildings also provide convenient interchange stations for alternative modes of commuting within the megablock. Alternative modes for daily commutes assist in maintaining the green spaces, decreasing heat island effect, and preserving urban hydrological cycles as a result of avoiding the detrimental attributes of automobiles within the megablock.

Principle 4. Solar Energy Production at Stations:

The Green TOD principle supports interchange stations within the premises. These interchange stations preserve the ecological environment by generating power from wind and photovoltaics as renewable energy. These renewable energy sources located above roofs of interchange stations, management offices, and community buildings sustain a climatic shelter to enhance social interactions.⁷⁶

2.6 Good City Form—Review

Kevin Lynch an American urban planner, has authored or co-authored several publications on urban planning design over a timespan that exceeded three decades (1954-1984). Most of

⁷⁶ Robert Cervero and Cathleen Sullivan, "UC Berkeley Center for Future Urban Transport: A Volvo Center of Excellence," in *Toward Green TODs*, Institute of Transportation Studies (California: University of California, 2010), 1-8.

Lynch's writings were created from investigative research conducted at Massachusetts Institute of Technology (MIT).

Lynch reflected extensively on good city forms (GCFs). These GCF theories are used as a theoretical formulation for reflective evaluations within this thesis. According to Lynch, GCF principles are utilised to establish an inhabitant's experience and are influenced by interactions within communal zones. An increase in densities is sought to decrease environmental damage and enhance urban sustainability. Built environments are reshaped for density increases to help impede suburban sprawl. Emily Talen and Cliff Ellis emphasise the need for theorising GCFs before creating urban planning designs when stating:

The need for theoretical development to support and nurture normative prescription is critical if we want to have any hope of promoting true beauty in city planning rather than half-solutions and disingenuous proposals to proceed. This is the much needed task. Relying on planners to step in to resolve externality problems when the market fails is hardly a theoretical basis for a dynamic profession. We need to take advantage of recent intellectual developments, along with the already rich body of literature on the structure of great urban places, to launch a renewed quest for good city form.⁷⁷

Therefore, it is important to develop superblock typologies considering GCFs. New Zealand architect and Unitec Lecturer David Turner recommends measured net densities that are context-specific to New Zealand as:

I suggest, at a threshold density of approximately 25 to 30 dwellings per hectare. Ordinary perceptions at this density are conscious of multiple units of separate private house[-]holds which occupy and share elements of the same space.⁷⁸

Turner's recommendations vary building typology with increasable densities and are reasonable for Auckland,⁷⁹ although Wellington's landscape (difficult to develop and expensive to service) forms a constraint for a similar application. Likewise, WCC's urban sustainability initiatives would benefit from reconceptualising of GCFs.

⁷⁷ Talen and Ellis, "Beyond Relativism: Reclaiming the Search for Good City Form". 47.

⁷⁸ Turner, "Planning for Higher Density: Concepts of Privacy in Auckland's Culture of Housing". (2010), 275.

⁷⁹ Ibid., 255-288.

2.7 Reflections on Modified Superblocks

Gordon Wilson and John Cox conceptualised a ‘Centre’ for architects and planners in Wellington city. The Centre focused on improving urban conditions and published: *Living in Cities* (1954).

Land use zone segregation for the Te Aro Central Building District (CBD), formed in 1961, assisted in determining and establishing standardised rates and rents for the residential, commercial and other property. The Centre’s publication *Wgtn 196χ* (1961) by English émigré architect and town planner Neville Burren created proposals for Wellington such as *Te Aro Replanned* that provided principles to improve health, work, buildings, rental value, traffic and parking. The exhibition as mentioned in *Wgtn 196χ* intended to combine smaller land sections and provide a pedestrian friendly CBD. These intentions assisted in re-establishing urban planning regulations to improve liveability within the Wellington region. Burren’s positive intentions complemented by the National Roads Board enabled the creation of concept plans for a motorway to pass inner suburban zones and connect Te Aro Flats with the Northern suburb of Ngauranga.⁸⁰

Wellington city’s contextual landscape experiences a constraint in natural form and urbanisation. The peninsula shapes the urban form, which is divided by the metropolitan area’s outer green belt and includes parcels that are difficult to develop and expensive to service land. While a slower rate of construction activity affects the housing affordability ratio, the infill initiatives that encroach on green spaces are also unacceptable solutions. This research’s proposition fosters biodiverse environments, for the inhabitants’ well-being⁸¹ (Figure 2-21).

For example, a box containing several items comprises a certain amount of cubic space, which protects the integrity. An increase in quantities requires the rearrangement and replacement of mismatched items into suitable boxes, rather than compressing the contents. In summary, WCC’s *Smart Capital* compact city initiatives would be most viable through restructuring programmes, rather than through undertaken infill and intensification recommendations. This process is recognised as alternative constructed spatial configurations and is similar to reorganising as well as modernising each metropolitan definition, for the specific uses.

⁸⁰ Julia Gatley, *Vertical Living: The Architectural Centre and the Remaking of Wellington*, ed. Paul Walker (Auckland: Auckland University Press, 2014), 1-105.

⁸¹ Carol E. Heim, “Leapfrogging, Urban Sprawl, and Growth Management: Phoenix, 1950–2000,” *American Journal of Economics and Sociology* 60, no. 1 (2001): 245-272.

Figure 2-21 Outer Green Belt—Map (2014)

From: WCC. 2014. p. <https://tinyurl.com/jsvzb3y>

Summary: *Literature Review*

Investigates superblocks constructed from the 1850s to 2010s, and outlines the influence of this construction typology. In particular superblocks from Vienna, London and Hong Kong.

3. A New Zealand Superblock–Contextual Evaluations

The blended approach described in the following chapters is considered in this chapter for a New Zealand superblock and to help evaluate WCC’s public objectives in *Wellington Towards 2040: Smart Capital*.⁸² The method offers an opportunity to provide constructive alternatives for WCC and other councils in similar situations and, for other cities in New Zealand. In the next chapters four specific models—Woodberry Down, Discovery Bay, Linked Hybrid and Hobsonville Point—have been compared to also help determine the most desirable principles around which to design a New Zealand superblock.⁸³ (Figure 3-1).

Figure 3-1 Comparative case study–discussion topics (2015)

From: Author. 2015.

*Major developments of superblocks provide a comparison to help formulate the most effective characteristics of a New Zealand superblock.*⁸⁴

⁸² Wellington City Council, “Wellington Towards 2040: Smart Capital”. 1-11.

⁸³ Delwyn Goodrick, “Comparative Case Studies: Methodological Briefs Impact Evaluation No. 9,” (2014). UNICEF Office of Research - Innocenti. <https://tinyurl.com/z99a63o>, 1-8.

⁸⁴ Ibid.

A procedure of ‘comparative case studies’ is utilised with four benchmark precedents in mixed-method processes to identify the most relevant implications for this research study. The process assists in determining the factors that affect the environmental sustainability, while maintaining population growth, for the creation of a New Zealand superblock (Figure 3-2).

Figure 3-2 Comparative case study process (2014)

From: Goodrick. 2014. p. 3.

The logic of comparative case study used is to identify two or more precedents and evaluate improvements, through a mixed-method process to determine a New Zealand superblock.

The data matrix illustrates in Figure 3-3 the listed quantitative and qualitative assessments undertaken while considering researchable parameters to achieve mixed-method evaluations as design principles. The mixed-method evaluations as principles will be utilised in the chapter *Site—Implications* to assess outcomes on the selected Lincolnshire Farm site as a case study exemplar of the New Zealand context.

3.1 Mixed-Method—Evaluations

The argument structure comprising this section consists of the quantitative deductions for density and asset value, investments, operational costs and premiums as economically successful parameters to reflect desirable characteristics. The mixed-method section compares micro- and macro-level quantitative and qualitative aspects to attain a New Zealand superblock, SPD, with desirable characteristics and GCFs (Figure 3-3).

Figure 3-3 Data Matrix—mixed-method evaluation (2016)

From: Author. 2016.

The mixed-method evaluations displayed in sequence as per the data matrix. The quantitative and qualitative assessments were considered, but not included in this chapter; instead only the mixed-method evaluations are presented as assessments. The assessments included the researchable parameters addressed in this chapter, besides the listed sub-categories that result in the mixed-method evaluations, and succeeded by the chapters as illustrated.

The researcher will ascertain whether data used for “descriptive analyses or inferential analyses, or both are appropriate” for use relating to the study.⁸⁵ The conceptual structure comprises ‘sampling schemes’ which subsequently are identified, examined and compared to determine a sampling frame, to ensure the quantitative deductions enable clear and concise explanations of the comparisons from graph and table formats.⁸⁶ For example, a quantitative sampling frame is weighed and presented for possible transferable applications using ratings. (Table 3-1).

Table 3-1 Classified investigative research sampling frame (2014)

Field-study dated: 26.03.2014					
Classification	Assessment criteria	Rating	Site visited	Transfer	Criteria Development
Built environment components	Urban fabric	C		simple	SPD Bank, Changsha, Hunan.
	Climatic conditions	C			
	Environmental planning	C			
Performance components	Design life	B			
	Construction detail	A			
	Aesthetic value	A			
Meta components	Social cohesion	A			
	economic conditions	B			
	Cultural orientation	A			
Compatibility rating: A/B/C/D					
*Transfer: simple – different methods / complex – multiple dimensions					

From: Author. 2014.

An example, of the quantitative investigated research and the application of data applied from a typical field investigation using ratings. The ratings comprise sub-classification symbols: A–Excellent; B–Good; C–Poor and D–Fail; potentials, before application of a precedent research, which is compiled in relative relevance to, and applied for simple or complex transfers, while promoting a viable project’s requirements.

Another method utilising sampling frames illustrates a comparative analysis in Table 4-5. The approaches use descriptive and inferential elements of four superblocks case studies.

The standard to determine the worth of a qualitative research study from referenced source is by giving importance to the argumentative processes within qualitative research. The qualitative research process assists in describing appropriate reference cases or scenarios, with a variety of opinions through comparative contextual evaluations, from different from

⁸⁵ Anthony J. Onwueghuzie and Julie P. Combs, “Emergent Data Analysis Techniques in Mixed Methods Research: A Synthesis,” in *Sage Handbook of Mixed Methods in Social & Behavioral Research*, ed. Abbas Tashakkori and Charles Teddlie (Washington, D.C.: Sage Publications, Ltd., 2010), 396-404.

⁸⁶ Ibid., 353-365.

referenced sources of philosophical and methodological concepts. The process encompasses spheres of ‘credibility’, ‘confirmability’, ‘transferability’ and ‘dependability’ with some recent additions of ‘transparency’, ‘relevance to users’ and ‘reflexivity’⁸⁷ to form an appropriate assessment.⁸⁸

Tashakkori and Teddlie’s sampling frame recommendation elaborates impacts of the built environments on public well-being. The inhabitants could be individuals, groups or organisations and might either be interviewed with appropriate questionnaires as probable sampling frames or could efficiently be accessed as credible research of quantitative data from reliable sources. The database source makes provisions, for the preferable data sets to conduct analyses. The data set obtained from probable sampling frames could be weighted and utilised to base claims, which can be analysed to determine criteria for further enhanced R&Ds as recurring ‘sampling criteria’ to compose an ‘integrative typology’.

Analysing data in mixed-methods research is one of the most difficult steps—if not the most difficult step—of the mixed-methods research process. The analytical process to create data sets in a mixed-methods research study incorporates diverse methodologies. These methods comprise ‘quantitative data analysis’ apart from another or several ‘qualitative data analysis’ for the creation of strategies. These strategies derive from established research definitions or a structure of mixed-methods evaluations. A research study best conducts mixed-methods evaluations by involving the resulting understandings for:

- 1) Unifying the research contents, for the comparison of characteristics,
- 2) Creating investigative structures, including ‘typologies’, ‘models’, and ‘paths’ and others,
- 3) Determining mutual pragmatics, for the evaluative incentive plans of propositions,
- 4) Establishing research methods, besides emerging with anticipative policies,
- 5) Achieving and provide accuracy, for the anticipative policies,
- 6) Calculating the investigative structure’s outcomes and validating the research criteria,
- 7) Instructing a measured initiative owing to typologies, models, theories, and paths among others.

⁸⁷ Alicia O’Cathain, “Assessing the Quality of Mixed Methods Research: Toward a Comprehensive Framework,” *ibid.*, ed. Abbas Tashakkori and Charles Teddlie (Washington, D.C.: Sage Publications, Ltd., 2010), 534.

⁸⁸ *Ibid.*

The mixed-methods evaluations for this thesis investigation comprise the following analytical typologies used to emerge principles.

i. Rationale/purpose for conducting the mixed analysis:

The purpose of structuring mixed-method evaluations is to provide alternative approaches to Wellington City Housing Accord, 2014. The research contents comprised quantitative and qualitative analysis to re-strategise policies. The results focused on the urban environmental sustainability of Wellington city while maintaining steady urban growth as planned.

ii. Philosophy—underpinning the mixed analysis:

Lynch's modernist normative structure comprising the public policy structure reinforced essential objectives to achieve GCFs for Wellington city. The GCFs focus on positive behavioural impacts of the built environment on the inhabitants of the urban environments. The research parameters to achieve this criterion comprise economic, environment, social and density aspects. The mixed-methods evaluations concurrently focused on green philosophies of ED, GU and Green TOD principles (Figure 4-1).

iii. Some data types analysed:

Wellington city's urban housing growth policies were researched as well as evaluating impacts of higher densities. The research was analysed for quantitative and qualitative attributes. These policies were then rationalised and correlated to Greater London Authority's planning objectives. For example, issues from many failed housing estates also were evaluated for implications and public revitalisation programme justifications. WCC's urban strategy was then reassessed with opportunities provided by the RMA.

iv. Some data analysis that was employed:

These analyses addressed public strategic housing programmes such as: The Red Vienna movement to Green megablocks; Le Corbusier's influence together with Modern Movements impacts on housing programmes; the post-war welfare state's policy shift to an Asian capitalist economy after decolonisation, for Hong Kong and Singapore; the impact these nations have made on the patterns of dispersal to enhance housing programmes within mainland China; the Centre's impacts on post-war housing developments in Wellington city.

v. The time sequence of mixed analysis:

The data analyses spanned from 1919 to 2015, considering: Interwar and post-war era superblocks used for population growth; Le Corbusier's influence since 1940's considering innovation in construction technology brought about by Modern Movement; HKHA's influence since the 1940s on the nation of Hong Kong, Singapore and mainland China; Urban sprawl concerns from interwar to the post-war era and the current impact's effects within New Zealand; WCC's initiatives comprising the housing accord since 2010.

vi. The level of interaction between quantitative and qualitative analyses.

The analyses reflect the qualitative behavioural impacts of the built environment together with the quantitative site construction numbers. WCC's initiatives are comprising qualitative programmes together with quantitative housing price fluctuations. The higher densities implicate qualitative behavioural impacts and quantitative density assessments relevant to the New Zealand context. These interactions also comprise urban spatial controls and built environment interior spaces.

vii. Priority of analytical components:

The study was prioritised commencing with research, analyses, and development of criteria, for the site implicated assessments. While the research comprises superblock investigations, the analysed green principles suitable for the application within New Zealand. The analysis reflects the method to establish a theory of GCFs while maintaining structured norms. The comparative case studies use precedent projects reverberating the findings in sequential progressions. These sequential progressions lead to the thesis' contextual evaluations that establish the research parameters.

viii. Some logical components:

The key analytical components comprise the research proposition, literature review of superblocks, and a blending of relevant green initiated principles. The elements transform into theory validation processes that include critical reflections of Lynch's structured evaluative norms. The processes complement the comparative case studies' progressions leading to the mixed-method evaluations. The assessments ascertain the site implications, as well as addressing urban growth and environmental conservation. The enhancements seek to provide a real economic base relating the social aspects.

ix. Link to other design components:

The literature review and investigation results are compiled using a 'five whys' method and critical thinking. The comparisons reflect the theory using Lynch's methodology and process. The mixed-method evaluations subsequently are projected using the concurrent quantitative and qualitative analysis as implications to help determine parameters. These processes reflect the site analysis as implications of all the discussed methods within effective spatial configurations.

x. The phase of the research process when all analysis decisions are made:

The thesis's phases comprise theory validation and critical reflection and mixed-method evaluations. The phases as steps lead to the investigative site that reflects on context-specific applications. The theoretical formulations confirm possible applications to sites within Wellington city and wider New Zealand.

xi. Type of generalisation:

The thesis proposes an alternative to *Smart Capital's*, proposition and the housing accord requirements. In conducting, these theoretical formulations ways to improve the lives of Wellingtonians will emerge.

xii. Analysis orientation:

The process of evaluating case-oriented analyses includes recurring mixed-methods evaluations in relation to the implications of a site. Eventually, the recurrence offers a conclusion to the ongoing theoretical formulations as principles, for the context-specific applications.

xiii. Cross-over nature of analysis:

The principles would ideally provide WCC with options to avoid the infill and intensification initiative with alternative spatial configurations. The analysis's nature consists of "research formulation, research planning, and research implementation." These interactive levels involve decision-making abilities for the applications at varying levels of architectural planning.⁸⁹

Kevin Lynch's good city form criteria and Steffen Lehmann's criteria for achieving principles of green urbanism can summarise the research parameters: economic, environmental, social and density. This chapter looks at these four characteristics in detail.

3.1.1 Economic Criteria

This thesis investigation argues that a New Zealand superblock can achieve a GCF and outcompete other developments by promoting convincing economic investments and operational costs within a PPP framework, to form the SPD. Adequate investments and sufficient allowances for operational costs ensure a successful project realises and is managed for the duration of the megablock's design life,⁹⁰ and, along with green star ratings, assure sustained returns for the inhabitants of the PPP⁹¹ (Table 3-2). The megablock is made feasible by matching the nation's 'purchasing power parity'⁹² of construction costing (construction

⁸⁹ Anthony J. Onwueghuzie and Julie P. Combs, "Emergent Data Analysis Techniques in Mixed Methods Research: A Synthesis," *ibid.*, ed. Abbas Tashakkori and Charles Teddlie (Washington, D.C.: Sage Publications, Ltd., 2010), 353-377.

⁹⁰ Liu and Wilkinson, "Large-Scale Public Venue Development and the Application of Public-Private Partnerships (PPPs)". 88-100.

⁹¹ Michael Rehm and Rochelle Ade, "Construction Costs Comparison between 'Green' and Conventional Office Buildings," *Building Research & Information* 41, no. 2 (2013): 203-207.

⁹² Rabiun Olatunbosun Ojeniyi, "Construction Cost Comparison of OECD Nations," Article, *AACE International Transactions* (2003). AACE International. <https://tinyurl.com/hwjm777>, 3.3-3.4.

economics⁹³) in New Zealand to the status, such as Canada, within OECD and gaining sufficient leverage to compensate for the geolocation disparity in comparison to Australia.⁹⁴

Table 3-2 Modified PPP and exchange rates—New Zealand (1999)

Note: The modified and recommended exchange rates and purchasing power parities base empirical assessments in consideration to New Zealand's geolocation and population disparity to other nations of the OECD. These modifications have been conducted to achieve Canadian 'Purchasing Power Parities' with the intention to stabilise New Zealand's financial status within the OECD group of nations. A New Zealand superblock seeks supplementation of desired urban sustainability in New Zealand.

Table modified from: Statistics New Zealand. 2003. p. 11.

A New Zealand superblock with PPP and a modified purchasing power parity⁹⁵ will assist in a robust internal economy by increasing the real estate value, decreasing export earnings a fraction to develop new international markets for farm products. MBIE needs to implement these budget revisions in coming years, which apparently neglected such efforts in the financial budgets for 2015 and 2016⁹⁶ together with amendments in the official cash rate (OCR). These modifications made to the OCR will assist the exchange rate to increase as projected and permit restructuring of New Zealand's economy over the next decade. This restructuring will accommodate a predator-free corporate business environment similar to Zealandia Sanctuary conceptual model with knowledge economy prerogatives and financially secure biodiversity within New Zealand.⁹⁷ For example, MBIE could set up a R&D division for export markets of construction products by using the existing global connections for marketing and promotional systems.

This investigation argues that superblock real estate as 'holdings' by WCC would permit sufficient, rental property on the market at all times, with options for rent to purchase and

⁹³ Rawlinsons Media Ltd., Rawlinsons New Zealand Construction Handbook 2011, (Auckland: Rawlinsons Media Ltd., 2011), <https://tinyurl.com/job5u8e>. 5-8.

⁹⁴ Ojeniyi, "Construction Cost Comparison of OECD Nations". 3.2-3.9.

⁹⁵ Ibid., 3.3-3.4.

⁹⁶ Bill English, "Budget Policy Statement," *Budget 2015* (2014). New Zealand Government. <https://tinyurl.com/hzrn96b>, 1-9.

⁹⁷ Statistics New Zealand, "Purchasing Power Parities," New Zealand Government. <https://tinyurl.com/jdqdajb>.

outright purchase, increasing opportunities for home ownership from <65% to >90% in New Zealand.⁹⁸ This superblock could also avoid unsustainable real estate market fluctuations to the magnitude of the 2008 global ‘subprime crisis’⁹⁹ (Figure 3-4).

Figure 3-4 House price fluctuations—RBNZ (2005–14)

From: Global Property Guide. 2016.

*Annual house price volatility in percentage from 2005 to 2014, the lower blue line denoting the actuals with visible effects of the ‘subprime crisis’ in 2008, and the upper red line denoting the nominal fluctuations.*¹⁰⁰

The construction industry holds a significant market share in the global economy (the projection for the year 2020 is expected to reach \$10.3 Trillion¹⁰¹) with importance in New Zealand, as construction ranks the third most important economic generator. The construction industry in New Zealand also influences parallel businesses and corporations in the areas of banking, manufacturing, and mining, which are interrelated to real estate prices and sales.¹⁰² Similarly, the current account for foreign reserve outstanding in New Zealand is increasing due

⁹⁸ Tony Tan Keng Joo and Tai-Chee Wong, “Public Housing in Singapore: A Sustainable Housing Form and Development,” in *Spatial Planning for a Sustainable Singapore*, ed. Tai-Chee Wong, Belinda Yuen, and Charles Goldblum (Netherlands: Springer 2008), 135.

⁹⁹ Robert J. Shiller, “Preface to the Paperback Edition,” in *The Subprime Solution: How Today’s Global Financial Crisis Happened, and What to Do About It*, ed. Robert J. Shiller (New Jersey: Princeton University Press, 2008), ix-xxiii.

¹⁰⁰ Global Property Guide, “New Zealand’s Property Market Still Robust,” Global Property Guide. <https://tinyurl.com/5twdpc>.

¹⁰¹ PRNewswire, “Global Construction Market Worth \$10.3 Trillion in 2020: 50 Largest, Most Influential Markets,” PRNewswire. <https://tinyurl.com/hnn2k2e>.

¹⁰² Shiller, “Housing in History”. 29-38.

to migration intake and increase in the nation's business activity, which would require the Treasury to purchase goods on terms (increasing surcharge on imports) shortly¹⁰³ (Figure 3-5).

Figure 3-5 Balance of payments–New Zealand (2003–17)

From: The Treasury. 2015. p. 31.

The graph reflects 2) current account deficit, 3) investment and income lower, besides 1) goods and services sustaining itself to match the growth in population.

GU promotes and WCC seeks to implement improved mechanical services for increased comfort to benefit the inhabitants of cities with EED.¹⁰⁴ Operational costs, when inbuilt with financial paybacks, permit additional investments within the SPD to be recovered in time-related returns. Therefore, the capital costs are analysed with financial paybacks that are worked-out on 'Life Cycle Cost', which comprise "the sum of 'acquisition cost' and 'ownership cost' of a product over its life cycle"¹⁰⁵ (Figure 3-6).

¹⁰³ The Treasury, "New Zealand," *Economic and Financial Overview 2015* (2015). New Zealand Government. <https://tinyurl.com/hugmdgt>, 30-34.

¹⁰⁴ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 77-80.

¹⁰⁵ Australia/New Zealand Standard, "AS/NZS 4536:1999 Life Cycle Costing—an Application Guide," in *Wellington, SANZ: Standards Association of New Zealand* (Wellington: Standards AS/NZS, 1999), 6-7.

Figure 3-6 Simple relationship in reliability and life-cycle cost-diagram (1999)

Colour-wash on scan from: AS/NZS 4536:1999, p. 62.

The Trade-off area indicates the satisfactory performance and acceptability for the life-cycle cost analysis (minimum allowable, reliability, and budget limitations).

WCC can also benefit from operating revenues (rates) from a New Zealand superblock because of its participation as a holding company, similar to the Government of Hong Kong that gained precedence from LCC and earns a significant amount in property processing fees.¹⁰⁶ Discovery Bay, for example, is owned by a private company Hong Kong Resort Company Ltd. (HKR) and annually submits a year-end balance sheet to the revenue office of the Government of Hong Kong for tax assessment supporting the well-being of an entire community.¹⁰⁷

Urban planning can complement the design intent of government policy such as knowledge economy, tourism, and be farm product export oriented. These design intentions would assist

¹⁰⁶ Samuel R. Staley, *Planning Rules and Urban Economic Performance: The Case of Hong Kong* (Hong Kong: Chinese University Press, 1994), 11-39.

¹⁰⁷ KPMG, "Discovery Bay City Owners' Fund," *Accounts for the year ended 31 March 2014* (2014). Discovery Bay Services Managment Limited. <https://tinyurl.com/hdsbzbdb>, 1-21.

in defining the urban form with the specific infrastructure needed to meet population growth within the research parameters for a GCF.

3.1.2 Environment Criteria

An ecosystem is a fragile environment, unique to each location that has evolved over the ages and has formed self-replenishing environments supporting a biodiverse ecosystem and largely altered by mechanised farming during the advent of the industrial era (1760–1840).¹⁰⁸

Zealandia is a benign biodiverse sanctuary that seeks to protect the ecosystem consisting of wildlife, bird and insect habitat to rehabilitate their species within the main islands of New Zealand.¹⁰⁹ These biodiverse sanctuaries are also at risk from global warming due to the increased GHG (greenhouse gases) released into the atmosphere from industrial nations that cause increases in temperature, which will either turn extinct or increase species to unsustainable levels.

Humankind does need a positive habitat that creatively forms through living in comfort and harmony within the eco-system. These eco-systems should exist in each environment achieving GCFs.

Renewable energy (RE) defines a naturally occurring energy resource from a non-exhaustible first supply base, which will be a reliable alternative to GHG-generating energy sources. These renewable natural resources include and similar to ‘water’, the ‘wind’, ‘solar’, ‘geothermal’ (with certain controls), and ‘biomass’.¹¹⁰ RE highly is promoted by the Ministry for the Environment (MfE) in New Zealand (Figure 3-7). New Zealand is fortunate to have access to most alternative energy resources (Figure 3-8).

¹⁰⁸ Thomas Eichelbaum et al., “Report of the Royal Commission on Genetic Modification,” (2001). New Zealand Government. <https://tinyurl.com/j4et85x>, 1-101.

¹⁰⁹ Zealandia Ecosanctuary, *Zealandia: The Karori Sanctuary Experience*, podcast audio, Official Promotional Video for Zealandia, 2:58, accessed January 9, 2016, 2010, <https://youtu.be/3Sd-TsgXwXE>.

¹¹⁰ Office of the Covenor, “Energy Efficiency, Renewable Energy, and the Resource Management Act,” 2015, no. January 1, 2016 (2015). Office of the Minister of Environment. <https://tinyurl.com/z3d7h4h>, 1-13.

Figure 3-7 New Zealand GHG emissions (2015)

From: MfE. 2015. p. 5.

New Zealand is likely to reach the year, 2020 target for GHG emissions, considering WCC aims and GU's urban planning strategy. The 2040 sustainable objectives will be difficult to achieve, as urban sprawl will persist, as it has since the 1920s, and reserves and sanctuaries simultaneously will have to be compensated for financial sustenance of precincts.¹¹¹ For example, the council presently (2015) issues district plan for commercially viable underutilised reserve land within various town centres of Wellington city.

Figure 3-8 NZ Electricity by fuel type (2013–14)

From: MBIE. 2014. p. 46.

Oil meets 44% (<40% is locally drilled) of all the energy demand for New Zealand, and the remaining 56% is supplied through RE sources as illustrated.

¹¹¹ Ministry for the Environment, "Biennial Report and Net Position Snapshot 2015," (2015). Ministry for the Environment. <https://tinyurl.com/hv6ja3p>, 1-5.

The bulk of the energy demand consumed in New Zealand by importance comprises industrial, residential, commercial (transport) and agriculture that consumes the least amount of energy within all the sectors¹¹² (Figure 3-9). Onsite RE investments and operational costs are feasible within superblocks and megablocks.

Figure 3-9 Electricity consumption by sector (1975–2014)

From: MBIE. 2014. p. 47.

*New Zealand’s energy demand has increased from <18,000 to <40,000 gigawatt-hours (GWh) in the past three decades.*¹¹³

For a New Zealand superblock, eco-infrastructure could consider multi-purpose approaches and supersede the single-purposed, such as grey infrastructure, by making provision for advanced facilities (roads, leisure zones and sanitation). The facilities would address environmental damage in unified methods to provide low carbon zones.

The eco-infrastructure process is to investigate and project environmental damage by gauging and organising mutual collaborations, using variations and observing and applying changes to the eco-infrastructure planning in a rejuvenating manner to meet the needs of inhabitants (Figure 3-10). Eco-infrastructure is a variant of function and requirements, which is regulated by terrain, latitude and altitude, and provides environmental damage protection and GHG discharge moderations to provide living comfort for inhabitants.¹¹⁴ The latitude for Discovery Bay and Wellington being different will result in various approaches.

¹¹² Ministry of Business Innovation & Employment, “Energy in New Zealand: Comprehensive Information on and Analysis of New Zealand’s Energy Supply, Demand and Prices,,” *Energy and Building Trends* 15 (2014). New Zealand Government. <https://tinyurl.com/zleawtj>, 45.

¹¹³ Ibid., 47.

¹¹⁴ Carlos H. Betancourth, “Eco-Infrastructures, Feedback Loop Urbanisms and Network of Independent Zero Carbon Settlements,” in *Eco-City Planning: Policies, Practice and Design*, ed. Tai-Chee Wong and Belinda Yuen (London: Springer Science+Business Media B.V., 2011), 51-61.

Figure 3-10 Eco-infrastructure – the model (2011)

Colour-wash on scan from: Betancourth. 2011. p. 60.

The moderation process for eco-infrastructure.

Waste Management and Minimisation Planning (WMMP) determine the design calculations for waste deliberation within any superblock or zone for collection, which allows measurement of the facilities required to incorporate services within the planning design for a WMMP zone.¹¹⁵ These facilities make provisions for waste collection based on the amount, estimate, mixture, origin, terminus and redirected compositions, which surmount the statistical implication of WMMP on the urban planning design for any zone within New Zealand.¹¹⁶

¹¹⁵ Ministry for the Environment, “Waste Assessments and Waste Management and Minimisation Planning”. 19-25.

¹¹⁶ Ibid., 19-28.

The aim of these facilities is ‘Reduction’, ‘Reuse’, ‘Recycling’, ‘Recovery’, ‘Treatment’ and ‘Disposal’ of waste, with joint participation between WCC and any collection zone, outsourced by contractors or the corporate bodies.¹¹⁷ As an example, this successfully could be achieved by constructing a WMMP depot, within the megablock.

The *RMA (1991)* “promotes sustainable management of natural and physical resources”¹¹⁸ within New Zealand, with each precinct (e.g., WCC) responsible for regulating polluting agents in the ecological environment. The New Zealand Emissions Trading Scheme (NZ ETS) facilitates the trading of GHG discharges with reforestation as carbon sinks to attain carbon discharge targets.¹¹⁹ WMMP ensures waste is decreased in quantity and the depletion time in landfills manifestly is reduced (Figure 3-11).

Figure 3-11 WMMP–design (2015)

From: MfE. 2015. p. 10.

*The planning process to determine the WMMP scope and following vital components, for any project.*¹²⁰

3.1.3 Social Criteria

‘Environmental human-friendliness (EHF)’¹²¹ enhances the living standards in New Zealand.¹²² EHF is a ‘complex multi-dimensional and multilevel’ perception, “with a potential impact on the subjective well-being” of inhabitants¹²³ (Figure 3-12).

¹¹⁷ Ibid., 22-25.

¹¹⁸ Ibid., 60.

¹¹⁹ Ibid., 60-61.

¹²⁰ Ibid., 10.

¹²¹ L. Horelli, “Environmental Human-Friendliness as a Contextual Determinant for Quality of Life,” *Centre for Urban and Regional Studies* 56, no. 1 (2005): 15-22.

¹²² Ibid., 15-20.

¹²³ Ibid., 18-20.

Figure 3-12 The Heuristic Ideal Model (2006)

Colour-wash on scan from: Horelli. 2005. p. 20.

Interrelationship for a good environment that comprises the physical, functional, participatory structure for families, friends, residents, and peers, creating a cultural structure forming social capital as proposed by EHF.

The method to instil EHF within any ‘good environment’, is ‘environmental psychology’ and ‘participatory planning’. This method both influences and is used to create a built environment respectively. The former is attained by investigative planning to improve human performance within any built environment, and the latter is the process of joint planning to realise the built environment.

Bechtel explains the concept of a ‘Standard Perception of Environmental Quality Index’ (PEQI’s)¹²⁴ as an individual within a ‘biosphere’. This biosphere includes the social sphere formed by the built environment to determine the ‘environmental quality’. This environmental quality includes instruments to determine the success or failure of a ‘community’ within a built environment, which remains within the ‘PEQI’s biosphere’¹²⁵ (Figure 3-13).

¹²⁴ Robert B. Bechtel, “The Perception of Environmental Quality: Some New Wineskins for Old Wine,” in *Perceiving Environmental Quality: Research and Application*, ed. Kenneth H. Craik and Ervin H. Zube (New York: Plenum Press, 1976), 108.

¹²⁵ *Ibid.*, 105-122.

Figure 3-13 PEQI's – Man, biosphere, social sphere and built environment (1976)

Photomontage from: Bechtel. 1976. p. 108.

Bechtel's PEQI's (left-hand side) modified by A New Zealand Superblock's concept of PEQI's permits social interaction in common zones of superblocks as opposed to automobile accessed suburbia (right-hand side).¹²⁶

The superblock forms a community (social sphere) within the megablock (built environment) that lies within the city limits (e.g., city, nation, or globe) and interacts rather than confines to succeed with newer communities and other nations.¹²⁷ Therefore, the individuals form a sense of 'belonging' and 'participation' within the community, city, or nation.

Figure 3-14 Typical USA suburban homes (2004)

From: Frumkin, Frank and Jackson. 2004. p. 4.

Figure 3-15 Discovery Bay Central Park (2015)

From: Chua. 2015. p. 3.

An illustration of a typical post-war USA's suburban homes with roads for access in Figure 3-14, and Central Park of Discovery Bay with a bigger pedestrian-friendly zone as photographed in Figure 3-15.

The design of a megablock can use low-speed, no-pollution and no-noise alternative transport to foster pedestrian-friendly safe zones (i.e., megablock with Green TOD) and provides amenities (i.e., kindergarten, primary and secondary schools, malls, plazas, sport grounds and clubhouses, among others). It forms a basis for 'participation' and 'inclusion', for the

¹²⁶ Ibid., 108.

¹²⁷ Ibid., 105-122.

inhabitants of the megablock (Figure 3-14 and Figure 3-15). When compared to the automotive driven suburban neighbourhoods of New Zealand, residents in the non-motorised Discovery Bay live healthier lifestyles by engaging in cycling, walking, running and swimming in safe zones (Refer to the section, *Introduction to Superblocks*).

Table 3-3 Environmental features—Green TODs (2012)

GREEN TOD ATTRIBUTES for a MEGABLOCK >250ha				
	GREEN TRANSPORTATION		GREEN URBANISM	
Built Environment	Infrastructure	Program and Policies	Energy	Open, Space, Waters and Storm-water
Greenfield, brownfield or greyfield	Rail link from closes railway station.	Major entrances from SH1 and SH2	Waste converted to energy	Stormwater treatment
e.g., farm, factory or mall	Electric [battery] bus service to megablock from railway station at 15 minute intervals	Parking provided at major entrances as interchange to pedestrian friendly megablock	Food waste and waste water sludge converted to biogas and used for heating	Rainwater catchment Max. permeable surfaces Purifying run-off channels through soil filtration
High density residential, commercial and amenities	Bike lanes and bike and pedestrian designated pathway and parking	Hotel, club-house, stadium, multi-function indoor sports, water sport, shopping street and mall focus of community interaction	Heat capture systems for HVAC systems	Ample open space: Inner courtyards Parks Playgrounds Reserves and boardwalks
TOD: mixed-use megablock	Tunnel below a site [instead of splice-cut motorway], e.g., between SH1 to SH2	18 hole golf course and centre with ED principles.	Combined heat and power plant	Preservation or relocation of existing trees and open space within the megablock
	Emergency vehicles access within the megablock	Bowling club	Low-energy construction and energy saving measures	Eco-infrastructure
	Pedestrian friendly megablock	Street design for maximum interaction	EED – whiteware	Preservation from Subsidence
	Electric golf-cart access within megablock	Marae	Maximum insulation and triple glazed windows	On-site fresh water reservoir for WCC
		Community centre	Solar powered hot water systems	
		Primary and secondary school	Photovoltaics and mini wind turbines for street-lighting	

From: Author. 2016.

An exemplary of a megablock attributed Green TODs' environmental features and green transportation table: built environment, infrastructure, and programme and policies / GU: energy and open space, water and storm-water.¹²⁸ Note: This reflective chart has adapted attributes from Hammarby Sjostad's (Stockholm, Sweden) project, for the comparison of Green TODs within a megablock, in Wellington, New Zealand.

The impact of TOD on the built environment is reflected within the social capital of a megablock, which accumulates or disperses the inhabitants as a result of convenience or inconvenience, and the outcomes can be measured, over a duration of time. Inner-city areas have limited social interaction due to the business nature of the precinct, in comparison to outer fringe suburban developments that accumulate greater social capital, as the inhabitants engage in activities and form lasting relationships within a megablock. Qualitative and quantitative measures can be used to evaluate the bond between the 'built environment' and the 'community' with models to compare results between a traditional suburban development and a superblock, which results favouring megablock with Green TOD¹²⁹ (Table 3-3).

¹²⁸ Cervero and Sullivan, "Green Tods". 128.

¹²⁹ Md. Kamruzzaman et al., "Patterns of Social Capital Associated with Transit Oriented Development," *Journal of Transport Geography* 35 (2014): 144-148.

Environmental behaviour reflects the manner in which residents interact with the built environment while engaging in congested and uncongested venues such as, in private, sport, health care, alleyways and natural zones. The private zone is the accounted spacing of individuals, inclusive of spacing orientation relating to each individual and their likes and dislikes, value orientation and cohesion within the built environment. As building spacing efficiently is determined by environmental design (ascertained by climatic conditions) rules and limits, for the environmental and behavioural aspects of an individual¹³⁰ (Figure 3-16).

In time, these illustrated spaces have been modified to suit present-day requirements (e.g., ‘malls’, ‘roads’, ‘suburbia’ and ‘residential developments’,¹³¹ among others), with alternatives to review and form approvals by making provisions for improvements, which result in different combinations of any built environment to its historic past. The systematised approach to redefining the limitations of the concept is to conduct research, form a theory, evaluate, and apply the outcome of the research based on the constraints and provide alternatives to attain ‘recognition’ and ‘legitimacy’ in the built environment.¹³²

Figure 3-16 Perception—Street (1990)

Photomontage from: Rapoport. 1990. p. 295-296.

The influence of the built environment on the environment and behaviour of individuals.

This systemised approach has been utilised in Discovery Bay (a megablock, which gained precedence from LCC, GLC and GLA) with success (1973–2015)—by continuously redefining the concept of the built environment and improving on the historic information, for the

¹³⁰ J. J. Edney, “Theories of Human Crowding: A Review,” *Environment and Planning A* 9, no. 11 (1977): 1216-1217.

¹³¹ Amos Rapoport, “Toward a Redefinition of Density,” *Environment and Behavior* 7 no. 2 (1975): 310.

¹³² *History and Precedent in Environmental Design*, vol. 77 (New York: Plenum Press, 1990), 297-311.

betterment of the environmental behaviour of the inhabitants.¹³³ A New Zealand superblock is intended to follow this pattern of continuous improvements on historical data sets and form an assortment of interdependent superblocks within a megablock using the following twelve principles. As the author of this thesis, these twelve principles efficiently have been systematized, for the context-specific New Zealand applications. These principles comprise an integrated guide to urban planning design solutions. These principles reasonably can be utilised for strategic planning and implementation solutions, as well:

- 1st. Principle: Promote increases in actual density with decreases in visual density,
- 2nd. Principle: Ensure that liveability is not compensative, for the increases in actual density,
- 3rd. Principle: Establish perceived density and provide for privacy,
- 4th. Principle: Delineate a transitional pattern of zones and enhance interactive density,
- 5th. Principle: Conform density to acceptable predetermined limits within a megablock,
- 6th. Principle: Ensure a desirable characteristic economic capital through PPP and the SPD process,
- 7th. Principle: Ensure employment in the construction industry to progress with desired urban sustainable characteristics,
- 8th. Principle: Decrease ground coverage to increase afforestation with seasonal gardens,
- 9th. Principle: Restore social capital with increases in interactive density,
- 10th. Principle: Promote Green TOD and alternative transport within a megablock,
- 11th. Principle: Construct a common shared on-site eco-infrastructure facility within each megablock,
- 12th. Principle: Equate a community through a GCF and develop a sense of place.

¹³³ Glendinning, "From European Welfare State to Asian Capitalism: The Transformation of British Public Housing' in Hong Kong and Singapore". 315.

With consideration of the above principles, seeking a positive solution to resolve these issues is possible by adjusting the economic policy at national level, with the intention to protect the ecological environment and attain social capital with effective density mechanisms. These guidelines would then be accrued as desirable characteristics for New Zealand at macro levels of governance. A New Zealand superblock is the alternative solution at the micro-level and could be considered as an alternative to WCC and HNZ's initiations to impede urban sprawl with either infills or MDH as options to ultimately achieve positive growth at macro-levels within the cities of New Zealand.

The realisation of a New Zealand superblock, SPD with a council that fosters a Holding Company in liaison with, for example, MBIE would successfully balance live, work and play environments and attain desirable features as core objectives within New Zealand. These aims also possess a constructive outcome for the New Zealand landscape, agriculture, public and international arenas of interaction and enhance natural regenerative processes with ecological principles for government policy as sustainable managements.

3.1.4 Density Criteria

As a guide or standard, each city council provides estimates as guidelines, for density evaluations and projections (e.g., FAR and du).¹³⁴ These guidelines enable a planner to create designs on various uses for different precincts and different densities with amenities.¹³⁵

Estimating appropriate density (i.e., residential density (in persons/ha)) that eventually forms the actual density of any superblock project is a critical aspect that requires careful consideration while designing urban plans. Kernel approaches are a useful method to achieve realistic projections with the objective for 'statisticians' to use as application on facts and figures (statistics) to determine density for experimental design with innovative intentions. A simple 'formula' used as an application to estimate human density within the built environment to form the actual density is one kernel method:¹³⁶

$X_1, X_2, \dots, X_n$ represent an example with dimensions n derived from an arbitrary inconstant with a density f , kernel density approximation, f at the location for x is appropriated by:¹³⁷

¹³⁴ Planning Department, "Hong Kong Planning Standards and Guidelines: Community Facilities," 3 (2014). The Government of The Hong Kong Special Administrative Region. <https://tinyurl.com/he8hgt>, 1-49.

¹³⁵ Wellington City Council, "Chapter 13. Central Area Rules Guide to Rules," (2000). Wellington City Council. <https://tinyurl.com/zxm5ts9>, 1-13.

¹³⁶ Simon J. Sheather, "Density Estimation," *Statistical Science* 19, no. 4 (2004): 588-595.

¹³⁷ Ibid., 588-590.

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x - X_i}{h}\right)$$

In places where kernel K fulfils the requirements $\int K(x) dx = 1$ and the levelling factor h is recognised as the frequency: The $K =$ unimodal ± 0 symmetric density and K ‘satisfies the conditions’:¹³⁸

$$\int K(y) dy = 1$$

$$\int y K(y) dy = 0$$

$$\int y^2 K(y) dy = \mu_2(K) > 0$$

‘A popular choice for K is the Gaussian kernel, namely’:¹³⁹

$$K(y) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{y^2}{2}\right)$$

The above formula can be used with an arbitrary inconstant of dimensions example $\mu = 10$ derived from a composition, made by reflections example $N(\mu = -1, \sigma^2 = (1/3)^2)$ and $N(\mu = 1, \sigma^2 = (1/3)^2)$ with an estimated 0.5 factor, with a Gaussian kernel frequency of $h = 0.3$; These arbitrary inconstant statistics can be projected by tables, graphs and computer programmes (simulations¹⁴⁰) to create a relatively accurate assumption of the actual density within any built environment.¹⁴¹

The ‘income density function’ can be calculated with the formula:

$$P(y_1 < y < y_2) = \int_{y_2}^{y_1} f(y) dy$$

¹³⁸ Ibid.

¹³⁹ Ibid.

¹⁴⁰ Woncheol Jang and Ji Meng Loh, “Density Estimation for Grouped Data with Application to Line Transect Sampling,” *The Annals of Applied Statistics* 4, no. 2 (2010): 905.

¹⁴¹ Sheather, “Density Estimation”. 588-596.

Whereby $f(y)$ = *income density function* as an arbitrary earning entity y , whose earnings are $> y_1$ and $< y_2$, this formula also establishes an income valued shared community.¹⁴²

Figure 3-17 Mark 1—urban environment (1963 – 74)

From: Rooney. 2003. p. 27.

Figure 3-18 Mark 1—interior views (1963 – 74)

From: Rooney. 2003. p. 56.

The Mark 1 Resettlement Estate, Wong Tai Sui high-density apartments in 1963 (Figure 3-17) and Mark 1 Shek Kip Mei in 1974 (Figure 3-18); the urban environment of a superblock and the interior image of a family unit illustrated respectively.

The design of superblocks should favour density criteria, besides supporting the well-being of inhabitants – both the urban spatial configurations reflecting real thoughtful approaches as well as the interior spaces. Adverse implications of true high-density are viewed on the Mark 1 superblock. These include a high number of inhabitants on the exterior and the windowless interior spaces of buildings (Figure 3-17 and Figure 3-18). Le Corbusier proposed gross densities of 120 to 150 du per acre (298 to 370 du/ha) with a ground coverage of 12% for the Radiant City in the 1940s. Journalist Jane Jacobs, in the 1960s contested these densities by recommending 50 to 150 du per acre (124 to 370 du/ha) with different building typologies and increased ground coverage. Transit villages, designed at higher densities with increased ground coverage than existing auto-driven suburbia, could include a car-parking building at the main entrances, to convert any megablock into a car free zone¹⁴³ (i.e., point of change, from cars to bicycles, electric driven golf carts and electric public buses to create a pedestrian-friendly neighbourhood). Alternative transport options are feasible within these car-free zones, as over

¹⁴² Fred Campano and Dominick Salvatore, “The Income Density Function,” Oxford University Press.

<https://tinyurl.com/hxmz868>.

¹⁴³ Bernick, *Transit Villages in the 21st Century*, 74-85.

the past few decades (since the 1980s) these megablocks¹⁴⁴ have increased from <100 ha to >750 ha, in several locations within the OECD nations.¹⁴⁵

The reduced streetscapes increase the landscaped areas within the megablock, which is possible with alternative transport that is conducive to purpose-built parks and waterbodies, forming appropriate proportions and safe zones that functionally can realise ‘small garden cities’.¹⁴⁶ As an example, the State of California, in 1994, had 26 large housing projects as transit villages, with varying densities for ‘rental apartment complex’ from ‘20 to 60 du per acre (50 to 148 du/ha)’. On the contrary, the suburban rail developments set an acceptable benchmark of ‘12 to 15 du per acre (30 to 37 du/ha)’ to qualify, for a transit village’s standard.¹⁴⁷

Built environments visually perceived less dense than they truly are in fact and figures (statistics) comprise clever integrations of landform and urban form. As urban planning design techniques are used to reduce perceived density in higher actual situations, likewise less dense cities developed and viewed as having the higher density perceptions enhance a GCF¹⁴⁸ For example, Sydney (population: 4.84 million, land area: 1,236,770 ha) strives to be perceived as less dense, while Darwin (population: 0.15 million, land area: 11,201 ha) effectively seeks being seen as denser than the actual or original density.

The formula to calculate actual ‘residential density is persons/hectare’¹⁴⁹ (pp/ha) and ongoing attempts are made to increase density for energy conservation and to reduce pollution. A common attempt is to increase the residential density with urban intensification and infills, by using existing infrastructure in a bid to impede urban sprawl,¹⁵⁰ which inversely creates traffic congestion and on occasions the infrastructure fails due to the additional population.¹⁵¹

Perceived density is calculated in ‘area weighted residential density or population weighted average’; with variations in the zone size (local area) a ‘relative perceived density’ is used,

¹⁴⁴ Robert Cervero, “Transit Villages: From Idea to Implementation,” (California: University of California, 1994), 8-13.

¹⁴⁵ Audit Commission Hong Kong, “Grant of Land at Discovery Bay and Yi Long Wan,” 6, no. 43 (2004). Lands Department. <https://tinyurl.com/j32o97f>, 1-5.

¹⁴⁶ Peter Hall, “Retro Urbanism: On the Once and Future TOD,” in *Sprawl and Suburbia*, ed. William S. Saunders (Minneapolis: University of Minnesota Press, 2005), 125-129.

¹⁴⁷ Cervero, “Transit Villages: From Idea to Implementation”. 9.

¹⁴⁸ A. J. Richardson, P. J. Brunton, and S. M. Roddis, “The Calculation of Percieved Residential Density,” *Road & Transport Research* 7, no. 2 (1998): 12.

¹⁴⁹ Ibid., 2.

¹⁵⁰ Wellington City Council, “Wellington Towards 2040: Smart Capital”. 33-42.

¹⁵¹ Richardson, Brunton, and Roddis, “The Calculation of Percieved Residential Density”. 1-5.

which creates a precise assessment with coefficients to derive ‘comparable perceived residential densities’. ‘Population weighted average’ is preferred for summation to ‘area weighted residential density’, as it allows for newer additions of larger less-populated zones on the city fringes to exclude and only use comparable zones as inclusions for assessments. With relative perceived density calculations as illustrated in the graph (Figure 3-19), at 2,500 ha Darwin is denser than Hobart, and at 10,000 ha Hobart is denser than Darwin; in comparison cities with a larger footprint (10,000 ha) remain constant, such as Sydney, Melbourne, Brisbane and Perth.¹⁵²

Figure 3-19 Relative perceived density (1998)

From: Author, 2015.

*The graph created from Table 10 of the reference as a comparison for Australian Cities (1998).*¹⁵³

Discovery Bay in retrospect, a suburban mixed-use, residential development with private, public recreational facilities when compared to existing suburban developments of Hong Kong in 1974, increased ‘relative perceived density’ to support the dense urban island.¹⁵⁴ Discovery Bay does not intend to compete with Hong Kong Island (the inner-city area of Hong Kong) by actual density. Rather, it assists the ‘population weighted average’ of Hong Kong and increases the relative perceived density of suburban Hong Kong in its inception and following phases. A

¹⁵² Ibid., 1-12.

¹⁵³ Ibid., 12.

¹⁵⁴ Audit Commission Hong Kong, “Grant of Land at Discovery Bay and Yi Long Wan”. 48.

New Zealand superblock, an outer city fringe SPD, will strive to increase actual density with less dense perceived density, which will result in higher relative perceived density.

For creating a positive psychological environment, a planner is required to approach the physiological aspects of urban planning design and ensure comfort levels achieve successful levels within any GCF. The comfort requirement includes daylight, hygiene, physical, thermal, travel, visual, and outdoor wind comfort levels within urban environments.

Megablocks could accommodate dual-purpose rainwater catchment reservoirs constructed within the Drosscapes, which could use these newly harvested water storages as water sports amenity zones. These desirable characteristics are achievable due to the megablock's size and the PPP's associative judgements that would decrease the usable land area, with increased liveable densities, and purposefulness for the developments.¹⁵⁵

Summary: *A New Zealand Superblock—Contextual Evaluations*

The Wellington city's context offers mixed-methods evaluations to address the researchable parameters, for the study. The objectives successfully is achieved as twelve principles, for the creation of a New Zealand superblock.

¹⁵⁵ Berkeley Group PLC, *Woodberry Park - A Place in the Making*, podcast audio, Woodberry Park - A Place in the Making, 4:33, accessed December 24, 2015, 2012, <https://tinyurl.com/jb8yhrs>.

4. Comparative Method and Case Studies

The investigation looks at the strategic viability of superblocks within the New Zealand context using a method achieved by merging relevant components of Ecological Design (ED) principles by Sim Van der Ryn and Stuart Cowan; Green Urbanism (GU) principles by Steffan Lehmann; the principles of Robert Cervero and Catherine Sullivan's framework for Green Transit Oriented Development (Green TOD). The components are then examined within the context of principles proposed by Kevin Lynch—economic, environmental, social and density (see Figure 4-1).

Table 4-1, Table 4-2, Table 4-3, and Table 4-4 provide a summary of principles of ED, GU, TOD and Green TODs, which will be used to help unfold the complexities of these principles in the following sections, to help theorise a GCF for Wellington.

Many architects' and writers' works effectively were evaluated for research material such as Bernard Tschumi, Lewis, Mumford, Michel Foucault, Rem Koolhaas, Renzo Piano, Peter Eisenmann, and Jacques Derrida, among others. This preliminary research purposefully was undertaken and compared with Kevin Lynch's works before accepting the good city form (GCF) assumptions as a methodology for this thesis. This decision was made using critical thinking skills to identify the 'root-cause' and determine relevant research parameters. A New Zealand superblock formulates modernist inspirations within post-war New Zealand suburbia that were refined by Lynch's writings. These writings possess a likeness to influence New Zealand's urban planning designs within existing or natural landscapes, commencing from the 1960's to present-day, due to the origins of the Garden City Movement and post-war urbanisation initiatives within the USA (Figure 4-1).

Figure 4-1 Normative theory diagram (2016)

From: Author. 2016.

Table 4-1 Comparative list of principles (2016)

Ecological Design (ED)	Green Urbanism (GU)	Transit Oriented Development (TOD)
<i>Solutions grow from place</i>	<i>Climatic conditions and site context</i>	<i>Walk</i>
<i>Ecological accounting informs designs</i>	<i>Self-sufficiency in energy production</i>	<i>Cycle</i>
<i>Design with nature</i>	<i>Zero waste city as closed loop eco-system</i>	<i>Connect</i>
<i>Everyone is a designer</i>	<i>Urban water management and quality</i>	<i>Transit</i>
<i>Make nature visible</i>	<i>Landscapes, gardens and biodiversity</i>	<i>Mix</i>
	<i>Eco-mobility</i>	<i>Density</i>
	<i>Regional materials and prefabricated system</i>	<i>Shift</i>
	<i>Densifications and intensifications</i>	
	<i>Green building design and solar access</i>	
	<i>Affordable housing and mixed usage</i>	
	<i>Local and high food security</i>	
	<i>Public health and cultural identity</i>	
	<i>Urban governance and sustainable methods</i>	
	<i>Sustainable urban development</i>	
	<i>Sustainability strategies</i>	
Summarised from: Van der Ryn and Cowan. ¹⁵⁶	Summarised from: Lehmann. ¹⁵⁷	Summarised from: ITDP. ¹⁵⁸

From: Author. 2016.

The comparative list reflects the principles for ED, GU and the defined standards for TODs.

Relevant components of ED, GU and Green TODs consist of ‘planning process’ principles have been merged in this thesis to redetermine the parameters of GU (approved by WCC) within the context of a New Zealand superblock (Table 4-1). This thesis seeks to redetermine the GU parameters comprising economic, environmental, and social by evaluating New Zealand’s cultural variables as a density parameter. This section summarises, derives by analysing a development criterion that would determine the premise, for the thesis proposition’s vision (refer to Table 4-2, Table 4-3, and Table 4-4).

¹⁵⁶ Van der Ryn and Cowan, *Ecological Design*, 1-172.

¹⁵⁷ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-213.

¹⁵⁸ Institute for Transportation and Development Policy, “TOD Standard”. 1-8.

Table 4-2 Ecological Design—Principles (2016)

1. <i>Solutions grow from place</i> : ED requires a specific understanding of a location and to make provisions, which are appropriately sized for individuals to preserve the ecological habitat of the location.
2. <i>Ecological accounting informs design</i> : To evaluate the ecological effects of the location by establishing the design premise and refining the design.
3. <i>Design with nature</i> : Involving <i>living processes</i> within the design ritual makes provision for every living organism, which assists to promote regeneration rather than depletion of the natural capital.
4. <i>Everyone is a designer</i> : Appreciate every design concern and suggestion offered by individuals who are contributors to a positive ecological environment by the association of place.
5. <i>Make nature visible</i> : Designing with <i>natural cycles</i> of living things, which are observable by individuals, assisting to invigorate the built environment and cultivating informed individuals as habitants of the built environment.

Summarised from: Van der Ryn and Cowan. 2016. p. 54-56.

*The five ascertainable principles that ensure ecological and technological sustainability are embedded within the prospective design.*¹⁵⁹

Table 4-3 Green Urbanism—Principles (2016)

1. <i>The city based on its climatic conditions and site context</i> : It is vital to confirm the effects of climate on each site. The building on the site should be conducive to sustainable attributes that address the climatic conditions with the building envelope.
2. <i>The city as a self-sufficient energy producer</i> : With the use of on-site RE the site should avoid the use of fossil fuel and create a zero-carbon environment. These RE installations should consist of groupings of different types of on-site energy generators.
3. <i>The zero-waste city as closed loop eco-system</i> : It is important to create a ‘recycle society’ that minimises and “either composts or recycles from 60 to 90%”, of all waste generated, to form the closed loop principle.
4. <i>The city with closed urban water management and high water quality</i> : The perception of an ‘eco-district’ describes the ‘water management’ systems, for the efficiency requirements. These systems can support rainwater catchment, with the efficient use of water, and water and drainage recycling systems. This helps maintain the balance of living organisms within the water resource systems.
5. <i>The city that maximises landscape, gardens and biodiversity</i> : These schemes enhance ‘biodiversity’, ‘habitat’, and ‘wildlife’, together with ecological rejuvenation and eco-system preservation processes. These schemes are intended to increase CO ₂ absorption with a microclimate and reduce urban heat island effect within the macroclimate.
6. <i>The city of eco-mobility and an efficient low-impact public transport system</i> : Site access and Green TODs within an ‘eco-mobility’ perception, with a good mix of public transport systems and interchanges, which assist in reducing commuter stress and increasing community interaction.

¹⁵⁹ Van der Ryn and Cowan, *Ecological Design*, 1-172.

7. <i>City construction using regional materials and prefabricated systems:</i> The method of using collaborative, creative, durable and sustainable manufacturing and disassembly techniques, to create cost-effectively constructed housing with ‘environmentally friendly’ and ‘process integrated technologies’, which can minimise waste.
8. <i>The city with densification and intensification of existing districts:</i> The method of ‘urban infills and intensifications’ to create mixed-use, high-density, and compact city centres that contribute to a smaller footprint with taller buildings, encouraging rehabilitation programmes.
9. <i>The city of deep green building design and solar access:</i> Enhancing green building initiatives and environmental design with solar architecture to produce surplus energy, which can be conducive to preserve passive building design and natural environments.
10. <i>The city with special concern for affordable housing and mixed usage:</i> The introduction of flexible typologies within the inner-city areas, enhances demographic migration and economic diversity within these higher density zones, and, when supported by Green TODs and social housing, makes provision for an appropriate socio-economic sustainable environment.
11. <i>The city of local food supply and high food security:</i> The process of disconnecting the metropolis from the farms, enhances the inner-city roof gardens as natural eco-systems within the metropolis. These natural eco-systems support recycling and food processing with possibilities for organic food cultivation with a shorter supply chain.
12. <i>The city of public health and cultural identity: A safe and healthy city:</i> A metropolis should take pride in clean air with less pollution and maintain their existing unique urban form, which is commonly ascertained by the climatic conditions. The process is possible with grassroots approaches, conversion, conservation and protection of heritage that fosters an increase in density, supported by Green TODs.
13. <i>The city of urban governance and sustainable procurement methods:</i> Involves councils to introduce GU principles, form eco-cities as government programmes, and implementing ‘anti-sprawl’ to define the metropolis limit, with good value property intensifications.
14. <i>The city of education and training in a sustainable urban development:</i> Sustainable urban development fosters knowledge economy and public social awareness programmes for the inhabitants by involving architects, engineers and planners to improve urban quality.
15. <i>Particular sustainability strategies for developing countries:</i> The balance of growth in urban and global arenas for emerging economies, with innovative methods to decrease slums with community support and job creation, and making provision for climate change to achieve sustainable growth.

Summarised from: Lehmann. 2016. p. 212-243.

*The fifteen ascertainable principles of GU that determine the conceptual model.*¹⁶⁰

¹⁶⁰ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-244.

Table 4-4 Transit Oriented Development—Principles (2016)

1. <i>Walk</i> : The walkways should be purposeful, interactive and secure, lined with activity to induce liveliness and well-being, and efficiently integrate with urban spaces.
2. <i>Cycle</i> : The cycleway should be well connected to proximate locations for daily activity to be conducted with ease in secure zones with signposts for parking bays.
3. <i>Connect</i> : The network for cycling and walking should foster shorter distances, and provide interaction, vistas and activity along the network with interchanges for public transport systems.
4. <i>Transit</i> : TOD standard authentication requires a minimum credit with either ‘bus rapid transit (BRT)’ or ‘rail transit’. These transportation links should foster interchanges to alternative transport and provide walkways to high-density TOD developments that within a kilometre radius (15 to 20 minutes’ walk).
5. <i>Mix</i> : An integrated combination of corporate, business, shopping, residential, and amenities, in proximity to a transit link, makes provision for reduced commuter travel distance and cost-effective neighbourhoods.
6. <i>Density</i> : Feasible transit links support a compact urban centre with density, as the density makes provision for ongoing economic activity with increased interaction. The limitations to density are building environmental design concerns, which are critical for the well-being of inhabitants.
7. <i>Compact</i> : The spatial integration of many mixed-use developments as ‘compact centres’ increase density and require higher investments, which enable decreased travel time. The compact centres make provision for ‘multimodal transport’, which can accommodate multiple public transport options to outer fringe urban areas.
8. <i>Shift</i> : In consideration of the above seven principles, alternative transport gains precedence within the urban planning design objectives promoting economics with social interaction. Alternative transport also reduces the need for parking and motorways in urban precincts.

Summarised from: ITDP. 2016. p. 1-28.

*The eight ascertainable standards for TOD.*¹⁶¹

As the first step in the methodology, the TOD principles described in Table 4-4 from ITDP are summarised as four green standards for mobile sources listed in Figure 4-2 Cervero and Sullivan recommend these TOD standards for mobile sources together with four GU principles for stationary sources to form the framework for Green TOD environmental features. The TOD features comprise ‘transit design’, ‘non-motorised access’, ‘minimal parking’ and ‘compact development’, in addition to GU principles: ‘energy self-sufficient’, ‘zero waste’, ‘community gardens’, ‘open space’ and ‘buildings’. This framework helps to design a combination of buildings to support transportation using Green TOD principles to enhance environmental features.

¹⁶¹ Institute for Transportation and Development Policy, “TOD Standard”. 1-28.

ENVIRONMENTAL FEATURES OF GREEN TODs

TOD	GREEN URBANISM
Mobile Sources	Stationary Sources
<ul style="list-style-type: none"> • Transit Design: World-class transit (trunk & distribution); Station as hub; Transit spine • Non-Motorized access: Bike paths; Pedestrian-ways; Bikesharing/Carsharing • Minimal Parking: Reduced land consumption, building massing and impervious surfaces • Compact, Development of mix of uses 	<ul style="list-style-type: none"> • Energy Self-Sufficient: Renewably powered—solar; wind; organic waste converted to biogas; Energy efficiency: District heating/cooling; Combined heat and power • Zero-waste: Recycle; re-use; Methane digesters; Rainwater collection for irrigation and gray-water use; bio-swales • Community Gardens & Open Space: Composting; tree canopies; water-table recharging • Buildings: Green roofs; Orientation (optimal temperatures); Insulation; glazing; Air-tight construction; Low-impact and recycled materials

Figure 4-2 Green TODs (2012)

From: Cervero and Sullivan. 2012. p. 127.

The determinable framework for Green TODs that comprises multiple combinations of TOD standards and GU principles.

4.1 ED, GU and Green TOD principles

The intent of this section is to triangulate critical-to-success factors of the principles and framework as determined by ED, GU, besides Green TOD respectively, and to verify and substantiate validations, for a New Zealand superblock, SPD (Figure 4-3).

- ED's five principles outlined by Van der Ryn in the book *Ecological Design* (1996) and consist of simple validity options. These options remedy the prevailing circumstances with 62 projects as examples.¹⁶²
- GU's fifteen principles outlined by Lehmann in the book *The Principles of Green Urbanism* (2010), with four case studies and several examples of design applied proposals and projects as exemplars.¹⁶³
- Green TODs, are defined in Cervero and Sullivan's article, "Green TODs: Marrying Transit-Oriented Development and Green Urbanism" (2011), stating the framework for Green TODs, by merging TOD with GU.¹⁶⁴

Figure 4-3 ED, GU, and Green TODs schematic (2016)

From: Author. 2016.

When categorised as ecological and technological, sustainability results in ED principles favouring ecological approaches, whereas GU principles¹⁶⁵ term ecological approaches as 'vernacular'¹⁶⁶, and are inclined to technologically sustainable objectives. Green TODs also engage in technological sustainability, which is further inclined to GU's principles, rather than the ecological approaches of ED.¹⁶⁷

Ecological Design: ED classifies 'conservation', 'regeneration', and 'stewardship' by describing them as integrated measures for appropriate governance, to ensure environmentally sustainable design, maintenance, and progression with sustainable paradigms, as unique to any biodiverse location.¹⁶⁸ Lehmann (2010) suggests that these similar classifications are sub-classifications and describes them as fifteen core principles for GU, which are used for

¹⁶² Van der Ryn and Cowan, *Ecological Design*, 173-184.

¹⁶³ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-767.

¹⁶⁴ Robert Cervero and Cathleen Sullivan, "Green Tods: Marrying Transit-Oriented Development and Green Urbanism," *International Journal of Sustainable Development & World Ecology* 18, no. 3 (2011): 210-212.

¹⁶⁵ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-213.

¹⁶⁶ *Ibid.*, 774.

¹⁶⁷ Van der Ryn and Cowan, *Ecological Design*, 116-122.

¹⁶⁸ *Ibid.*, 17-25.

calibration as one to four for conservation, five to ten for regeneration and eleven to fifteen for stewardship, for use in developing nations.¹⁶⁹

- *Conservation*: minimising the use of ‘natural capital’ (includes reuse and recycling, preserving farmland, increased density, better envelope design and optimising fossil-fuelled automobiles).
- *Regeneration*: “the repair and reuse of the living tissue” that heals natural capital.
- *Stewardship*: economic options and optimised use of the natural capital.¹⁷⁰

ED is a systemised approach promoting built environments in harmony with natural capital, by respecting the ‘flows’, ‘cycles’, and ‘patterns’ that enhance the sustainable values of any environment.¹⁷¹ Yeang and Lehmann discuss within *The Principles of Green Urbanism* (2010) that GU’s approaches for urban design and vernacular architecture are to reflect passive design for buildings and decrease the ‘ecological footprint’ with anti-sprawl and retrofitting the metropolis. These approaches, they suggest, is best accomplished with initiatives that can enhance green buildings and eco-cities.¹⁷² WCC has also taken a similar stance by incorporating the principles of GU and eco-cities within their growth initiatives.¹⁷³

Biodiverse ecological environments thrive on healthy, sustainable interdependence within the living beings that exist in harmony in an environment. These living beings follow lifelong rituals that provide essential processes such as ‘waste as nutrients’ within the interdependent community. The appropriate balance of waste as nutrients within the interdependent community determines the equilibrium of success, for the biodiverse environment. A desirable characteristic megablock regulates these aspects of interdependency at a community level.

Integrating ED with GU (Green Urbanism): Both ED and GU are in compliance with recycling and acknowledge either industrial ecology or ‘eco-masterplanning’ as solutions to conventional toxic methods.¹⁷⁴ Industrial ecology, as an example, includes natural ‘wastewater’ fluid systems embodied by plants of selected types. The roots of these plants

¹⁶⁹ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 212-241.

¹⁷⁰ Van der Ryn and Cowan, *Ecological Design*, 20-25.

¹⁷¹ Ibid., 17-32.

¹⁷² Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 770-776.

¹⁷³ Wellington City Council, “Wellington Towards 2040: Smart Capital”. 26-31.

¹⁷⁴ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 770-804.

absorb toxins from the water and are incinerated at a later stage to separate the residual toxins as a “cleanup”,¹⁷⁵ together with the assistance of the natural fluid systems.¹⁷⁶

Although GU defines the urban edge, infills and intensifies the city to impede urban sprawl, ED propagates the ‘ecological knowledge’ that differentiates ‘complex’ and ‘homogeneous’ systems to protect the natural capital. The complex systems, which address local issues, have a contextual understanding of the immediate environment in comparison to homogeneous systems, which are universal and lose the sense of quality and variety, for a compatible or generic orientation. To define complex and homogeneous systems, one would have to monitor a chain of events on a local and universal scale, as every local event has magnified reactions on a universal scale. In respect to New Zealand’s natural capital, it is essential to implement government fiscal policies to determine the local and universal effects on an estimated ratio. The ratio would assist in better estimating and improvising methods for ‘knowledge’ and ‘design’ and clarifying any misconceptions with regards to the economic and environmental parameters.¹⁷⁷

Lehmann (2010) discusses concerns for density by contrasting the metropolises of Barcelona and Sydney as exemplars. These exemplars claim that Barcelona fosters high-density blocks from four to six stories that are urban planned and designed with open spaces into ‘compact’, and pedestrian-safe districts, which permit double the population/km² to reside-in and perform better than Sydney.¹⁷⁸ These claims assessed in appreciation with economic, environmental, and social aspects would gain significant merit as a successful metropolis. These aspects are evident while comparing the suburban planned low-densities of Sydney, which would be better than the high-densities of Vallecas Urban Extension of Madrid that is experiencing social, environmental, and economic issues as opposed to Lehmann’s claims¹⁷⁹

Integrating ED and GU with Green Transit Oriented Development (Green TODs): GU promotes Green TODs to form an associated ‘transit’ and ‘compact’ metropolis, by encouraging hybrid developments. These hybrid developments make provisions for pedestrian-safe neighbourhoods, with alternative transport facilities with unadvised intensifications. An

¹⁷⁵ Van der Ryn and Cowan, *Ecological Design*, 110.

¹⁷⁶ Ibid., 105-120.

¹⁷⁷ Ibid., 65-68.

¹⁷⁸ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 780.

¹⁷⁹ Aurora Fernández Per, Javier Mozas, and Javier Arpa, *Density Is Home: Housing by a+t Research Group* (Vitoria-Gasteiz, Spain: a+t architecture publishers, 2011), 112.

alternative method to assist WCC in meeting their growth initiatives for 2040 discussed in the following chapter outlines the implementation processes of a Smart Planned Development (SPD). The implementation of a SPD as a New Zealand superblock would enable WCC to ensure fruition of their 2040 objectives, successfully achieves in a systematic and progressive manner, within the outlined parameters.

4.2 Smart Planned Development

As an important part of the methodology for this investigation, the thesis will weight the integrated principles of ED, GU, and TOD against four important criteria established by American urban planner Kevin Lynch—economic, environmental, social and density—to help smart planned development characteristics suitable for the Wellington context. The aim of this section is to acknowledge the relevance of Lynch’s planning theory¹⁸⁰ in the elaboration of a normative theory of GCF, within the New Zealand context.¹⁸¹

Lynch’s (1976) urban theories were focused on the ‘visible corridor’¹⁸² and ‘mapping’¹⁸³ to investigate and develop a language that could be used to describe and analyse visual perception or ‘imageability’¹⁸⁴ that comprises the structural interrelationship of ‘environmental images’¹⁸⁵ (Figure 4-4).

Lynch recommends that planners should firstly allocate zones based on the intended function, rather than the built environment’s aesthetic appreciation. The second measure is to focus on the purpose of the built environment and the amount of integrated space allocated for each function, rather than the associated statistics. A third consideration also requires the planner to assess the qualitative purposes that include the behavioural patterns of the inhabitants within the integrated spaces, including the much sought after quantitative derivatives. A fourth assessment requires the urban planning design to be evaluated appropriately and examined through experimental design to obtain reasonable proof of the innovative prowess. Finally, a

¹⁸⁰ Kevin Lynch, “The Form of Cities,” *Scientific American, Inc.* 190, no. 4 (1954): 55.

¹⁸¹ Talen and Ellis, “Beyond Relativism: Reclaiming the Search for Good City Form”. 37-44.

¹⁸² Kevin Lynch, *Managing the Sense of a Region* (Cambridge, MA: MIT Press, 1976), 99.

¹⁸³ *Ibid.*, 108.

¹⁸⁴ *The Image of the City* (Cambridge, MA: The MIT Press, 1960), 9.

¹⁸⁵ *Managing the Sense of a Region*, 84-164.

planner could contribute positively towards the intended function and include all the requirements, within the built environment.¹⁸⁶

Figure 4-4 Composite landscape sketch (1976)

From: Lynch. 1976. p. 161.

A visual perception is reflecting an environmental image.

The original theories of Lynch (1958) proposed the following analytical categories of the urban zone: 'element type', 'quantity', 'density', 'grain', 'focal organisation' and 'general spatial distribution', which were applied to typical model towns with moderate success.¹⁸⁷ (Figure 4-5 and Figure 4-6).

¹⁸⁶ Kevin Lynch and Lloyd Rodwin, "A Theory of Urban Form," *Journal of the American Institute of Planners* 24, no. 4 (1958): 203-204.

¹⁸⁷ Ibid., 205-207.

Figure 4-5 Archetypes (1958)

Photomontage created from: Lynch. 1958. p. 205-207. From: Lynch. 1958. p. 207.

Figure 4-5 and Figure 4-6: The systematised archetypes assist in designing model towns with GCFs.

To help determine good urban form, it is essential to ascertain a 'goal', and reflect upon possible difficulties in recognising the benchmarks and then commencing with designing the form and volume of buildings.¹⁸⁹ These goals could be allocated as valuable evaluations, to help determine the benchmarks for the development of criteria, and commence designing shapes and volumes of buildings to achieve a GCF.¹⁹⁰ (Figure 4-7). The thesis investigation proposes that these systematised procedural goals could be used to water and are incinerated at

These categories exemplify the theory; this systematised method includes archetypes for qualitative evaluations as the built-up structure and volume controls; quantitative evaluations as facts and figures; urban parameters as adequate access and density. Additionally, built-up controls as spatial combination and quality; visual coherence as urban axis and foci; and urban integration as urban grid and patterns; to comprise primary measures and achieve a positive urban form¹⁸⁸ (Figure 4-6).

Figure 4-6 Model town (1958)

¹⁸⁸ Ibid.

¹⁸⁹ Ibid., 211-214.

¹⁹⁰ Ibid., 201-214.

a later stage to help determine a Good City Form and Smart Planned Development for the Wellington context.

Figure 4-7 Critical goals (1958)

Photomontage source: Lynch. 1958. p. 212-213.

The illustrated matrix utilised to determine the goals for GCF as per Lynch's original theory.

Lynch (1960) determined five vital elements for the positive well-being of urban inhabitants as 'paths', 'edges', 'districts', 'nodes' and 'landmarks'. These are utilised in conjunction with cohesive objectives linking interactants within the urban environments¹⁹¹ (Figure 4-8).

According to Lynch, urban environments comprise three aspects of sustainability that consist of economic, environmental, and social agendas. These urban environments form due to government fiscal policies to establish good business models and address unique cultural values. Relating to determining the size of a city, Lynch states:

Unfortunately, the evidence that there is general optimum city size is weak indeed. May it be that this great question is, after all our mental labor, only an empty one? Many effects that we attribute to city size, such as congestion, are more correctly associated with the general *density* of a city, and particularly with the density of its employment centers, when many people must converge into a relatively small area each working day. Congestion need not appear in extensive, multinucleate cities of low density, even if they are extremely large.¹⁹²

The intervisible patterns profiled for the surrounding biodiverse environments enhance the aesthetics of the built environment inclusive of the layered eco-infrastructure facilities, and to help establish a 'sense of community' for any location.¹⁹³

¹⁹¹ Lynch, *The Image of the City*, 47-48.

¹⁹² *A Theory of Good City Form*, 241-242.

¹⁹³ *The Image of the City*, 91-117.

Figure 4-8 Five vital elements (1960)

Photomontage created from: Lynch. 1960. p. 47-48.

The presented schematic elements.

The intentions for successful application of these elements are to encourage urban ‘legibility’, enhance typological associations, attain identifiable character and achieve commendable status that reflects the social capital of inhabitants within the urban environment.¹⁹⁴ The evolving model town through time would create and recreate an urban experience with inherent intentions as a ‘visual plan’ directed by these five vital elements.¹⁹⁵

This visual plan for the urban environment would represent built-up and complex structures, free-flowing and universal schemes, besides accurately compose detailed, including versatile buildings as an urban experience. The urban experience as an inherent quality would be a timeless constant, pursuing mutual perceptions for its urban inhabitants and could assist in determining a plausible model town as a GCF.¹⁹⁶

¹⁹⁴ Ibid., 1-13.

¹⁹⁵ Ibid., 115-117.

¹⁹⁶ Ibid., 115-120.

Lynch (1961) recognises patternable importance within urban planning design, as segregative patterns that consist of ‘grain’, ‘focal organisation’, and ‘accessibility’¹⁹⁷ (Figure 4-9).

Figure 4-9 Segregative patterns (1961)

Photomontage created from: Lynch. 1961. p. 48-49.

Urban patterns that determine coherent cities are cost-effective environments that contain identifiable comfort parameters.

The intricate association of patternable objects, configured as interactive junctions, amount to the grain and focal organisation. The distance between junctions determines the interactive and accessible quality of the urban environment, which define ‘accessibility’¹⁹⁸ and assist in evaluating a GCF.

Lynch’s (1981) later theories seek solutions to what equates with a ‘good city’ from its original spatial configurations. The core approaches to establishing this theory investigate component groups as performance dimensions for urban pragmatics. The urban pragmatics comprise liveable communities that each determine though reasoned understandings and values these norms differently. These ‘norms’ consist of five criteria: ‘vitality’, ‘sense’, ‘fit’, ‘access’, and ‘control’ as well as two meta-criteria: efficiency and justice. For example, the theory deals with the vitality criterion by determining public values of ‘sustenance’, ‘safety’, ‘consonance’, ‘genetic diversity’ and ‘ecological community’.¹⁹⁹ These values, as classifications of social

¹⁹⁷ *City Sense and City Design: Writings and Projects of Kevin Lynch*, ed. Tridib Banerjee and Michael Southworth (Cambridge, MA: MIT press, 1990), 47-49.

¹⁹⁸ *Ibid.*

¹⁹⁹ *A Theory of Good City Form*, 37-129.

capital and ecological environment, possess positive and negative attributes for a good city. An altered ecological environment does not alter the social capital, rather the creation of a GCF alters the social capital. The GCF comprises behavioural patterns from inhabitants as positive contributions to the urban environment and further enhances the ecological environment.²⁰⁰ These values can be included as vital aspects to define the GCF.^{201*}

4.3 Case Study Analyses

As an important part of the research methodology, a comparative analysis is provided in this section to assess the quantitative and qualitative values of the parameters to improve a megablock's GCF. The aim is to understand the working of the superblocks within these megablocks by evaluating the following four case studies:

- Woodberry Down Regeneration Project (2014–16)—Hackney Council, London.
- Discovery Bay development project (1973–2016)—Hong Kong.
- Linked Hybrid (2003–09)—Beijing, China.
- Hobsonville Point (2006–present)—Auckland.

This comparative case study analysis section intends to help develop robust criteria for superblocks within the New Zealand context. Each of these case studies will be assessed in relation to how well they achieved the four criteria established by Kevin Lynch as necessary for successful urban planning; economic, environmental, social and density.

²⁰⁰ Ibid., 101-102.

²⁰¹ Ibid., 108-109. *These are Lynch's scholarly remedies for urban sprawl.

4.3.1 Woodberry Down–London (2014–16)

Greater London Authority's (GLA) (2008) successive programme at Woodberry Down was initiated to provide the existing tenants with social housing and sought to form an international community²⁰² (Figure 4-10).

Figure 4-10 Woodberry Down regeneration (2008)

From: Ian Ritchie Architects. 2008. webpage. <https://tinyurl.com/n24xds9>

Aerial render of the megablock.

By initiating:

- narrowing of access roads with a prior 'analysis by TfL (Transport for London)',
- reduced 'visual and physical impacts on residents',
- 'secure parking' provisions,
- 'open space provisions',
- beneficial unit designs for continuing residents,
- expanded 'space standards to social rented units',
- affirmative action on 'London Plan requirements'.²⁰³

GLA (2010) had set out suitable parameters for the 'Mayor's capital growth programme' and intended to protect the green belt and food source on the outer fringes. Hackney Council's vital regeneration masterplan at Woodberry Down is an excellent example of a prevailing market trend in the United Kingdom that seeks to make provision and revitalise, at an accessible price

²⁰² Planning Decisions Unit, "Woodberry Down Estate - Kick Start Site One". 1-2.

²⁰³ Ibid., 3-4.

range, good-value property for the community. At the present stage, several superblocks redeveloped comprise the regeneration efforts within the Woodberry Down megablock.²⁰⁴

The high-yielding regeneration seeks to enhance economic, environmental, social and density aspects for this TOD. These constructive parameters also offer concessions including workable heights, open space, accessible facilities, ‘affordable housing’ and reduced vehicular car parks (ratio 0.28).^{205*}

Woodberry Down’s sustainable design includes recycling and use of sustainable building components objectives. This urban regeneration programme adopted global ‘climate change’ justifications with improved sustainable schemes and provided ‘biomass boilers’ by constructing two ‘energy centres’. The GLA intends to build six energy centres on achieving compliance and later to further upgrade with a new scheme that has twelve energy centres.²⁰⁶

The urban regeneration programme also contemplates ‘Metropolitan Open Land’, the ‘Blue Ribbon Network’, a boarded walkway and landscaping with a pathway to the river. The ‘Nature Conservation Action Plan’ includes protective measures for waterbirds after evaluating the ecological environment on the river edge and ensuring compliance with the ‘UK Biodiversity Action Plan’ with ‘London Wildlife Trust’. This urban regeneration programme is also in agreement with the Noise and Pollution Act (1974).²⁰⁷

Economic: The economic aspects of this megablock have positively influenced Hackney council with better developments that contribute to the macro business, in addition to the amenities and retain, by providing communal service for this Hackney council subregional lease. The scheme has introduced cost-effective operational procedures, addressing vital issues such as economic and environmental utility, for the tenants and owners’ well-being.

Environment: The ecological habitat preserves biodiversity, fosters the reservoir and supports wildlife within the Hackney council subregion (megablock). These intentions conversely create a sustainable development, by increasing viewing angles, adding better pollution and noise controls, and enhancing social capital.

²⁰⁴ “Kick Start Site 3: Woodberry Down in the London Borough of Hackney,” *PDU/2880/02* (2012). Greater London Authority. <https://tinyurl.com/z5aepy6>, 1-15.

²⁰⁵ *Ibid.*, 1-14. *This is a second stage official endowment for regeneration.

²⁰⁶ “Woodberry Down Estate in the Borough of Hackney,” *PDU/0704b/02* (2009). Greater London Authority. <https://tinyurl.com/z88nbqh>, 17-23.

²⁰⁷ *Ibid.*

Social: The social capital consists of existing tenants along with newer owners who together comprise communities that interact within the community zones and amenity areas of the developments. The development's community is improved through this rejuvenation process.

Density: Woodberry Down achieves increased density by implementing continuous regeneration programmes that include relocating existing tenants to the newly developed phases. The urban planning design has made additional changes by increasing the previous building heights with constructive towers that rest on top of the perimeter blocks.²⁰⁸

4.3.2 Discovery Bay development project–Hong Kong (1973–2015)

The Sino-British Joint Declaration (1984) brought the real estate markets to extremely low prices which lasted until the official hand-over of Hong Kong to the People's Republic of China in 1997.²⁰⁹ The market recession also affected growth patterns of Discovery Bay (1973–2016) and slowed the phases of construction for the megablock until after the millennium. Discovery Bay is operated by a private firm, Hong Kong Resort Company Ltd, and offers shares to end-user buyers²¹⁰. Likewise, the GLA at Woodberry Down commenced in 2015 with 'right to buy' residential units as an additional option that included 50% 'affordable homes' and 50% 'housing authority' apartments.

In the year 2011, the residential population of Discovery Bay was 12,258, with 14 completed phases and none of the public facilities as conceptualised by the developer (0.12 development ratio) except for the four private golf courses.²¹¹ The other amenities included schools, kindergartens, a fire station, clinics, health clubs, plazas, landscape, beach and reserve, to make the development a stimulating urban environment in which to live, work and play.²¹²

The residential density amounted to 20.0 people per hectare (ppha) at 4,383 du and <3 persons per unit,²¹³ with a maximum of 24 levels per block. With several phases of development still pending, Discovery Bay expects a sum total of 25,000 residents at 40 pp/ha,²¹⁴ which would

²⁰⁸ "Woodberry Down Masterplan," *Planning Report D&P/0704d/01* (2014). <https://tinyurl.com/j8clact>, 1-9.

²⁰⁹ Roger Nissim, *Land Administration and Practice in Hong Kong* (Hong Kong: Hong Kong University Press, 2012), 26-29.

²¹⁰ KPMG, "Discovery Bay City Owners' Fund". 1-21.

²¹¹ Census and Statistics Department, "2011 Population Census - Fact Sheet for Discovery Bay in Islands District Council District," (2011). The Government of the Hong Kong Special Administrative Region. <https://tinyurl.com/zmuayn7>, 1.

²¹² Audit Commission Hong Kong, "Grant of Land at Discovery Bay and Yi Long Wan". 15-24.

²¹³ Census and Statistics Department, "2011 Population Census - Fact Sheet for Discovery Bay in Islands District Council District". 1.

²¹⁴ Audit Commission Hong Kong, "Grant of Land at Discovery Bay and Yi Long Wan". 48.

amount to an estimated density from >14 to <21 du/ha, equivalent to a medium-density housing (MDH) megablock upon completion (Figure 4-11).

Figure 4-11 Occupation type for Discovery Bay, Hong Kong (2011)

Created from: Census and Statistics Department 2011. p. 1.

*The total population indulging in residential and commercial activities was 18,846 with 29.2% unpaid family member: classifying residents as 5.8% self-employed, 5.6% homemakers, 10.5% students and 6.8% retired persons, 7.0% others and the remaining <35.0% in ongoing occupation.*²¹⁵

Discovery Bay reflects attributes of Lynch's theory. This continuous process has evolved over four decades and is still building a megablock²¹⁶ (Figure 4-12).

Imageability is evident while riding the ferry, which forms the primary link to the urban centre (Hong Kong Island) and assists the viewer to 'look' to this megablock that is interwoven within the urban form.²¹⁷ The ancillary accesses to Discovery Bay include a commutable mass transit railway (MTR) with an interchange for public bus and an urban corridor to the vehicular parks at the main entrance.²¹⁸

²¹⁵ Census and Statistics Department, "2011 Population Census - Fact Sheet for Discovery Bay in Islands District Council District".
1.

²¹⁶ Lynch, *The Image of the City*, 115-117.

²¹⁷ Ibid.

²¹⁸ Matt Valentine, *Love Letter to Discovery Bay*, podcast audio, Music Video Showing A Day in the Life of Discovery Bay, Hong Kong on December 7th, 2013., 5:10, accessed May 14, 2016, 2013, <https://tinyurl.com/zl2mue4>.

Figure 4-12 Amalfi superblock–Discovery Bay (2013)

From: Luo. 2013. p. 82.

Amalfi superblock denoted by the colour red within the outlined Discovery Bay megablock.

Amalfi represents a typical built environment within the Discovery Bay megablock, which includes three mid-rise blocks in which prospective buyers can expect the following.²¹⁹

- “amenities that complement the residential unit with” [swimming pools and common areas] “for prospective inhabitants and their guests, together with access to the worthwhile megablock’s amenities”.
- common areas that comprise main “entrance and lift lobby, mail and delivery room, management counter with elevators and landscaped” communal zones.

²¹⁹ Luo Jiayun, “Sub-Deed of Mutual Covenant,” *Amalfi, 8 Amalfi Drive, Area N1d, Phase 14, Discovery Bay City, lantau Island, New Territories* (2013). Kao, Lee & Yip Solicitors. <https://tinyurl.com/jfj8y7a>, 1-2.

- constructive facilities that provide, operational “transformer rooms, electrical low voltage room, functional air-conditioning unit, and platforms”, and dormant “fire services water pump and fire hose reels”. Additionally, there are readied portable “water pumps, water meter cabinets, and flushing, electrical meter cabinets, dormant emergency generators and electrical meters”.
- constructive facilities that include effective, “telecommunication broadcasting equipment and positive television networks”.²²⁰

The prospective buyers of a residential unit at Discovery Bay are granted with rights for ‘easement and privileges’, authorisable “subject to which each undivided share of and in the lot and city is held”. A full undivided share allows equitable interests to residents that might not be equal in stock value, for the amenities, common areas, and land owned in a megablock.²²¹

Economic: The consistency of constructive developments is maintained to sustain professional opportunities and market and asset values within the megablock. The apartment owners form as undivided shareholder partners and are passively responsible for the maintenance of existing and construction of new superblocs, exemplified as Amalfi (Figure 4-13 and Figure 4-14). The invested shareholders in liaison with the management offices within the greater megablock are responsible for making progressive decisions and reside in or rent their properties.

The constructed privately-owned hotels, golf courses, functional shopping plazas and public transport systems are reasonable financial assets that assist in achieving sustainable outcomes for the economic, environment and social aspects.

Environment: The ecological environment, although not green rated, has several green attributes, such landscape, bush and beach. While the vegetation is maintained as a reserve, the landscape and beach form transitional comfort zones for movement and leisure activities.

²²⁰ Ibid.

²²¹ Ibid., 1-40.

Figure 4-13 Amalfi superblock plan (2010)

From: Discovery Bay. 2010. webpage. <https://tinyurl.com/kge8mla>

This residential superblock was created and constructive project programmed in phases.

SCHEDULE OF ACCOMMODATION FOR AREA N1d/e									
USER	NO. OF UNITS		GROSS BUILDING AREA (m ²)		GROSS SITE AREA (m ²)		PLOT RATIO		
	MP 6.0E1 Area N1	This SMP	MP 6.0E1 Area N1	This SMP	MP 6.0E1 Area N1	This SMP	MP 6.0E1 Area N1	This SMP	This SMP
HOUSING ACCOMMODATION	2075	N1d/e 266	173,855	N1d 15,731.794 N1e 17,437.490	33,169.284	414,450	N1d/e 44,257	0.42	N1d/e 0.75
		N1a/b 757		N1a/b 59,932.116			N1a/b 71,914		N1a/b 0.83
		N1c 541		N1c 49,720.586			N1c 17,087		N1c 2.91
		N1f/g 298		N1f/g 31,033.014			N1f/g 89,895		N1f/g 0.35
	TOTAL	1,862 < 2075	TOTAL	173,855 = 173,855	TOTAL	223,153 < 414,450			

Figure 4-14 Amalfi site working (2010)

From: Discovery Bay. 2010. Webpage. <https://tinyurl.com/kge8mla>

This schedule forms the detail of areas for the Amalfi superblock.

The 615.2ha site²²² of the megablock in relation to the floor area ratio (FAR) and building height provides significant open ground space and seeks to increase the built environment in pertinent to the *Environmental Study* created by Ove Arup & Partners to maximise land use.

²²² Audit Commission Hong Kong, "Grant of Land at Discovery Bay and Yi Long Wan". 48.

The *Environmental Study* assesses the possible impact of further constructive development as criteria for the daily commute, water supply drainage and sewage to avoid contamination and noise, which affect the air and water quality, to conserve the land and marine ecology.²²³

Social: Discovery Bay has withstood time and matured by realigning growth strategies to a sustainable investment pattern that conserves the ecological environment as natural capital. This investment pattern has led to financial securities and assists in forming social capitals. Likewise, the built environment that reflects GCF characteristics enhances positive behavioural aspects and minimises negative physiological and psychological impacts on residents, through supporting Green TODs and interactions, and appropriate amenities and facilities.

Density: The Discovery Bay megablock has increased its suburban density over the past four decades. There has been a total of six revisions, and the seventh masterplan is under a draft proposal by the residential owners. Each superblock has established comfortable densities by maintaining an appropriate balance among actual, visual, perceived and interactive aspects of densities through continuous phase developments.

4.3.3 Linked Hybrid–Beijing (2003–09)

The Linked Hybrid complex is categorised as an urban revitalisation project when compared with Amalfi, which categorises as a suburban superblock, within the Discovery Bay megablock. Although the distinguishable factors of the superblock remain the same, the urban or suburban aspects make the difference (Figure 4-15 and Figure 4-16).

²²³ Ove Arup & Partners Ltd., “Optimisation of Land Use in Discovery Bay: Environmental Study (Area 10b),” *Hong Kong Resort Company* (2015). Ove Arup & Partners Ltd. <https://tinyurl.com/jqqezua>, 1-11.

Figure 4-15 Linked Hybrid Complex (2003–09)

From: Steven Holl Architects. 2009. p. 342.

Site Plan.

This 220,000m² mixed-use superblock observes social interaction as natural components with sustainable characteristics that foster transitional spaces by blending the internal zones and external streets as a vibrantly motivated built environment. The revitalisation is visually superimposed as urban layers for purposeful interaction within commercial, residential and educational zones, having made provision for comfortable amenities and sustainable features. The 22 superimposed urban layers embody a circumferential walk at levels 12 to 18, spatially integrating a set of towers with podiums and streets with courtyards evolving into urban vistas with commutable pathways. The sustainable aspects of the Linked Hybrid include geothermal wells with symbolic green spaces and load-bearing sun-shaded facades that assist in connecting pathways with natural vistas for better living for the inhabitants.²²⁴ The best summary of the Linked Hybrid Complex would justifiably be a private development that has strived to attain

²²⁴ P. Haupt, "Architecture Vs. Nature: A Reinvented Relationship," *Eco-Architecture V: Harmonisation between Architecture and Nature* 142 (2014): 42-44.

social capital and environmental sustainability to urban revitalisation, by recognising social interaction while creating a superblock.

Figure 4-16 Linked Hybrid Complex (2003–09)

From: Steven Holl Architects. 2009. p. 343.

The Linked Hybrid Complex is a horizontal skyscraper in Beijing, China.

Economic: The high investment strategies utilised, as allocated by the government to incorporate sustainable features, have provided means of income for domestic and international suppliers and manufacturers as a premium on project investment costs. These costs also allow the constructed superblock to be projected as innovative designs with artistic construction techniques. The sustainability features are specifically designed to reduce operational costs to zero in most instances. Over and above these aspects, the interactive densities assist in enhancing convenience shopping and entertainment zones with micro-businesses to increase asset value within this mixed-use superblock.²²⁵

²²⁵ Steven Holl Architects, *Linked Hybrid*, 00:00:00–00:10:48.

Environmental: The 655 geothermal wells, which are 100m deep, have made provisions for up to 70% heating and cooling energy efficiency. All horizontal planes maximise greenspace and water bodies to incorporate sustainable features of green roof and grey water on-site storage to stabilise the micro-climatic conditions of the superblock and assist with milder temperature variations.²²⁶

Social: The interactively advanced high-density along with public amenities and zones have increased social interaction, which is beneficial to microeconomics and forms social capital within this mixed-use superblock. Green TODs provide for bicycle parking and pedestrian non-motorised friendly zones within this designed compact and mixed-use superblock that lies within 15 minutes' walking distance to the nearest transitional subway station.²²⁷

Density: The floor area ratio (FAR) 2.10, with a building height of 73.5m for this residential hybrid complex, has an equivalent density of FAR 2.65 for a typical 100m tower. This high density is perceived as low by the residents due to the placement of buildings and alcove windows for the condominiums, which assist in providing substantial privacy with reduced visual densities. The superblock provides ground level permeability, and the garden level and sky loop enhance interactive densities by providing public spaces as zones of experiential movements that reverberate as a city within a city. The three interactional layers also assist the condominium owner with a visual connection to the horizontal plane (landscape) with reduced vertical level differentiations as experienced in medium-rise buildings, which typically created <24 to 27m heights.²²⁸

4.3.4 Hobsonville Point–Auckland (2006–present)

Hobsonville Point is a 167ha site, solely-owned by Hobsonville Land Company, and is an affiliate through PPP with HNZ Corporation. The project programme regenerates the former RAF (Royal Air Force) airbase facilities into ten to fifteen year phased development. This development's aims utilise a method combining construction industry experts and welfare trust lobbyists. The case study evaluates the project's impacts as an outer fringe MDRA relevant to the New Zealand context. The site is positioned on Hobsonville Peninsula and bounded by the Waitemata Harbour within the northwestern districts of Auckland. The constructive intentions

²²⁶ Ibid.

²²⁷ Ibid.

²²⁸ Ibid.

comprise 3,000 houses and promote 2,000 employment opportunities in the adjoining marine industrial facilities (Figure 4-17).

The site eventually will comprise less than 18 du/ha upon completion. The agendas include resident amenities recreational and support facilities and educational premises. The development promotes aim to make “a place to; live, learn, work, and play and grow.”

Figure 4-17 Hobsonville Point—Development (2015)

From: Hobsonville Land Company. 2015. p. 3.

The location map illustrating the development in blue colour, positioned on SH18 (Green coloured line) with connections from SH1 (blue coloured line) and SH16 (red coloured line) to Auckland’s CBD, apart from the Ferry Service denoted as black coloured dash line.

The Hobsonville Point’s master plan consists of ten neighbourhood units (primary superblocks) as divisional precincts of different types. The pathways created for pedestrians include green spaces, parks, and playgrounds that enhance social interaction among residents²²⁹ (Figure 4-18).

²²⁹ Simon Loius Opit, “Consuming Community: Land Development Projects and the Rhetoric of Building Community in Hobsonville, Auckland” (Master of Arts in Geography, University of Auckland, 2012), 1-28.

Figure 4-18 Hobsonville Point Development—Axonometric (2015)

From: Hobsonville Land Company. 2015. p. 4.

The Hobsonville Land Company's management envisions to: "Build a strong, vibrant community that sets new benchmarks for quality and accessible urban development with an environmentally responsible focus."²³⁰ The firm combines objectives from the Sustainable Business Network and the New Zealand Green Building Council to deliver this vision. The environmental sustainability objectives were achieved by working with central government organisations and the New Zealand Green Building Council.

Economic: This megablock seeks to incorporate urban growth through competent business zones, besides enhancing profitability for the investors and inhabitants. Additionally, the approach decreases the resident's spending through resourceful environmental measures. The measures include alternative public transport connecting Auckland's CBD, which results in >50% households with one or less vehicle. The 6ha Marine Zone offers jobs in proximity to the development. The development also creates a shopping street, community centre, and a kindergarten. 75% residents are located within 1200m of primary schools and 1600m of secondary education. The megablock also provides 'bike and car shared schemes', further enhancing cost-efficiency levels (Figure 4-19).

²³⁰ Hobsonville Land Company, "Sustainability Report 2014/15," (2015). Hobsonville Land Company. <https://tinyurl.com/le975x7>, 3.

Figure 4-19 Hobsonville Point Masterplan (2011)

From: Lietz. 2011. p. <https://tinyurl.com/ma8ajrv>

The master plan illustrates the designed features within the site that revolve around the main street with a village concept. The urban grid creates pedestrian-friendly zones for cycling, public transport, and walking, for the residents and visitors.

Environment: The megablock seeks to incorporate urban growth while increasing the existing biodiverse environments. Additionally, the built environment protects the ecological environment by employing energy efficient design processes and decreasing fossil fuel usage. The environmental initiatives improve and reduce water utilizations, including conversion of existing building and waste minimisation programmes. The site also includes 10% of the total land area ($\pm 16.7\text{ha}$) as green pathways, spaces, and reserves of biodiversity. The biodiversity assessments consisting of before and after construction reflect an addition to plant variety and quantity. The average electricity and gas utility (2026 target) comprise $\leq 6500\text{kWh}$ amounting to 12% lesser than Auckland city's median rating of 7115kWh . The average water utility (2026 target) comprise ≤ 100 litres amounting to 33% lesser than Auckland city's median rating of 157 litres. The mean dwelling's waste per person per annum contains $\leq 100\text{kg}$ together with 20% of the existing buildings reused. The houses are efficiently constructed at "BPI [Building Performance Index] of 1.2 or lower for thermal performance and 5.5 Star HERS [Home Energy Rating System] hot water rating", or commercial property to NZGBC (New Zealand Green Building Council) standards.

Social: The megablock seeks to incorporate urban growth through public amenities and to foster an international environment at Hobsonville Point. Additionally, this megablock makes provision for affordable homes for 'first home buyers' and inhabitants with 'moderate

incomes'. These provision also incorporate community centres. The intentions seek to "promote a healthy and safe living environment." These social enhancements create a real base for residents at various levels of interaction (childhood, youth, adult and elderly living) with opportunities provided through public amenities to improve skills. These objectives seek to foster social interaction by $\geq 80\%$, for the 2026 target with 20% more affordable homes. Also, the megablock is especially designed for children to live in safe neighbourhoods from an earlier age. All residents are placed within 400m walking radius to common interactional spaces and leisure zones.²³¹

Density: The net residential density is < 18 du/ha. The visual density is therefore less than the visual density affecting in higher density residential apartment precincts. These precincts comprise mixed-use blocks of ground level shops with four-storey apartments above, lacking green spaces. This urban mixed-use development inappropriately is constructed within an outer fringe megablock. These mixed-use perimeter block style precincts are ill-advised for the well-being of inhabitants in the New Zealand context. Even though shared green spaces remain in proximity within the megablock, the visual perception comprises roads and parking spaces. Moreover, the inhabitants suffer increased stress from amplified noise and pollution levels. Nevertheless, the megablock successfully has managed to keep the perceived density low with decreased heights. The decreased perceived density seems pointless in consideration to the 270° views to Waitemata Harbour surrounding the peninsula. Therefore, even though claims remain to have enhanced interactive density among other issues, the optimum levels, still are to be achieved.

The megablock comprising 167ha would have served well as a smart planned development supporting alternative transport with the boundaries. The megablock relatively have optimised conventional improvements for the health and wealth-being of the inhabitants. A future project using these precedents would cause negative effects within the New Zealand context. Unfortunately, the development's roads are future-proofed for the next decades, and most of the buildings work completed. The revisions of the road networks at this stage are next to impossible and an expensive affair. The impacts should have been well-thought of at master plan stages for the entire megablock, rather than for superblocs. However, future-proof developments can pursue the path of a New Zealand superbloc—SPD approaches.

²³¹ Ibid., 1-19.

Table 4-5 Superblock – Comparative analysis sampling frame (2016)

Particulars	Woodberry Grove—Blk-2 KSS2	Discovery Bay—Amalfi	Linked Hybrid	Hobsonville Point—Sunderland
Built environment components				
Urban Fabric	B	B	B	C
Climatic	B	B	B	B
Environ. planning	A	B	B	C
Performance components				
Design life	B	B	B	B
Const. detail	C	C	B	B
Aesthetic value	C	C	C	C
Meta components				
Social cohesion	B	B	B	B
Economic	B	C	B	B
Cultural	B	B	A	B
Site specific quantitative and qualitative data				
Site area (ha)	1.22	4.4	5.9	7.4
Bldg. area (m ²)	25000	33169	221426	–
Dwelling unit (du)	220	266	644	211
Affordable	160	–	–	<152
Existing tenants	60	–	–	–
Heritage homes	–	–	–	10
Retail (m ²)	2805 Excl.	–	Incl.	–
Clubhouse	B	B	B	B
Amenities	C	B	B	B
FAR	2.05	0.75	3.73	–
Bldg. height (m)	30	93.8	73.5	<15
Greenspace (%)	40	30	25	<15
Car parks	71	–	1000	>211
Sustainable ratings	BREEAM	–	LEED	HERS–NZGBC
Training centre	C	C	C	B
Courtyards	B	B	C	B
Swim. pool	–	B	B	–
Water / sport	B	B	–	B
Cinema	–	–	B	–
Plaza	B	B	B	B
Compatibility ratings and sub-classification symbols: <u>A</u> – Excellent, <u>B</u> – Good, <u>C</u> – Poor, <u>D</u> – Fail				

From: Author. 2016.

The Sunderland Development's (superblock) construction area is still not finalised, and resources consents are pending. While Woodberry Grove, Amalfi, and Linked Hybrid have been constructed and actively being used.

The four comparative analyses of superblocks that function as standalones or within megablocks suggest possibilities for modern-day superblocks when relevant aspects are

combined and appropriately applied to the New Zealand context. These considerations, along with quantitative and qualitative evaluations and validations, could be used to help arrive at solutions for mixed-method deductions to resolve a New Zealand superblock's parameters (Table 4-5).

4.3.5 Thesis Proposition for application to a New Zealand superblock

Based on the comparative analysis, the list below indicates empirical relationships that would be most successful for a New Zealand Superblock:

Rural Residential: not ≤ 1 unit per 8ha.²³²

Suburban:

Residential FAR ≤ 0.5 to ≤ 1.8 .

Ground Coverage $\leq 12\%$ + storm water reticulation $\leq 18\%$.

Density

Apartment Block [≤ 9 to ≤ 11 levels] du: ≤ 45 per ha size $\geq 80 \sim \leq 180\text{m}^2$

[apartment / perimeter block floor plate dim. $\leq 100 \times \leq 100\text{m} \times \leq 18\text{m}$ depth].

Tower Block [≥ 12 to ≤ 45 levels] du: ≥ 140 per ha size ≥ 60 to $\leq 144\text{m}^2$

[tower block floor plate dim. $\leq 30 \times \leq 18\text{m}$].

Urban: Commercial FAR ≤ 3.0 to 5.0 inclusive of 10% convenience shops.

Ground Coverage $\leq 40\%$.

Above podium ht. $\leq 24\text{m}$, tower coverage $\leq 28\%$.

Building height ≥ 80 to $\leq 150\text{m}$.

25% of the total constructed area to be used as du, size $\leq 60\text{m}^2$.

Centre: Commercial FAR ≤ 8.0 .

Ground Coverage $\leq 100\%$.

Above podium ht. $\leq 24\text{m}$, tower coverage ≤ 28 to $\leq 35\%$.

Residential + $\leq 10\%$ convenience shops FAR ≤ 3.0 .

Building height $\leq 500\text{m}$.

²³² R. Andrew and J. R. Daymond, "Expansion of Lifestyle Blocks and Urban Areas onto High-Class Land: An Update for Planning and Policy," *Journal of the Royal Society of New Zealand* 43, no. 3 (2013): 137.

Ideally, all areas within a New Zealand superblock should accommodate eco-infrastructure for a ratio to the size of the development, such as grey water, sewerage, garbage and recycling facilities with additional ground coverage permitted for storm water reticulation.

Summary: *Comparative Method and Case Studies*

While the individual application of any one approach alone may not be suitable to the Wellington context, this chapter and the previous one together show how analysing three relevant international superblocks and a local superblock can help establish a New Zealand specific theory of GCF.

5. Critical Reflection

The previous chapter looked at the strategic viability of superblocks within the New Zealand context through merging relevant component of:

1. Ecological Design (ED) principles by Sim Van der Ryn and Stuart Cowan;
2. Green Urbanism (GU) principles by Steffan Lehmann;
3. Robert Cervero and Catherine Sullivan's framework for Green Transit Oriented Development (Green TOD).

These components, considered specifically in relation to applicability to the New Zealand context, were examined within the context of four important criteria established by Kevin Lynch's—economic, environmental, social and density—to establish desirable urban planning characteristics.

Kevin Lynch's guiding principles will then be tested in the final thesis chapter in relation to the Wellington context, using Lincolnshire Farm as an investigative site exemplar.

Lynch defines normative theories as 'explicit, commonly understood rules of evaluation:

A normative theory, therefore, must deal with the complexities of aesthetic, ethical, and political theory to secure its foundations and cannot rely solely on empirical evidence from the social and natural science.²³³

This suggests that the 'social, economic and cultural' urban planning process 'variables' are of greater prominence than the 'spatial' or aesthetic values that define the built environment of a city. Nevertheless, these variables also implicate spatial and aesthetic values for any urban environment.

On assessing historical references, Talen and Ellis reach a conclusion that "one generation's 'solution' to the problem of metropolitan form often becomes the next generation's 'problem'". Therefore, to avoid such situations, an intelligible approach to architecture and planning is required.²³⁴

²³³ Talen and Ellis, "Beyond Relativism: Reclaiming the Search for Good City Form". 38.

²³⁴ Ibid., 37-38.

According to Kevin Lynch (1981) to achieve a GCF, an architect or planner has to determine a good normative infrastructure.

This theory asserts that the form of any permanent settlement should be a magical model of the universe and the gods. It is a means of linking human beings to those vast forces and a way of stabilizing the order and harmony of the cosmos. Human life is thereby given a secure and permanent place; the universe continues its proper, off, and, not incidentally, the structure of human power—of kings, and priests and nobility—is maintained. All of this may seem sheer superstition today, but the theory has had a tremendous historic influence. Moreover, it turns out that we enlightened ones still abide by many of those same ideas. There may be reasons for their tenacity that go beyond superstition.²³⁵

Relating to Lynch's recommendation for planners to utilise a normative infrastructure, authors Talen and Ellis state, "We believe that a theory of good city form should coexist at the same level with other planning theories and animate planning practice more than it does at present."²³⁶ Therefore, an insight into the workings of Lynch's normative structure rationalises a critical theory, or offers an American pragmatism reflection of critical enquiry methodologies. The methodologies comprise analytical, practical, and normative methods to provide clear norms, for the criticism as well as achievable pragmatic goals of transformation.

5.1 Objections

In this book *Good City Form*, Lynch asks: "But Is a General Normative Theory Possible?" He responds, "While theories about the origin, development and functioning of cities are in course of lively development, and while the theory of the planning process (decision theory) is well along, we have no adequate contemporary normative theory about the form of cities. There is a dogma and there is opinion, but there is no systematic effort to state general relationships between the form of a place and its value. If we have some ground for understanding that cities are, we have practically no rational ground for deciding what they should be, despite a flood of criticism and proposals. ...It may simply not be possible to create a connected normative theory. There are a number of reasons why this could be so, and it is well to state them explicitly, thus allowing an explicit rejoinder. Many of these doubts have at one time or another been my

²³⁵ Lynch, *A Theory of Good City Form*, 73.

²³⁶ Talen and Ellis, "Beyond Relativism: Reclaiming the Search for Good City Form". 37.

own, as these ideas developed, waxing, over the years.”²³⁷ Lynch then explores the eight most common ‘Objections’ and responds to each one.

Lynch’s book, *A Theory of Good City Form* presents 8 common ‘objections’—followed by his rebuttal of them. It is Lynch’s response to these eight objections that comprise Lynch’s normative theory. Lynch writes;

“These limitations might be inevitable. It may simply not be possible to create a connected normative theory. There are a number of reason why this could be so, and it is well to state them explicitly, thus allowing **an explicit rejoinder**. Many of these doubts have at one time or another been my own, as these ideas developed, waxing and waning, over the years. Here, then, is my position today.”²³⁸

Lynch is describing the 8 typical ‘objections’ (limitations) to a connected normative theory, i.e. why it may not be possible. He then addresses each ‘objection’ (or limitation) with an explicit ‘rejoinder’. A rejoinder is a rebuttal or response to an objection.

Lynch’s description of each objection, and then his response to each objection is the most important and presented as reflections. These reflections comprise a direct quotation of his objections and subjective interpretations of Lynch’s rebuttal and response.

Objection 1: “Physical form plays no significant role in the satisfaction of important human values, which have to do with our relations to other people.”²³⁹

Rejoinder: “It is rather easy to demonstrate that we are made miserable or joyful by physical conditions as well as by social ones, although the effects are sometimes obscure.”²⁴⁰

The built environment’s aesthetic values often have little bearing on the physical well-being of inhabitants. Spatial configurational options provide alternatives for building spacing, daylight, and ventilation, in addition to weatherproofing and sanitation together with interior spatial dimensions to help enhance the physiological and psychological conditions of inhabitants. Well-designed built environments have a positive impact on the well-being of inhabitants, although the impacts at times are inapparent.

²³⁷ Lynch, *A Theory of Good City Form*, 99.

²³⁸ Ibid.

²³⁹ Ibid.

²⁴⁰ Ibid., 100.

Objection 2: “More precisely, physical form by itself has no important influence on human satisfaction. Unless you specify the particular social circumstances of the people who occupy a place, you cannot judge the quality of that place.”²⁴¹

Rejoinder: “Yet it is evident that physical patterns have important effects on people, given a set of social patterns, and that an analysis of these physical effects is important to understanding the whole.”²⁴²

The built environment does not by itself impact the inhabitant’s well-being and contentment. Instead, the social context is particularly important in determining the psychological standard of the built environment. For example, a Hong Kong Island resident might consider a dwelling’s room in New Zealand as spacious, while a Chinese citizens from the mainland might find the same room size smaller than acceptable.

Objection 3: “Physical patterns may have predictable effects in a single culture, with its stable structure of institutions and values. But it is not possible to construct a cross-cultural theory. It is even dangerous, since it will inevitably be used to impose the value of one culture on another. Each culture has its own norms for city form, and they are independent of those of any other.”²⁴³

Rejoinder: “Nevertheless, the danger remains, as in any theory dealing with human values, that a handsome general formulation cloaks an ethnocentric bias. Being aware of this danger is one defense against it.”²⁴⁴

A built environment influences cultures to form a steady social context, rather than multi-cultural environments. Cultural values establish standards or normative structures. Social ‘concerns’ share cultural values and result in similar built environment solutions for shared problems. These concerns should allocate equal credit to the “theory dealing with human values, that a handsome general formulation cloaks an ethnocentric bias.”

Objection 4: “Regardless of any influence it may or may not have, physical form is not the key variable whose manipulation will induce change.”²⁴⁵

²⁴¹ Ibid.

²⁴² Ibid., 101.

²⁴³ Ibid.

²⁴⁴ Ibid.

²⁴⁵ Ibid.

Rejoinder: “It is sufficient, in order to make its study relevant, to show that a change of physical form can often be made and can have an influence on persons, independent of social change.”²⁴⁶

Contrary to common beliefs, the social context can alter the built environment. Research investigations into built environments show impact analyses of social capital over the course of time. The built environment’s evolution results from “time and through an intervening variable, that is, through the actions and attitudes of persons.” The conception of a public garden, for example, might bring containment to the inhabitant, thereby enhancing associated leisure attributes. Successful urban planning, therefore, needs to acknowledge that the built environment does impact the individual, community, and the social capital.

Objection 5: “But physical form is not critical at the scale of a city or a region. The shape of one’s home or workplace or neighbourhood, where most people live out their lives, has something to do with the quality of life.”²⁴⁷

Rejoinder: “We will try to show that this consignment of physical concerns to a purely local influence is a false boundary. It may be that the feature that have been thought to comprise large-scale city form are indeed irrelevant phenomena.”²⁴⁸

The built environment contributes to the well-being of the inhabitant on a micro-scale comprising the level of interaction within the interiors of the dwelling, office, and neighbourhood building(s), more than at the metropolitan’s macro-scale of activities. At the metropolitan scale issues such as “economic and social consideration take over.” Therefore, it is advisable to consider a megablock’s GCF, rather than only entire metropolitan’s unified aesthetic values.

Objection 6: “But even if there were a demonstrable connection between city form and value, it would inapplicable, since there is no such thing as the “public interest.” Even within a single culture and a single settlement.”²⁴⁹

Rejoinder: “Even if this were untrue, a normative theory would still be useful to any struggling group (and to its professional advocates) in order to make clear to themselves what they want,

²⁴⁶ Ibid., 102.

²⁴⁷ Ibid., 103.

²⁴⁸ Ibid.

²⁴⁹ Ibid.

as well as being essential for any neutral planner who indifferently, amorally, and scientifically predicts the outcome of whatever outrageous proposal is submitted to him.”²⁵⁰

The general values consider the natural and social capital of prime importance to meet the need of present and future generations. These measures can address various aspects to comprise better environmental, aesthetic values to benefit the social capital. However, the general values need to be considered within the social context and be evaluated for alternative methods before application as process implementations. Lynch recommends a normative theory to any professional, group, or community involved in such decision-making processes. The policy theory would assist in utilising the natural capital to benefit the social context while sustaining economic requirements and cultural values. The policy structure would assist professionals in validating the proposed use of associate values.

Objection 7: “Normative theories—that is, explicit, commonly understood rules of evaluation—may be possible in regard to purely practical objects such as foundations or bridges, but are inappropriate for esthetic forms.”²⁵¹

Rejoinder: To these arguments Lynch states:

My first answer is that cities are, of course, also very practical objects, whose multiple, explicit functions can be the subject of clear, external discourse. Moreover, collective decision, when it extends beyond the very small group, demands such discourse.

My second and more fundamental answer is that “practical” and “esthetic” functions are inseparable esthetic experience is a more intense and meaningful form of that same perception and cognition which is used, and which developed, for extremely practical purposes. Theory must deal with the esthetic aspects of cities, even though it may be a more difficult part of its task. Indeed, it must deal with function and esthetics as one phenomenon.²⁵²

The normative structure possibly might miss a few ‘complex’ aspects of ‘subjective qualities’ of issues. In compliances made to the block quote.

Objection 8: “Cities are vast natural phenomena, beyond our ability to change’ and beyond our knowing how we ought to change them.”

²⁵⁰ Ibid., 104.

²⁵¹ Ibid.

²⁵² Ibid.

Rejoinder: “However, we do intervene in complex, large-scale, “natural” phenomena, with some knowledge, and do not inevitably incur disaster.”

Lynch refers to historical mega-projects while stating, “[a]ttempting to design a city as one designs a building is clearly misleading and dangerous....” These deductions must have materialised through empirical assessments. Lynch also recommends the use of five ‘in order to’ questioning methodology and determines the process by which any design can be brought to positive fruition.²⁵³

The discussions comprise Lynch’s normative structure of GCFs in addition to developing a multitude of options from various cultural values. The choices need to consider the differing contextual implications that normally are unique to each location. The cultural variable is determined by the inhabitant’s values that differ in classified groups and communities. In the course of time, practicality typically overshadows the inhabitant’s demands. Approvals addressing the demands of several urban inhabitants as decision makers, require an explicit comparative methodology to deduce proposals, recommendations, or initiatives. According to Lynch, the approval process comprises an urban policy that outlines the initiative’s objectives similar to “health, well-living, the highest and best use of the land, the conservation of resources, a stable and integrated society, a maximum of opportunity, and the like.”²⁵⁴ The original strategic urban policy reflects theoretical understandings, for the general public’s aspirations. Subsequently, the preliminary strategic policy would be followed by initial public approvals through urban planning proposals. These proposals would ideally comprise reasonably sound assessments of problems with a few specifically designed solutions that result in structure plans. These structure plans would then comprise evaluations to prioritise objectives while weighing their relative merits and demerits. Lynch emphasizes:

those goals which are as general as possible, and thus do not dictate particular physical solutions, and yet whose achievement can be detected and explicitly linked to physical solutions. This is the familiar notion of performance standards, applied at the city scale.

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These attributes linked to a strategic urban policy might consist of a basis to establish a normative theory with appropriate aims.²⁵⁶

²⁵³ Ibid., 99-108.

²⁵⁴ Ibid., 105-108.

²⁵⁵ Ibid., 108.

²⁵⁶ Ibid., 106-108.

5.2 Dimensions of Performance

According to Lynch, the approach to measure performance of spatial configurations for urban environments determines the attributes and ensures the quality of the location. The quality of the site comprises the urban environment apart from the social capital that involves the inhabitants. Lynch argues that the strategies to focus and ascertain the parameters of the performance assessments for any site consist of three interlinked considerations. These considerations include to elaborate form and purpose, describe the spatial configurations, and evaluate the unique attributes for an urban environment. These unique attributes contribute to an 'identifiable character' reflecting the spatial quality, which is assessed using the following characteristics: measurable scales, different groups, and different position variables.

As assessments criterion combines to analyse any mini-city or megablock by evaluating its location apart from each performance dimension to equate approximations, which are based on the cultural values and assist in creating spatial configurations. As an example, a performance dimension attributed urban environment might seek to provide medium-grade weatherproofing to match the real estates' quality in relation to the financial budget's requirements. While some inhabitants might prefer cost-effective property and accept lesser quality weatherproofing. An identifiable character as a developed criteria would seek to establish an optimum solution. The optimum solution based on the established assumptions would allow determining the urban environment's working goals. Therefore, Lynch prescribes a set of nine attributes as performance dimensions to comprise any guide or policy, for the assessments of:

- 1) Spatial configurations used to create urban environments,
- 2) General characteristics with specific attributes relating to urban aesthetics,
- 3) Unique attributes associated with specified goals and values,
- 4) Urban environment's aesthetic qualities as relevant to the core pre-determined values,
- 5) Dimensions of performance using different groups in different situations, and inclusive of ratings or acceptable standards,
- 6) The location together with identifiable and measurable approximations,
- 7) Attributes associated with generalised aspects of the urban environment,
- 8) A dimension's based achievements with implications and evaluations, for unique settings,
- 9) Dimensions to address, evolving qualities and values over the course of time.

The nine attributes aim to avoid isolation and seclusion of the residents within an otherwise, inanimate built environment. An urban environment's concept should comprise similar metamorphic characteristics of the ecological environment. Lynch describes the natural surroundings and states:

Ecological systems are made of “unthinking” organisms, not conscious of their fatal involvement in the system, and its consequences, unable to modify it in any fundamental way. The ecosystem, if undisturbed, moves to its stable climax of maturity, where the diversity of species and the efficiency of the use of energy passing through are both at the maximum, given the fixed limits of the inorganic setting. Nutrients recycle but may gradually be lost to sinks, while energy inevitably escapes the systems or becomes unavailable. Nothing is learned; no progressive developments ensue. The inner experiences of organisms—their purposes and images—are irrelevant; only their outward behaviour matters.²⁵⁷

According to Lynch, the urban environment can commence on ‘learning ecology’ as conceptual understandings that modify the ‘rules of the game’ for the spatial configurations. For example, the attributes of an ecosystem can help with the understandings of diverse, interdependent ecological environments comprising contextual knowledge, dynamic stability, and cyclic processes. Additionally, characteristics could include enhancements for ‘value’, ‘consciousness’, and ‘progressive change’, including ‘invention’ and ‘learning capacity’ increases. An urban environment contains valued spatial configurations that can be altered to include integrated elements interlinking built environments into a sturdy fabric. Technically, a successful megablock would sustain a multifaceted ecology's values, besides being future-proofed for modifications. Likewise, an urban environment is “good which enhances the community the continuity of a culture and the survival of its people, increases a sense of connection in time and space, and permits or spurs individual growth: development, within continuity, via openness and connection...[a settlement that is] “accessible, decentralized, diverse, adaptable, and tolerant to experiments.” Therefore, a megablock should include “statements of value with statements of objective relationships” as ‘value implied’ preferences, for the creation of a normative theory. The choices involve ‘continuity’, ‘connection’, and ‘openness’ that underlay the norms for the context-specific theory application. In consideration of such a theory, Lynch recommends a set of ‘dimensions of performance’, which help ensure

²⁵⁷ Ibid., 115.

acceptable standards are maintained within urban environments. The performance dimensions consist of five basic dimensions: 1) 'vitality', 2) 'sense', 3) 'fit', 4) 'access', and 5) 'control', including two meta-criteria, 6) 'efficiency' and 7) 'justice'.

1) Vitality:

The capacity levels comprising the urban environment's essential operations, which support the inhabitant's sanitation requirements inclusive of all endurance aspects for the residents. Vitality also includes aspects involving ecological environments such as ecosystems and biodiversity that influence the inhabitant's well-being incorporating the needs of other species and organisms.

2) Sense:

The capacity levels consisting of urban environments reflecting perceptions and understandings, as well as addressing the varying needs of inhabitants within an ever-changing timespan and spatial configurations. These understandings assist in linking the ethical values and public perceptions comprising the built environment and behavioural impacts on the inhabitants forming into the philosophical constructs.

3) Fit:

These interaction zones assist in maintaining occupancy levels of comfort to positively impact the behavioural attributes of the inhabitants, including future-proof ability to convert the spaces in response to ever-changing needs.

4) Access:

The capacity levels constructed to integrate the inhabitants' household tasks, service facilities, as well as employment and business, including interaction and recreation zones. This spatial configuration also determines the number of amenities and interaction zones, together with exposure to ecosystems and biodiverse environments.

5) Control:

The capacity levels conceiving the construction of spatial configurations considering environmental design features, inclusive of the built environment's integral pathways and spaces that regulate road widths, building setbacks and spacing. The built environments consist of commercial, residential, and amusement activities.

6) Efficiency:

The assessments comprising investment and operational costings required for construction and ongoing repairs, which are specified considering the environmental design and performance capacity of the mechanical systems.

7) Justice:

The assessments consisting of environmental design considering benefits and paybacks such as energy efficiency design, or embodied energy material together with cost implications. “Justice is the criterion which balances the gains among persons, while efficiency balances the gains among different values.”²⁵⁸

The two ‘meta-criteria’ address ‘costs and benefits; and are distinct from the five dimensions of performance. The dimensions assist in assessing the meta-criteria, only after the fundamental values using the five performance criteria are ascertained relating to the urban environment. “All five can be defined, identified, and applied to some degree, and this application can be improved.” The question remain whether the dimensions are applicable to the criteria. Do the criteria aim to enlighten the goodness of the megablock, or are the objectives only theoretical and inapplicable to the actual site? Are the dimensions classified and assessed in a reasonable manner? Are the capacity levels of performance made as a practical proposal for the enhancements of the urban environment? Are the dimensions’ capacity levels ascertained relating to a specific spatial pattern for the results to become usable as the basis for a proposal? Are the site performance levels altered when the objectives are revised? Because these questions arise, it is essential to evaluate each dimension as well as offer explanations on varying sub-components of dimensions and the linkages to unique spatial configurations with associated cultural values.²⁵⁹

1) Vitality:

An urban environment that serves physiological and psychological aspects will thereby better serve the inhabitants. The infrastructural estimates gained from urban density for commercial, residential and entertainment activities determine the environmental planning requirements. Natural capital plays an important in determining activities, while biodiversity and ecosystems complement the urban landscape identified by the geolocation. Ideally a well-designed urban

²⁵⁸ Ibid., 199.

²⁵⁹ Ibid., 111-120.

environment provides ‘safety’ for the residents as well as shelter, within a context of clean, pollution-free, and environmentally friendly metropolitan zones along with emergency services to protect inhabitants from accidents and natural disasters. These requirements reflect on the residents as the central and most critical factor for designing an urban environment. Therefore, Lynch recommends organic cultural structural patterns, for the urban configuration models. These configuration modes are intended to enhance the environmental design characteristics. The urban features would aid in increasing interactive density through movement to improve the health and well-being of residents. These day-to-day motion induced residents would require pathways to conduct business and chores. Modern-day pathways require pedestrian and traffic integrations with parks and amusements zones addressing environmental design concerns. Although these concerns comprise functional features, the aesthetic quality or evaluations are also necessary to benefit social capital.²⁶⁰

2) Sense:

An urban environment over time forms an image and identity among inhabitants. Likewise, inhabitants reflect the urban environment’s status symbols as represented by its activities and lifestyles. These spatial qualities represent an urban inhabitant’s values, reflected in the architectural and urban elements. Each inhabitant experience consists of an individual’s education, upbringing and understanding of global issues. These attributes of individuals over time represent the cultural values and normative structures of a city, community or town’s social capital. These sensory urban qualities include perspectival illusions, fragrance, sounds and textures. Familiarity with these urban norms helps inhabitants to identify a place associated with the urban spatial configurations. Modern-day construction industry terms these urban norms as ‘place making’.²⁶¹

3) Fit:

The factors of fit consider a workplace’s “the ability to do something well, [and] be adequate or sufficient.” This factor links global issues to any location and assesses the behavioural attributes relating to cultural values to the selected place. Furthermore, the fit factor combine attributes such as aesthetics and environmental design, as well as ergonomics and movement, including contextual value applications with universal design intentions. Essentially, a place modifies design requirements to foster positive behavioural attributes. Unlike the vitality factor

²⁶⁰ Ibid., 121-130.

²⁶¹ Ibid., 131-150.

that possesses acceptable standards, the beneficial aspects of fit consist of fail or pass categories that need to meet the cultural variable. Therefore, fit evaluates aspects similar to ‘comfort’, ‘satisfaction’, and ‘efficiency’ interrelating inherent qualities and relating the attributes for a particular site.²⁶²

4) Access:

The present-day urban typology has established urban access patterns to better suit vehicular traffic and pedestrian integrations. These access integrations permit delivery of goods, passenger, and services at higher speed limits. Modern-day urban planning design involve major construction and public spending for access network implementations. Lynch’s fundamental concepts utilised as “analysis and manipulation of access via new roads, new modes of travel, [and] traffic controls” are still extensively implemented. The access dimension of performance plays an important role for any urban planning design programme.²⁶³

5) Control:

A town planning development’s control regulations explain key aspects of the control dimension of performance. These controls connect spatial configurations to measures such as road widths, section sizes, and setbacks to enhance environmental design characteristics.

As per the performance dimension, spatial configurations affect “feelings of anxiety, satisfaction, pride, or submission”. Modern-day population growth with contained housing availability is similar to the past “principle motives of war...[and] struggle for place.” The property still is a prized possession for homeowners. The formal ownership rights include control of measured spatial configurations. Therefore, these configurations ascertained by cultural measured as du/ha enable inhabitants to assess actual, visual, perceived and interactive density.²⁶⁴

6) Efficiency and Justice:

The effectiveness of urban environments comprises five dimensions as methods that need justification or validation for the application processes. The ‘efficiency and justice’ meta-criteria address issues, for the process application of this five-dimensional method to optimise performances. For example, a project’s cost analysis represents an economic factor that

²⁶² Ibid., 151-186.

²⁶³ Ibid., 187-204.

²⁶⁴ Ibid., 205-220.

requires validation for the choices relating to the ecological environment and the desired social capital objectives. These justifications create opportunities to evaluate the five dimensions as variations that result in a project's design options. These choices created as evaluations need a systemised approach to form appropriate comparisons. The systematisation leads to realistic evaluations while addressing a 'stream' of issues during the comparison processes. The evaluations would need reflections on "preference among futures whose values decline, increase, strike a plateau, fluctuate, or vary in other ways." Therefore, a theory of good city form would optimise such opportunities by evaluating better choices and achieving effective outcomes.²⁶⁵

The normative structure prescribed by Lynch using objections and dimensions of performance would adequately assist in creating a GCF theory. Lynch's structure critically assists in establishing and assessing to an alternative standard for the WCC's Smart Capital initiative. The thesis investigation has considered a blended structure through triangulating the three theories of ED, GU, and Green TOD to set green norms. These norms can then help establish GCFs for modern-day applications. These normative aspects are then structured in relation to Lynch's theories to help evaluate the aesthetic outcomes and improve the built environment's impacts on inhabitants. This structure proposed in this and then previous chapter also assimilates the comparative case studies for the theoretical formulations (Figure 4-1). The comparative case studies were undertaken for Woodberry Down, Discovery Bay, Linked Hybrid, and Hobsonville Point developments. The thesis reflected upon the four case studies and how they might inform good urban form for the New Zealand context. Additionally, the proposed thesis normative structure also assists in using the SPD implementation processes. These normative structures ascertain pathways for the norms to establish design objectives, as well as reflecting on the design rationale.

As an exemplar, GU seeks to increase density to impede urban sprawl and does not ascertain the particular amount of density that it recommends to intensify (GU only recommends an approximation of "70–120 du/ha in Central built-up areas"), and instead only claims, "compactness is equally important as density".²⁶⁶ This oversight by Lehmann could lead to

²⁶⁵ Ibid., 221-238.

²⁶⁶ Lehmann, *The Principles of Green Urbanism: Transforming the City for Sustainability*, 78.

poor conditions for inhabitants who live in these established neighbourhoods, especially if the economic situation of a city deteriorates.²⁶⁷

GU also suggests, having made provision for daylighting, optimising Energy Efficiency Design (EED) for buildings and minimising the use of fossil fuels and Green House Gases (GHG) within the building.²⁶⁸ Inspiration from GU's parallel concepts, similar to smart growth, sustaining cities, sustainable urbanism, green city and eco-city, will also be used together with principles of GU as the main concept, to evaluate a New Zealand superblock.

ED integrates living processes within the built environment with consideration to EED, material, energy and development. The integration would enable the establishment of criteria applications to help develop effective designs for a New Zealand superblock.²⁶⁹

Conclusively, the objections and dimensions of performance set the standard within the normative theory diagram's pathways using this structure. Therefore, the structure critically is considered important aspects to determine intelligible norms from Lynch's GCF inspirations.

Summary: Critical Reflection

This chapter reflects on Lynch's Objections and Dimensions of Performance in relation to good city form, and ultimately how it can be applied to the New Zealand context.

²⁶⁷ Ibid., 77-80.

²⁶⁸ Ibid.

²⁶⁹ Van der Ryn and Cowan, *Ecological Design*, ix-xiv.

6. Wellington Case Study Examination—Lincolnshire Farm

This chapter tests the research by applying it to a case study site just outside Wellington City, Lincolnshire Farm. The site's proximity and size would permit the city to construct alternative spatial configurations in the form of an outer fringe megablock comprising superblocks. Lincolnshire Farm is located 7 km north of Johnsonville, comprising 420ha with mild terrain in comparison to the urban greenbelt. It is bound by State Highway 1 (SH1), Grenada North, Woodridge/Newlands and Horokiwi Ridge. It represents an appropriate site exemplar for this investigation because WCC already has plans to develop this 420 hectares parcel for urban housing, and it is a suitable size for a megablock. Lynch recommends a process to define urban spatial configurations as GCFs formulated as a checklist of controls (Table 6-1). Lynch's 16 control mechanisms are examined in this chapter, in relation to the efficacy of transforming Lincolnshire Farm into a viable New Zealand superblock.

Table 6-1 Control mechanism—particulars (2017)

Particulars	Control mechanisms—typical megablock
1) Megablock size	Site area consists of >250 or <750ha
2) Environmental impacts	Air and noise pollution reduced—alternative transport
3) Density	MDRA varying typology for international inhabitants
4) Political/management units	Megablock is comprising superblocks
5) Eco-infrastructure	PPP constructed, and “body corporate” maintained
6) Utilities	Master plan phased, for the housing shortages
7) Commutable zones	400m walking radius, for the use of public transport
8) Access—major urban arteries	Car parks involve interchange zones at main entrances
9) Emergency services/schools	All commutes require alternative transportation vehicles
10) Urban spatial configurations	Biodiversity defined spatial patterns, for a megablock
11) Built environment	Environmental design is favouring behavioural aspects
12) Sustenance components	Employment—farming—service industries
13) Amenities and parks	Biodiversity and built environment defined zones
14) Sense of community	International orientation—New Zealand experience
15) Pleasures of living	Biodiverse—convenient—quiet—safe environments
16) Place-based sustainability	Sustainable source: food—energy—sanitation

From: Author. 2017.

*These development controls comprises recommendations for the creation of urban environments as a megablock.*²⁷⁰

²⁷⁰ Lynch, *A Theory of Good City Form*, 277-317.

1) Megablock Size: The investigation site area of Lincolnshire Farm comprises a 420ha parcel. This site attributes comprise an appropriate size, terrain and proximity to high-capacity rail lines for a megablock (Figure 6-1).

The diagonal hatch placed within the red outline includes selected land divisions and some encroachments of protected reserves coloured in red. The outline excludes the difficult to develop land involving the reserve and also the blue coloured hatch that denotes the proposed water reservoir included to avoid subsidence of the land. This thesis proposes a water reservoir inclusion to enhance the ecological environment, address necessities, and future-proof the land quality. The pink coloured dash line indicates the WCC proposed motorway as a link between SH1 and SH2. While costs may be prohibitive, the thesis would ideally recommend creating a motorway tunnel integrated with metropolitan utilities to enhance the air and noise quality of the megablock.

Figure 6-1 Lincolnshire Farm—420ha (2015)

Map of courtesy from: WCC. 2015.

2) Environmental Impacts: Due to its relative level topography, the Lincolnshire Farm site would be particularly suitable for alternative transport such as bicycles, golf carts, and EVs (lithium-ion electric vehicles). The alternative transport would significantly reduce air and noise pollution from automobiles as well as heat and radiation from roads while enhancing community values and convenience, safety and security (Figure 6-2 and Figure 6-3).

Figure 6-2 Solar vehicles (2008)

From: Lehmann. 210.p. 368.

Figure 6-3 Community bicycles (2010)

From Lehmann. 2010. p. 377.

3) Density: Urban spatial configurations should be conceived specifically to help shape megablock in relation to projected population growth. Low- to medium-density would include outer fringe developments at acceptable density levels within the Wellington precinct. High-density would be acceptable within the central areas. An experimented assessment as illustrated in Figure 6-4 presents an understanding of these implications on the built environment. This diagram represents Lincolnshire Farm developed in phases with variations of superblocks suitable for Wellington city.

Figure 6-4 Density—assessments (2017)

From: Author. 2017.

4) Political/management units: As an example of control mechanism four, Discovery Bay phases construction of the megablock. These continuous construction phases have evolved over four decades (1973-2015), and building activity is still occurring in several superblocks. The topography of the Lincolnshire Farm site would be particularly suitable to phased construction, which would help attain Green TOD attributes (Figure 6-5).

5) Eco-infrastructure: This master planning method established on bio-integration comprises four infrastructure layers: the green eco-infrastructure, the blue water management, the grey engineering infrastructure, and the human infrastructure. The objectives of this eco-master planning assist in conserving and restoring biodiversity. This thesis's proposed utility tunnel would integrate this eco-infrastructure layers with advanced on-site facilities at Lincolnshire Farm. These infrastructure investments would decrease council expenses and future-proof the quality of land. They would also help protect and restore the ecological environment for the inhabitant's well-being. The level terrain and climatic conditions permit these possibilities with ease at Lincolnshire Farm (Figure 6-6).

6) Utilities: Lynch recommends weighting impact analysis on a mini-city, rather than a full city, to help save costs in infrastructure spending impacting utilities (Figure 6-7). Using phased construction for the Lincolnshire Farm will benefit population growth improving sustainable urban opportunities for home prices, building costs, and interest rates on loans such as illustrated in Figure 6-8. The Lincolnshire Farm structure plan utilities comprise water supply, sewerage, and electricity among others. The size and terrain of the Lincolnshire Farm site permits easy on-site construction of such services. The facilities should involve rainwater purifications, solar and photovoltaic panels and wind farms. The link tunnel would allow ease of connections and ongoing service management for the utilities.

Figure 6-7 Metropolitan expansion (2017)

From: Author. 2017.

Figure 6-8 The industry's implications (1890–2000)

From: Shiller. 2008. p. 33.

7) Commutable zones: The design of the megablock structures the central nodes in relation to business and leisure, with schools located in sheltered zones. The travel distances are focused on the megablock's requirements, rather than the superblocks. This biodiverse megablock encourages school buses for the convenience of the younger generation (Figure 6-9).

Figure 6-9 Commutable zones—400m walkable zones (2008)

From Lehmann. 2010. p. 379.

8) Access—major urban arteries: A light rail network also could be constructed from Johnsonville station to serve the Lincolnshire Farm megablock. Typically, the stops comprising a combination of light rail and internal electric buses would be built at 400m along the central spine of the megablock. All residents would be within a 400m walkable radius. The stops and frequency would exceed NZTA's Icon standards with stations at entrances, for transfers to various routes within the metropolis. The travel options would enable travel to centres: Porirua, Hutt Valley and Wellington City. The Lincolnshire Farm structure plan can permit vehicular access from SH1 at Grenada Village or Grenada North and SH2 at Hutt Valley. However, the restrictions of conventional vehicles within the megablock also would require the occupants to transfer and use alternative transport (Figure 6-10 and Figure 6-11).

Figure 6-10 Schematic—Lincolnshire Farm (2003)

From: WCC. 2003. p. <https://tinyurl.com/kjs9gkf>

Figure 6-11 Light Rail—recommendation (2010)

From: Lehmann. 2010. p. 173.

9) Emergency services/schools: The Lincolnshire Farm megablock design would provide suitably sized on-site fire station and emergency services located at a central location, rather than standard New Zealand requirements. This is provision made to ensure the best grade emergency services are available through design (Figure 6-12 and Figure 6-13).

Figure 6-12 School bus—EV (2015)

From: Flickr.com p. <https://tinyurl.com/kpk6ann>

Figure 6-13 Police—EV (2016)

From: Flickr.com p. <https://tinyurl.com/n7un2km>

10) Urban spatial configuration: A Lincolnshire Farm megablock typically would comprise an ecological concept integrated within natural settings. The spatial configurations as illustrated in Figure 6-14 interrelated with biodiversity would advance and encourage the megablock's inhabitants. Lehmann's urban structures comprised options and used as context-specific applications represent an impact analysis. Lincolnshire Farm's structure plan can permit vehicular access from SH1 at Grenada Village and local roads from SH2 at Hutt Valley

(Horokiwi via Horokiwi Road and Hillcroft Road). However, the restrictions of conventional vehicles within the megablock would require the occupants to transfer to use alternative transport.

Figure 6-14 Spatial structure (2017)

Urban structures applied from: Lehmann. 2010. p. 702.

11) Built environment: Urban spatial configurational alternatives need to make provisions for spacing, daylight, and ventilation within the built environment. These configurations then also determine the building's envelope and sanitation along with interior spatial dimensions for enhancing the inhabitant's well-being. The environmental design objectives for a Lincolnshire Farm megablock would aim at avoiding isolated settings within the built environment, by complementing biodiversity to benefit the inhabitants.

Figure 6-15 Sustainability—balance (2011)

From: Dunn and Jamieson. 2011. p. 96.

12) Sustenance Components: The Lincolnshire Farm megablock, is already ideally suited for sustenance components, since it is an existing commercial farm with lifestyle blocks to the north of the site that can also foster organic farming possibilities for the megablock's inhabitants. The commercial zone (45ha) including incentive plans with eco-tourism would boost local employment opportunities. Therefore, the megablock comprising adjoining industrial areas would enable sustainable population growth (Figure 6-15).

13) Amenities and Parks: Van der Ryn recommends a Solar Living Center defined by biodiverse environments. Biodiverse environments already exist in the Lincolnshire Farm and would be preserved in a megablock design. However, these biodiverse environments require protection and restoration of the previously commercial farmed areas of the megablock. Overall the megablock would comprise pedestrian/cycle green pathways and recreational links through the areas of protection through improved eco-infrastructure. The sustainable composed modes of alternative transport would enable movement in ecologically enhanced biodiverse environments to boost eco-tourism. The amenities required for eco-tourism would complement the lives of the inhabitants and improve behavioural outcomes, social capital and interaction. Eco-tourism's introduction would enhance sustenance components with much needed investments, for the improved biodiversity and eco-infrastructure with financial paybacks (Figure 6-16).

Figure 6-16 Amenities & Parks—biodiversity, eco-infrastructure, & eco-tourism (2017)

From: Author. 2017.

Figure 6-17 Identifiable character—community (2017)

From: Author. 2017.

14) Sense of community: A community is shaped from the creation of social capital and urban spatial configurations' priorities and applied as urban planning designs. These designs include primary and secondary schools together with a variety of housing type comprising a mixed-use urban environment. This design permits the creation of an identifiable character with design elements as walkable streetscapes that encourage participation of residents in physical activities (Figure 6-17). These priorities also involve comfort brought about by improving living and commuting standards, and encouraging social interaction. Successful urban configurations foster cultural values and social objectives and should make "a place to, live, learn, work, and play and grow."

15) Pleasures of Living: Lynch (1960) determines five vital elements—'paths', 'edges', 'districts', 'nodes' and 'landmarks'—as illustrated in Figure 6-17, for the positive well-being of inhabitants. These elements would be used in combinations of that enhance social interaction among inhabitants. These aims match Lynch's ultimate goal to benefit the inhabitant's behavioural aspects and would imply real impacts at Lincolnshire Farm's megablock. The construction of biodiverse environments comprising wetlands is possible with the creation of

the Belmont reservoir with an enhanced edge for supporting species and organism as a habitat. This habitat also permits ED's objectives of rejuvenating the living tissue as a closed loop eco-system (Figure 6-18).

Figure 6-18 Infrastructure integration—biodiversity (2011)

From: Hart. 2011. p. 83.

16) Placed-based sustainability: In the design of a Lincolnshire Farm megablock, these characteristics would be achieved through interactions of the community with the built and ecological environment. The Lincolnshire Farm core goals would comprise an attractive, efficient, and accessible, integrated community that is liveable, diverse, sustainable and prosperous. The Lincolnshire Farm megablock design would involve an ecological environment providing energy, food, materials and transportation for the inhabitants' convenience (Figure 6-19). These aspects would enable legibility and bring about a sense of place and enhance social interaction. The applications require an increased awareness of the local climate to complement these aspects. The thesis investigation has proposed achieving this through merging process allowed merging newer green initiatives of ED, GU, and Green TODs with Lynch's theories. Unlike London's superblocs that have failed in the past, Lincolnshire Farm's site conditions allows for direct solar and wind gain for energy efficiency and environmental sustainability.

Figure 6-19 Sustainability—place-based (2011)

From: Hart. 2011. p. 259.

While the Hobsonville Point Comprehensive Development Project example of a New Zealand superblock is not totally successful, it could be significantly enhanced by applying Lynch's design principles in a context-specific manner. The architects probably had used standard global approaches for future-built context-specific design methods. This thesis advocates a context-specific focus to enable an informed well-researched approach for future-proof context-specific design approaches for successful New Zealand superblocks. The forthcoming projects comprising such attributes would need to optimize levels and match context-specific applications for New Zealand's design criteria. A quick way to re-check the optimized levels can enable re-confirmations by using the variations chart before commencing with site-specific analysis (Figure 6-20). These would be best utilised in conjunction with cohesive objectives linking interactants within the urban environments.

Lynch's methodological application comprises these 16 control mechanisms to optimise any megablock. The mechanisms assist in achieving appropriate solutions for ever-changing problems. These solutions can be future-built through the control mechanisms as Lynch's theory has provisions to accept ever-changing needs of inhabitants. The costs involve re-aligning policy in New Zealand to bring about a megablock with renewed lifestyles. The method of achieving a new lifestyle supports the research parameters and is determined by revisions in the supply chain. The literature review into superblocks offers a greater understanding transformed as a result of refining the density parameter. The context-specific evaluations comprise relating housing demand that requires acute attentions with alternatives as megablocks.

		Vitality	Sense	Fit	Access	Control
Society is:	rich	important for both, but	generally more highly valued	easier to achieve but more complex; future fit less critical	substitutes available; diversity is valued	important for both
	poor	more critical where margin is narrower	but symbolic meaning valued even when poor	simpler but more critical	crucial, especially to basic resources	
Society is:	homogeneous	important for both	easier to achieve	easier to achieve	less important?	less important?
	heterogeneous		more difficult, but richer	more complex	important, to avoid alienation	important
Society is:	stable	easier to accomplish	easier to achieve	easier to achieve	less important	less important
	unstable	more difficult to maintain	more difficult	present fit more difficult to maintain; future fit is crucial for survival	crucial for survival	crucial
Society is:	centralized	easier to attain via standards and technical knowledge	used to express and support dominance	less likely to be achieved; formal adaptability is valued	critical for control	local control suppressed
	decentralized	more difficult to achieve except via stable customs and widespread knowledge	expresses diversity	more likely to be achieved; manipulability is valued	less critical	local control favored

Some hypothetical variations in the achievement and valuation of the performance dimensions, in relation to variations in social situation

Figure 6-20 Variations—checklist (1981)

From: Lynch, 2010, p. 234.

Lincolnshire Farm megablock has proven the successful methods and critical reflections as test applications to attain a sense of place and an identifiable character. The critical reflections involve Lynch's theory of GCF to bring about a valued case study at Lincolnshire Farm. The applications have proven context-specific to Wellington city, a megablock's environmental design, eco-infrastructure and eco-tourism capabilities to attain urban sustainability. The site

test application validates, through precedent case studies and blends three theories comprising ED, GU, and Green TODs to improve living standards within biodiversity. The understandings gathered from the literature review develop a context-specific megablock at Lincolnshire Farm.

Figure 6-21 Visual imagery—Lincolnshire Farm (2017)

From: Author. 2015.

So, it is inadvisable to develop suburban houses supporting sprawling neighbourhoods, or pursuing infill and intensification initiatives for growth. Alternative spatial configurations combined with SPD implementations can bring about an alternative to resolve the housing crisis. Therefore, these examinations comprising visual imagery (Figure 6-21), and site analysis (Figure 6-22), reflect the actual conditions of the location with a suitable solution of a megablock specific examination (Figure 6-23) and site renderings (Figure 6-24). These

examinations result in attaining substance components, pleasures of living and place-based sustainability for the inhabitants.

Figure 6-22 Lincolnshire Farm--site plan 420ha (2017)

From: Author. 2017.

Figure 6-23 Specific examinations—site plan 137.6ha (2017)
From: Author. 2017.

Figure 6-24 Lincolnshire Farm—renderings (2017)
From: Author. 2017.

Summary: *Wellington Case Study Examination—Lincolnshire Farm*

Lincolnshire Farm is evaluated for implied design applications. These applications include recommendations and site sketches.

7. Conclusion

Wellington's Housing Accord and *Smart Capital* initiatives involve efforts to address urban growth and to address housing shortages within Wellington city. These efforts in Wellington city still need supportive solutions to meet these issues, and they require resolute actions with appropriate alternatives to balance demand with supply as well as sustain real estate investments. Housing price increases cause greater dependency on government resources. Also, urban sprawl can be damaging to the biodiversity and urban sustainability.

This thesis investigation posed the research question: can a modified version of mixed-use high-density superblocks help contribute to reducing urban sprawl within New Zealand in ways that also encourage environmental sustainability?

In answering the research question, a comparative investigation was conducted. The investigations included a literature review and comparative case studies of the strengths and weaknesses of superblocks. Site-specific evaluations applied to a local Wellington site, Lincolnshire Farm, suggest how mixed-use medium-density outer fringe megablocks can potentially help impede urban sprawl. The context-specific investigations suggested more effective options than the United Kingdom. This thesis investigation has proposed achieving this through merging newer green initiatives of ED, GU and Green TODs with Lynch's principles for GCF.

The incentives include readily available housing for the increased population growth together with decreased dependency on government resources. An additional bonus is enhanced urban sustainability and protection and restoration of ecosystems and biodiversity. This change can potentially enhance business models and urban lifestyles as well as maintain the nation's brand identities.

The merging relevant components theory comprises parameters that determine an assortment as spatially integrated indoor and outdoor built spaces.²⁷¹ The SPD is an implementation process of a New Zealand superblock that is developed through PPP and enables the creation of a context-specific superblock for New Zealand. This approach improves previous propositions for a New Zealand superblock and recommends a phased implementation process of the SPD to help address urban sprawl in New Zealand.

²⁷¹ Ibid., 239-291.

An actual design for Lincolnshire Farm is outside the scope of this theoretical investigation, as are construction economics and cost analysis, which would clearly have a major impact on decision-making. Site specific analysis of outdoor Wind Comfort (UrbaWind) for urban planning design and energy, and efficient design (EED) (EnergyPlus and Daysim) for building efficiency are also outside the scope of this investigation.

In conclusion, a New Zealand superblock can, in principle, offer an alternative healthier lifestyle in Wellington for families and individuals to whom living in positive communities with a multitude of options matters. These options include increased amenities, together with urban sustainable characteristics that foster positive population growth. The design of a New Zealand superblock is a theory that can be potentially realised as a GCF.

Summary: *Conclusion*

This thesis seeks to restructure the present fiscal policies to impede sprawling rural and urban environments and enables a manageable construct on a collaborative premise through PPP that attains a desirable characteristic, for a superblock and New Zealand.

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