

**Learning from the Edge:
An Inquiry into the Peri-urban Territory of Perth**

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Bachelor of Landscape Architecture (Honours)

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Acknowledgement of Country

I acknowledge the people of the Nyungar nation, the traditional custodians of the land on which this research was undertaken.

I acknowledge Elders past and present, and thank them for sharing their teachings and sustaining this landscape – its land, water and skies.

I acknowledge Aboriginal sovereignty has not been ceded.

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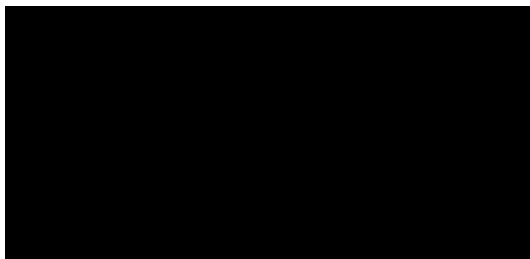
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This thesis contains published work prepared for publication, some of which has been co-authored. A copy of this is contained within Appendix C of the thesis document.



December 12, 2019

Abstract

This thesis presents research regarding the peri-urban territory of Perth, Western Australia. Perth is one of the most isolated capital cities in the world, located within one of thirty-six global biodiversity hotspots, and over the past five years, according to the *Australian Bureau of Statistics*, has recorded some of the largest and fastest population growth in Australia. The Greater Perth Metropolitan Region is currently home to 79 per cent of the State's population; however, the most recent predictions indicate that by 2056, the population is expected to increase from 2 million to 4.05 million (based on the highest growth scenario). In accordance with the *State Planning Strategy 2050*, planning policies direct 53 per cent of this growth into the peri-urban territory.

However, the peri-urban's primary constituent parts, of "urban" and "rural", are detailed separately in land use planning and are rarely integrated as a complete whole to describe the collective territory. For this reason, this study's aim was to discover, interpret and understand the peri-urban condition of Perth, and, through an alternative reading of its expanded thickness, render its potential. The rapid transformation of the peri-urban of Perth, to accommodate unprecedented rates of urbanisation, is exacerbated by the need for the city to negotiate the loss of biodiversity, agricultural food supply and water scarcity within the context of a rapidly changing climate. Furthermore, the pressure to retain, and as this research argues, increase, the value of the multi—variant socio—ecological and cultural conditions that the peri-urban provides, is critical.

This study was underpinned by a hybrid, mixed-method, theoretical and creative approach that combines planning and design epistemologies and methods to reveal the spatial and temporal landscape structure of the territory across a sixty-year period. The study evaluated the structural and functional components of the territory by analysing seventy, two by two-kilometre quadrats. The pervading peri-urban typologies were identified and confirmed the uniqueness of the territory. These types were evaluated for their value from the disciplinary perspective of landscape architecture and a rationale for an increased focus on peri-urban potential was proposed. The mixed-method approach forms a heuristic set of tools and techniques for design landscape study and qualitative development of contemporary metropolitan living that enrich the understanding and instruments of traditional planning tools to transcend the very concept of the peri-urban.

Accordingly, the research assessed how the peri-urban could continue to enable the expansion of the city while addressing the social and cultural complexities required to support urban and living

systems. It proposed an opportunity to restructure the current relationship between people and nature and distinguished how Landscape Architecture, as a design-based discipline concerned with how people connect to place through local ecologies, offers a unique opportunity to reconfigure this relationship and spatially remake the territory. Its relevance also lies in the way metropolitan regional planning policies that integrate, visualise and communicate a critical socio-ecological landscape perspective in decision making, could provide opportunities for societies to shape metropolitan regions in more sustainable ways, both mentally and physically.

As the UN Habitat's goals for urban-rural linkages outlines, peri-urban areas are a necessary component of working towards global sustainability. The research affirms that peri-urban areas are not merely an accident of 20th century planning, but a necessary component of integrated landscape-based planning for sustainability. A connected, working landscape mosaic derived from landscape structure and function, will be integral to achieving sustainability in the Anthropocene. So too, will be reading landscapes in the process of urbanisation, in order to provide a greater understanding of socio-ecological and cultural dimensions of the peri-urban territory.

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There are many people who have been a part of this journey over the past eight years.

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Authorship Declaration: Co-Authored Publications

This thesis contains work that has been published for publication.

Details of the work:

Weller, Richard, Zuzanna Drozd, and Sara Padgett Kjaersgaard. "Hotspot Cities: Identifying Peri-Urban Conflict Zones". *Journal of Landscape Architecture* 14, no. 1 (2019): 8–19. Accessed doi:10.1080/18626033.2019.1623542.

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Chapter 1, Section 1.1

Student contribution to work:

The discussion of the definition of the peri-urban, draws directly on the contribution the author made to the paper that has been published.

Student signature:

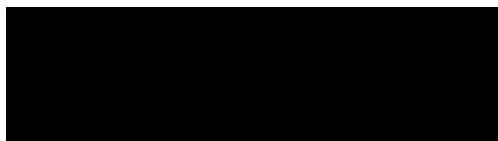


Date: 10 December, 2019

I, Nigel Westbrook, certify that the student's statements regarding their contribution to each of the works listed above are correct.

As all co-authors' signatures could not be obtained, I hereby authorise inclusion of the co-authored work in the thesis.

Coordinating supervisor signature:



Date: 11 December, 2019

Abbreviations and Acronyms

AILA	Australian Institute of Landscape Architects
BRM	basic raw materials
BAU	business as usual
CABE	Commission for Architecture and Built Environment
CBD	central business district
COB	Convention on Biodiversity
CNU	Charter of New Urbanism
GIS	geographic information systems
IFLA	International Federation of Landscape Architects
LAA	Landscape Architecture Australia
LGA	local government area
LLV	Learning from Las Vegas
MEA	Millenium Ecosystem Assessment
MRS	Metropolitan Region Scheme
NUA	New Urban Agenda
POS	public open spaces
PUI	peri-urban interface
RPC	Residential Planning Codes
SCP	Swan Coastal Plain
SDGs	Sustainability Development Goals
SER	social-ecological resilience
TDRs	tradable development rights
UGB	Urban Growth Boundary
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Education and Scientific and Cultural Organization
US	United States
VAMPIRE	Vulnerability Assessment for Mortgage, Petroleum and Inflation Risks and Expenditure
WAPC	Western Australian Planning Commission

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00 General introduction

This introduction defines the imperative for peri-urban studies and outlines the contribution that landscape architecture can make. A brief general introduction to the peri-urban condition is given below, as is the site for this research, the city of Perth in Western Australia. Finally, the nature of the inquiry, a key focus of this research, highlights the potential that lies within the peri-urban territory to address challenges confronting the city of Perth and the contribution landscape architecture can make in activating this territory.

0.1 The peri-urban

*A boundary is not that at which something stops, but as the Greeks recognized, the boundary is that from which something begins its presencing.*¹

A city's edge is the limen of the nature–culture divide; it is where the tensions of the natural world and human construct of the natural world have played out for centuries. If we accept that there is no absolute wilderness, because, as Cronon argued, “it is not what it seems”² then the most dynamic part of the city must be at the edge.³

Located at the transition of urban and rural zones on the periphery of urban regions, the peri-urban belongs neither to the rural nor the urban condition.⁴ The expansion of the peri-urban typically extends into land zoned as rural, or replaces areas consisting of natural vegetation assemblages. The resultant peri-urban condition is one driven by economic, political and social decisions that often view nature as a commodity and can lead to the resultant degradation of these environs as an side effect of progress and economic growth. The liminal zone of the peri-urban comprises a hybrid territory of land types including rural areas, rural–residential, hobby farms, conservation estates, large-scale recreational sites, basic mineral extraction sites, infrastructural networks (road, rail, energy), landfill sites and cemeteries. The peri-urban is, essentially, a disturbed, patchwork landscape, formulated by a degree of extension and enclosure distinguished by the built form of the city and the spaces occupied by the surrounding landscape.⁵

1. Heidegger explaining the essential role of the limit, as cited in Malpas, *Heidegger*, 89–90.

2. Cronon, “The Trouble with Wilderness,” 7–28.

3. Sorvig, “Nature/Culture,” 1–14. For a detailed description on the complexities of the word “nature” see Williams, *Keywords*, 155–58.

4. McKenzie, “Growth Management,” 83–99; Bruegmann, *Sprawl*; Bunker, “In the Shadow,” 61–82; Buxton et al., *State of the Peri-Urban Regions*.

5. Norberg-Schulz describes this tension as a figure–ground relationship, where “any enclosure become manifest as a ‘figure’ in relation to the extended ground of the landscape. A settlement loses its identity if this relationship is corrupted, just as much as the landscape loses its identity as comprehensive extension.” Norberg-Schulz, *Genius Loci*, 12.

Peri-urbanisation is a dynamic condition propelled by the outward expansion of the urban periphery. Despite being dynamic, the peri-urban does exhibit similar distinguishable spatial characteristics and can therefore be conceived as a territory.⁶ This is not territory in accordance with the principles of containment and boundary, but territory as a conceptualisation of the dynamics that underpin its condition. This thesis adopts the definition of the territory as a dynamic landscape and integrates critical visual studies to explain the reading of landscape in the process of urbanisation. Here, consider Reffestin's definition of territory, building on the work of Soja⁷ and Lefebvre,⁸ as space that we actualise and that is based on the needs of those who try to understand it. Territory, is therefore a consequence of the sphere of influence of our direct and indirect relations to its spatial phenomena.⁹ If we extend this approach to territory to include the definitions of political geographer Massey,¹⁰ this sphere of influence is represented by the accretion of place, as a result of the social, cultural and political dimensions of human activity associated within.

Conceptualising the peri-urban territory (and subsequently its definition) as a territory formed by serial and dynamic interactions and processes of urbanisation reconfirms how the peri-urban is outlined in accordance with global urbanisation patterns, as reflected in the declaration of the United Nations Habitat III.¹¹ Since this research began, there has been a widening global response by landscape architects to the "New Urban Agenda" (NUA) developed by the United Nations (UN)¹² and the subsequent Sustainability Development Goals (SDGs).¹³ Importantly, the NUA identifies how strengthening urban–rural linkages,¹⁴ as complex economic, social and environmental systems, reaffirms the need to shift from the dichotomy of urban and rural that has propelled urbanisation globally until now.¹⁵ This has provided momentum to the research. In this way, the thesis is opportunistic as it positions landscape architectural research and practice of the peri-urban landscape as central to achieving the SDGs.

As a result, it is appropriate to conceptualise the peri-urban as a territory and peri-urbanisation as territory making. On the establishment of peri-urban as territory, the processes and outcomes are an

6. See for example Hayden and Wark, *A Field Guide to Sprawl*, and Lerup, *One Million Acres* identifies a similar classification system for peri-urban types.

7. Soja, *The Political Organization of Space*, 1–54.

8. Lefebvre, *The Production of Space*.

9. Raffestin, "Space, Territory," 124.

10. Massey, "Power-Geometry," 59–69.

11. United Nations General Assembly, *The New Urban Agenda*. See sections 92, 98 and 136.

12. United Nations General Assembly, *The New Urban Agenda*.

13. United Nations, *Sustainable Development Goals*. See Goal 11: Sustainable Cities and Communities, which best explains the contribution of peri-urban landscapes to the "New Urban Agenda". More broadly, Goal 3: Good Health and Well-Being, Goal 6: Clean Water and Sanitation, Goal 7: Affordable and Clean Energy and Goal 15: Life on Land are also relevant.

14. United Nations General Assembly, *The New Urban Agenda*.

15. Sassen, *A Sociology of Globalization*. Sassen highlights the importance of recognising the cultural practices and capabilities that enable these practices, specifically in peri-urban areas where a highly formalised national framework of authority exists.

assembling collage of geography, memory and sentiment, not least political power.¹⁶ The peri-urban is represented by a network of relations—moments, actors and actions—and our understanding of the territory derives from reading, interpreting, intervening and representing its complex spatial condition within the city. In fact, to conceive the peri-urban as a territory charged with values inside a larger cultural framework allows us to familiarise and normalise it, as well as make it operative.¹⁷

This thesis sets forth two primary arguments. First, peri-urbanisation occurs without acknowledgement of the territory's unique condition, and second, consequently, it does so without society understanding the its potential. Importantly, these questions are situated within the global context of rapid urbanisation whereby it is anticipated that by 2050, 68 per cent of the world's population (an additional 2.5 billion people) will live in urban areas.¹⁸ Critically, these two aspects, what it is and what its potential might be, are essential for continued urbanisation in the context of global climate change, rural–urban migration, food and freshwater availability, clean air, health and wellbeing¹⁹ and thus, for humanity's role in the continued shaping of the new geological epoch of the Anthropocene.²⁰

While most of this growth is predicted to occur in Asia and Africa, there are many areas throughout the world that are critical to ensuring this urbanisation occurs sustainably (economically, environmentally, socially and culturally), so that the threat posed to highly biodiverse areas of the globe that are repositories of immense ecosystem services can be actively managed.²¹ The competing demands of increasing urbanisation and diminishing biodiversity highlights the need for a coordinated approach to managing global peri-urbanised land. The important synergies between ecological and cultural values and the benefits found within the socio-ecological milieu of the peri-urban territory are critical to addressing the growing division between culture and nature within the city and should be seen as a necessary requirement of an urbanising world and the prevailing ecological crisis.²²

16. Tuan, *Space and Place*.

17. Prezlj, "Unfamiliar Territory," 12.

18. This is an increase from 55% in 2018. See, United Nations, *World Urbanization Prospects 2018*, xix.

19. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being*.

20. Crutzen and Stoermer, "The Anthropocene," 17–18.

21. Seto, Guneralp, and Hutyra, "Global Forecasts of Urban Expansion," 16083.

22. See for example Swyngedouw, "Metabolic Urbanization," 21–40; Head and Gibson, "Becoming Differently Modern," 699–714; Head, "The Anthropoceneans," 313–20; Haraway, "Anthropocene, Capitalocene," 159–65; Haraway, *Staying with the Trouble*, 99–100.

0.2 Why Perth?

Australia is one of the most urbanised countries in the world,²³ with the construction and urban development industry forming the third largest contributor to the nation's economy²⁴ and one of the largest employment sectors. The economic stability of the nation relies on a model of suburbanisation into greenfield sites—undeveloped land, usually zoned rural, earmarked for future urban development and typically located on the fringes of cities. As the nation continues to urbanise beyond the 71 per cent of the population who currently reside in major cities, there is a diminishing supply of available greenfield sites for development.²⁵ Thus, the impact of this type of urban development raises bigger questions concerning problems associated with the liveability and sustainability of Australian cities.²⁶

Perth, located on the west coast of Australia, is one of the most isolated and lowest density capital cities in the world.²⁷ Despite a contraction of population growth over the past two years, in the past decade, Perth has undergone the fastest population growth of any Australian capital city.²⁸ Subsequently, the demand for housing, potable ground water (at a time of diminishing rainfall), food availability and road infrastructure has increased. Unsurprisingly then, Perth has the largest ecological footprint of any city in Australia,²⁹ stitched to the continental landmass by its 150 kilometre long, elongated and constantly growing urban form. It is one of the most sprawling and car dependent cities in the world.³⁰ Fuelled by the rise and fall of commodities sourced across this expansive state, forecasts of the subsequent population growth and housing demand suggest the city will double, reaching a population of 5.4 million by 2056.³¹

Notably, the city's expansion, north and south across the 25 kilometre wide Swan Coastal Plain (SCP),³² is occurring in one of only thirty-six global biodiversity hotspots.³³ Biodiversity hotspots, first

23. Western Australian Planning Commission, *Network City*, 65. Approximately 89% of Australia's population live within 100km of the coast. It also falls well short ecologically. In 1999 Australia had the 6th biggest ecological footprint per person in the world with just under 8 hectares person required.

24. Contributing about 8% of GDP. See Australian Bureau of Statistics, *8155.0: Australian Industry 2017–18*.

25. It should be acknowledged that more recent metropolitan strategic plans now include a target for infill development (i.e. development occurring within the already urbanised area) to minimise the impact of development within greenfield sites. This has, however, been difficult for many urban centres to achieve.

26. Australian Bureau of Statistics, *2071.0: Census of Population*.

27. Western Australian Planning Commission, *Directions 2031 and Beyond*, 4. Perth has one of the world's lowest urban area footprint-to-population ratios with the average housing density of ten dwellings per urban zoned hectare.

28. Australian Bureau of Statistics, *3218.0: Regional Population Growth*.

29. Wackernagel and Rees, *Our Ecological Footprint*. In 2010, Perth was identified by the Australian Conservation Foundation as the least sustainable city in Australia in the key area of ecological footprint (7.66 hectares/person/year). Ecological footprint compares actual human consumption of renewable resources and ecological services against nature's supply of such resources and services. It estimates the amount of land and water required to supply the good and services. It is a benchmark through which human demand on ecosystems can be measured.

30. Newman and Kenworthy, *Sustainability and Cities*.

31. Australian Bureau of Statistics, *3222.0: Population Projections, Australia, 2012 (Base) to 2101*.

32. Australian Nature Conservation Agency, *An Interim Biogeographic Regionalisation for Australia*. The SCP is a bioregion of the SouthWest climatic and biogeographical zone and includes the whole metropolitan area of Perth.

33. The SCP is part of the SouthWest Australia Ecoregion hotspot, whereby about half of the SouthWest's 8,000 plant species (as well as many associated fauna) occur nowhere else in the world.

conceived by Myer et al. are areas of biological commonality containing an exceptional number of endemic species and experiencing exceptional loss of habitat.³⁴ There is a strong correlation between species of national significance and cities, with cities containing substantially more threatened species per unit area than non-urban areas.³⁵ In this way, the natural values of conservation areas, including larger national parks and conservation estates, form shields between urban development and threatened species. Subsequently, the remaining endemic areas of the SCP and the network of open spaces that preserve biodiversity are seemingly incompatible with the current business as usual (BAU) operation of urbanisation. Compounding this is the danger posed by preservation of these highly biodiverse endemic areas in close association with urbanised areas as, if not adequately managed, they can pose a direct threat to homes and lives during a bushfire. Because peri-urban areas contain less dense development and more scenic and open spaces, they are exposed to a higher risk from bushfires.³⁶

This tension has become more explicit in the last decade, compounded by an increasingly dry climate.³⁷ Australia is considered to be a country at high risk of water scarcity, withdrawing 40–80 per cent of water relative to the available annual renewable supply.³⁸ As such, water scarcity is of major concern to the city of Perth. Faced with increased urbanisation and reduced rainfall, there has been limited groundwater recharge.³⁹ Over the past two decades, Perth has had to develop several strategies to deal with water scarcity.⁴⁰ In addition to managing consumers directly through water restrictions, these have included the development of two desalination plants south of the city, as well as recycled water initiatives that support the management of aquifer recharge for potable drinking water. Within this context, it is equally important to acknowledge that Perth's urbanisation has greatly impacted the rivers, estuaries, lakes, swamps and wetlands of the SCP. More than 200,000 hectares of wetland have been drained for agriculture on the coastal plain, and reclamation has claimed 1,501 acres of wetland along the shores of the Swan and Canning Rivers alone.⁴¹ Ironically, these water resources are also some of the most biologically productive areas of the SCP and directly and indirectly support most of its wildlife.

Thirty years ago, environmental scholar George Seddon dismissively proclaimed that Perth was “a

34. Myers et al., “Biodiversity Hotspots,” 854.

35. Ives et al., “Cities are Hotspots,” 122.

36. Paton, “Disaster Resilience,” 3.

37. Bekele et al., “Water Recycling via Aquifers,” 457.

38. Lindsay, Dean, and Supski, “Responding to the Millennium Drought,” 566.

39. McCallum et al., “Impacts of Climate Change on Groundwater,” 1637.

40. Water Corporation of Western Australia, *Freshwater Thinking*, 5.

41. These figures are originally provided in acres and have been converted by the author. See Seddon, *Sense of Place*, 226.

suburb in search of a city,”⁴² and this is still true today if we consider the rapid increases in dwelling construction over the past decade.⁴³ Despite efforts to curb the outward growth, the majority of new suburban development has predominantly occurred on greenfield sites. Furthermore, the extraction of raw materials required for suburban development to occur (sand, lime, limestone and water) is, conversely, extracted from the sites that urban development expands into. Acknowledging that there has been a significant improvement since infill monitoring began in 2011, more recent reports indicate that of the 47 per cent infill development required, Perth is still only achieving 42 per cent.⁴⁴

One of the main drivers for the continuing supply of greenfield land for urban development is housing affordability, a factor that is measured by the ratio between household income and household expenditure on housing costs.⁴⁵ Housing affordability is a large and widespread structural problem in Australia, with major drivers occurring within and outside the housing sector.⁴⁶ Within the peri-urban, this equation can be simplified by the relationship between supply and demand, with the argument that releasing more land (supply), market forces alone will lead to lower new house prices.⁴⁷ However, a study into this premise for the city of Perth found that land release within greenfield areas did not reduce housing prices, with one of the main reasons being the cyclic nature of housing growth for the city, a result of the primary industry boom across the state.⁴⁸ The diminishing housing affordability within peri-urban areas is increased twofold when one considers the impact of mortgage stress, commuting distance and increasing fuel prices on households. Sipe and Dodson’s VAMPIRE (Vulnerability Assessment for Mortgage, Petroleum and Inflation Risks and Expenditure) index⁴⁹ distinguishes the peri-urban areas of Perth and its growth corridors as having the highest score.⁵⁰

Greater recognition is needed of the fact that urban expansion continues to displace intensive agricultural areas despite the city relying heavily on the peri-urban territory for its perishable food supply.⁵¹ The highest intensification of agriculture over the past twenty years has occurred within peri-urban areas,⁵² and increasing land values brought about by urbanisation ensure that only the most

42. Seddon, “Whither the West,” 76.

43. Department of Planning and Western Australian Planning Commission, *Urban Growth Monitor*.

44. Department of Planning and Western Australian Planning Commission, *Urban Growth Monitor*, 4. In 2010 the State Government set an infill target of 47% for new residential development; in 2012 Perth only achieved 28% of this 47% target. There have however been improvements; in 2017, 42% infill was achieved.

45. Costello and Rowley, “Impact of Land Supply,” 6–7.

46. Costello and Rowley, “Impact of Land Supply,” 18.

47. Cox and Pavletich, “3rd Annual Demographia,” 3.

48. Haslam McKenzie and Rowley, “Housing Market Failure,” 374–78.

49. Dodson and Sipe, “Shocking the Suburbs,” 389.

50. Dodson and Sipe, “Unsettling Suburbia,” 394.

51. Australian Government, Department of Infrastructure, Transport and Major Cities Unit, *State of Australian Cities 2012*, 169. For the city of Perth, approximately 58% of perishable food comes from the city’s peri-urban area.

52. Low Choy et al. *Change and Continuity*, 9.

capital-intensive agriculture survives.⁵³ However, once rural land is converted for urban purposes, it may never revert to agricultural land, with the values attributed to it being lost forever.⁵⁴ Further, the intensification of peri-urban agricultural areas is becoming more and more incompatible with the quiet amenity expected from new residential areas. An option that is becoming more common is tradable development rights (TDRs), which are market-based planning tools that seek to protect land and compensate owners who forego future development rights.⁵⁵ Used readily in the United States (US), they are becoming popular mechanisms, not only to protect agricultural land but also to deliver a range of ecosystem services including open space, scenic amenity, cultural values and flood mitigation.⁵⁶ Here, we need to consider a diversity of other ecosystem services, landscape types and functions that could be provided for in the context of global climate change.⁵⁷

Currently, the transformation of the peri-urban area of Perth is determined by a land-use planning framework, which, through a suitability analysis,⁵⁸ sets out the location and timing for future urban development that, in turn, reduces land speculation.⁵⁹ In this way, land-use planning frameworks interact to continually, and incrementally, reconfigure the transformation of the peri-urban.

Subsequently, due to continued suburbanisation of the peri-urban, the diversity of the land types associated with the non-urban areas and the natural environment contained within non-urban areas is constantly being eroded or displaced.⁶⁰ For example, research by Brunner and Gleeson in 2015 has identified that of land zoned rural, only 4 per cent was used for rural activities, with the rest being for “other uses”.⁶¹ This figure indicates that land speculation is a key driver, and that the potential of these “rural” lands to support the city is undervalued. Not least for their value in providing food for the city, but also for forest products, waste, energy production, biodiversity conservation and tourism.

Urban development is a major driver of environmental change and of perpetuating a model of growth reliant on greenfield development. This has consequences, not least for biodiversity, but also for the delivery of services, affordable housing and jobs, liveability and health and wellbeing— aspects that are readily achievable through strong open space networks. The amenity and quality of

53. Harman and Low Choy, “Perspectives on Tradable Development,” 631.

54. Sinclair, Bunker, and Holloway, “From the Outside Looking in,” 18.

55. McConnell and Walls, “Transferable Development Rights,” 288.

56. Bengston, Fletcher, and Nelson, “Public Policies,” 275.

57. Harman and Low Choy, “Perspectives on Tradable Development,” 620.

58. The overlay technique that allows you to analyse various factors upon each other is attributed to US landscape architect Ian McHarg and is a predecessor of the modern land-use suitability analysis generated through geographic information systems (GIS).

59. Land speculation is the process by which rural land is held only for its monetary value as an urban site in the future. Usually these rural lands remain unproductive during the period of speculation, sometimes this can be years, meaning these lands produce little benefits.

60. Western Australian Planning Commission, *Perth and Peel@3.5 Million*, 50. For example, intensive agricultural areas traditionally occurring in Victoria Park, Bayswater, Spearwood, Osborne Park and parts of Wanneroo have been replaced by suburban housing.

61. Brunner and Glasson, *Contemporary Issues*, x.

landscapes within the peri-urban are usually strong drawcards for peri-urban settlement.⁶² However, the modes of urbanisation we continue to see propel an increasing gap between the privileged and the unprivileged, which is registered in the presence or absence of the constituent factors of urban amenity. Recognising that more compact and dense cities provide better opportunities for biodiversity within peri-urban areas,⁶³ they also provide greater urban amenity. The need to secure space on the periphery for public open space, moving beyond the passive approach (green and conservationist) to a real engagement with place, is now more urgent than ever. Rapid increases in urbanisation, at rates that are unprecedented in Australian history, mean that the peri-urban territory must not only absorb a significant proportion of this population growth but also support it by ensuring the delivery of ecosystem services that support aspirations for liveability and the health and wellbeing of the city's population.

Australia is a world leader in suburbanisation. It has the world's largest suburban building footprint to lot ratio, one of the highest levels of private home ownership and one of the world's highest levels per capita of mortgage debt, and yet the outer suburban development into peri-urban lands is marketed as affordable.⁶⁴ This is despite the housing produced through this development being equivalent to six times the average income. Arguably, this "cost" is even more compounded than developers wish to acknowledge if we interrogate further the diminishing state of Perth's natural systems, including a rapidly diminishing groundwater table, declining and irreplaceable endemic vegetation and over-reliance on motor vehicles and fossil fuels. Despite constituting the highest ever percentage of global human population and imposing the greatest ever levels of ecological disruption and waste networks, cities remain a crucible of human imagination and innovation. This thesis argues that, given these global threats, it is an imperative that Perth utilises these qualities to generate a bold new approach to sustainably in managing its peri-urban zone.

0.3 The role of landscape architecture

The term "Landscape" has been defined as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."⁶⁵ The profession of landscape architecture is focused upon the meaningful creation of spaces that respond to local environmental, social and cultural dimensions. Until now, studies of Australian peri-urban regions have been

62. McLennan and Handmer, "Reframing Responsibility," 12.

63. Seto, Guneralp, and Hutya, "Global Forecasts of Urban Expansion," 16085.

64. Cox, "Perth's Most Affordable Suburbs."

65. Council of Europe, *The European Landscape Convention*.

conducted through the lens of land-use spatial planning.⁶⁶ The role of the landscape architect has been notably absent from this study, limiting the development of an understanding of what value the peri-urban holds for the city and the impacts and implications that outward suburban development might have on it. This absence is partly historical, as a large proportion of landscape architectural work has been derived from the newly-created landscapes contained within suburban greenfield development.⁶⁷ As a discipline, landscape architectural practice and research has until recently provided very little by way of an informed, practical contribution to the strategic planning of Australian metropolises.⁶⁸

The need to elevate landscape architects to strategic roles at the metropolitan scale comes at a time when Australia—and more specifically for this research, Perth—is grappling with questions concerning liveability and sustainability of the city.⁶⁹ A range of elements contribute to liveability of the built environment in Australia, including urban amenity, housing availability, transport, air and water quality, access to natural environment and social and aesthetic aspects of heritage.⁷⁰ One of the major drivers of change that effects the liveability and sustainability of the city is population growth. The substantial drivers and current challenges for metropolitan spatial planning in Perth outlined previously have propelled me to distinguish the important role that the profession of landscape architecture may play in reconciling the large-scale natural systems of the city, and rapid urban development, with human scale.

Landscapes are social constructions and both the material and imagined knowledge of landscapes is mediated through collective human experience and the semiotics (language, representation and theory) within this social setting.⁷¹ With unabated outward suburban growth of Perth still occurring some sixty-five years after the first metropolitan plan, the thesis imparts both critical reflection and interrogation of the “modus operandi” to date.

In this thesis, I argue that the profession of landscape architecture has been complacent towards the effects of the rapid outward expansion of Perth. The project work of landscape architecture oscillates between the tension of directly assisting urban expansion or, at some later time, being seen to be

66. See Burnley and Murphy, “Exurban Development,” 246.; McKenzie, “Growth Management,” 83–99; Bunker and Houston, “Prospects for the Rural-Urban Fringe,” 303–23.

67. See Appendix B for a comprehensive overview.

68. The first contribution of its type was by landscape architect Richard Weller for the city of Perth. See Weller, *Boomtown 2050* and Weller and Bolleter, *Made in Australia*.

69. While several other states (for example, New South Wales and Victoria) have promoted landscape architects to high level strategic metropolitan planning roles within the Office of Government Architect, Western Australia remains focused on architects only to provide leadership and independent strategic advice to government to improve the design and buildings and public spaces. It does not offer, through a state department, the opportunity for landscape architects to directly influence the planning of the metropolis.

70. Department of Infrastructure, Transport, Cities and Regional Development, *State of Australian Cities 2014–2015*.

71. Swaffield, “Theory and Critique in Landscape Architecture,” 23.

able to remediate the effects of urbanisation.⁷² Furthermore, landscape architects have not adequately developed a theoretical approach and an agenda that responds to this scale of urbanisation. In several ways then, the thesis offers provocation as to how the profession of landscape architecture can operate at the scale of the city so as to effectively influence the conversation regarding global urbanisation. Crucially, this comes at a time when rural landscapes are converted to urban at a rate previously unseen across human history. Undoubtedly, the impact of continuous outward urban growth is to the detriment of the diversity of peri-urban landscapes and is therefore in need of a critical injunction.

0.4 A personal perspective

I came to this research as a registered landscape architect while working for the (then) Western Australian Department of Environment from 2008–2011. In this role, I was charged with designing recreational areas within conservation estates of the Swan Coastal District across the SCP.⁷³

This work enabled me to witness the almost daily removal of endemic banksia woodland for the construction of what appeared to be a homogenous suburban dwelling type. The reflective white roofs of new suburban greenfield landscapes came to dominate not only the horizon but also the foreground. The once rich, interconnected textural compositions of the SCP became replaced with nominal, self-contained (and self-referential) public open spaces (POS), containing very few retained mature trees (if any), water dependent turf and off-the-shelf play spaces.

I became somewhat perplexed and disenchanted with the profession at this point. Having spent most of my life growing up in Perth and completing my undergraduate studies in landscape architecture at the University of Western Australia, what I was witnessing was not what I had signed up for. This was not the transformation of the landscape that I expected to see from design professionals, especially not from my landscape architecture peers. However, what I was witnessing was the transformation of landscape driven by the economies of development, not the ethical, social or environmental imperatives of designing for people or the natural world. I began to ask: Could we do this better? In order to answer this, it required me to understand this mode of urbanisation and to find legibility and legitimacy in the intricacies of the landscape that gives rise to its condition.

72. Appendix B provides a review of ten years' worth of landscape architectural publications in Australia and demonstrates a range of projects within the peri-urban that have attempted to reconcile this.

73. The Swan Coastal District is a management boundary of the Western Australian State Department of Biodiversity, Conservation and Attractions. It is located within the SCP and is responsible for the planning and management of conservation areas in accordance with the Conservation and Land Management Act 1984 (WA), Wildlife Conservation Act 1950 (WA) as well as the Federal Environment Protection and Biodiversity Conservation Act 1999 (Cth).

0.5 Learning from the Edge

The title of this thesis derives from Robert Venturi, Denise Scott-Brown and Steven Izenour's seminal 1972 text *Learning from Las Vegas* (LLV),⁷⁴ where the authors proposed that the city of Las Vegas represented a unique and extreme example of the inherent characteristics of the modern US city. The city's ordinary form came to be interpreted as a landscape that amounted to a semiotic landscape constituted by popularly understood signs and symbols. The method of inquiry into the condition of the city of Las Vegas that was employed by the researchers and their students identified a textural approach to decoding and understanding architecture within the city's urbanscape. Theirs was an approach that proved, at the time, to be a significant departure from more theoretical structuralist and phenomenological theorisations,⁷⁵ towards a semiotically based mapping of the semantic relationships among architectural elements within a field.⁷⁶

The LLV exploration began with encountering the unknown condition and sustaining an ambivalence of wonder, a state of perplexity.⁷⁷ Reflecting on this several years later, Scott-Brown concluded that "we recommended learning (note, *learning*, not loving—at most we recommended a hate–love relationship with Las Vegas)."⁷⁸ As Vinegar assesses, the emphasis here on *from* in place of Scott-Brown's emphasis on "learning", indicates the researchers were seeking a departure from the city of Las Vegas—presumably, that the city of Las Vegas was already gone.⁷⁹

It is in this way that I approach the city of Perth, a place in which I have lived for the majority of my life, a place towards which I too have a suspended ambivalence, a love–hate relationship, and, through my own professional development as a landscape architect, I have come to see and understand Perth as a city formed through the widespread misperception of its relationship to its landscape. The apparent ease with which the evolution of the city's edge is permitted to replace swathes of this "hotspot" landscape beggars belief.⁸⁰ As Kilbane deduces, the minimum targets required by Australia as a signatory to the 1992 International Convention on Biodiversity (ICBD) are not being met.⁸¹ As such, the title of the thesis, "Learning from the Edge", implies first, both a method of inquiry and an approach to discovering its condition, and second, the urgency needed to understand and reveal the found textural components that not only sustain these ecologies but also

74. Venturi, Scott Brown, and Izenour, *Learning from Las Vegas*.

75. See, Aureli, "Manfredu Tafuri," 143.

76. Hays, *Architectural Theory since 1968*, xiii.

77. For further discussion on the state of wonder suspended here, see Vinegar, *I Am a Monument*.

78. Scott Brown, "On Architectural Formalism," 103.

79. Vinegar, *I Am a Monument*, 20.

80. As defined by Myers et al., "Biodiversity Hotspots," 853–58.

81. Kilbane, "Green Infrastructure," 64.

the people of Perth. In this respect, the thesis situates the profession of landscape architecture within the peri-urban “edge” and in doing so, through the methods of inquiry, develops an understanding of, and alternative value for, the peri-urban, a patchwork territory that is not currently integrated into the statutory planning system framework of Perth.

0.6 The Research proposition and aim

Research proposition

The rapid transformation of the edge of Perth to accommodate the unprecedented rates of urbanisation is exacerbated by the need for the city to negotiate the loss of biodiversity, agricultural food supply and water scarcity. It is timely, if not critical, to consider how the peri-urban could be a dynamic territory that can enable the expansion of the city and mitigate damage to the city’s natural systems while addressing the social and cultural complexities of urban and living systems. Essential to this is the need to disrupt and restructure the current relationship between people and nature to form new, multi-scalar, socio-cultural-ecological dimensions. Landscape architecture, as a design-based discipline concerned with how people connect to place through local ecologies, offers through its tools and methods a unique opportunity to reconfigure this relationship and spatially re-make this territory.

Aim

The research is based on the premise that the peri-urban territory is one that we do not really understand, even though its condition is explicitly linked to the growth of urban centres. The primary constituent parts of the territory, “urban” and “rural” are detailed separately in land-use planning for Perth, and are rarely integrated as a complete whole to describe “the peri-urban”. In this way, the overarching aim of the research is to discover⁸² and understand the peri-urban condition of Perth, and through an alternative reading of the peri-urban as an expanded thickness, render its potential. The research adopts a critical inquisitive approach to undertake the spatial and theoretical interrogation of the peri-urban and foregrounds landscape architecture as the profession to develop this potential.

The research proposition is closely informed by three overarching research questions:

- What is the peri-urban territory of Perth?
- What is the peri-urban’s potential?

82. In the same way John Hopkins and John Brinkerhoff Jackson, respectively, rediscovered the English and US landscape.

- What is the appropriate role of landscape architecture in the re-making of the peri-urban?

In the first instance, the absence of literature pertaining to the peri-urban identifies an immediate gap in the research, as does the lack of rich visual studies to help us understand and see the peri-urban differently and in doing so, reveal the potential of peri-urban to support further urbanisation.

0.7 Approach and methodology

Landscape has its own techniques of expression that it shares with other cultural practices.⁸³

However, widely agreed methods of landscape architectural research, differentiated from methods adopted from allied professions, have only begun to be defined over the past decade, with scholarship reflecting an increasing interest to situate and expand those methods that are specific to the profession of landscape architecture.⁸⁴ The emerging scholarship of landscape architectural design research references well-established and wide-ranging modal, interpretative methodologies across the social sciences, humanities and environmental sciences. In recognising this, the thesis integrates a hybrid, mixed-method, theoretical and creative approach that incorporates “critical visual studies” where the visual research methods (images and drawings) become both a medium and a method to investigate and communicate the research study.⁸⁵

Firstly, it is useful to distinguish how this research uses the term “imageability”. Nearly sixty years ago, Kevin Lynch used the term imageability to describe the mental maps that people make of a city as a collective whole as it is experienced in motion. For Lynch, imageability created legibility:

In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world that is held by an individual. This image is the product both of immediate sensation and of the memory of past experience, and it is used to interpret information and guide action.⁸⁶

Lynch’s imageability focused primarily on urban objects and in doing so, identified five elements—paths, edges, districts, nodes and landmarks—that formed the criteria for mapping the city, its coherence in the relationship of the elements to one another and its meaning (and therefore identity) through its legibility to the observer. However, landscape, unlike urban objects or urban form, is not a static backdrop; landscape is comprised of elements that change frequently, and with this comes the

83. Cosgrove, *Social Formation and Symbolic Landscape*; Ziady, DeLue and Elkins, *Landscape Theory*.

84. Swaffield and Deming, *Landscape Architectural Research*; van den Brink et al., *Research in Landscape Architecture*.

85. This follows Dee, “The Imaginary Texture of the Real,” 14.

86. Lynch, *The Image of the City*, 4.

difficult task of identifying permanent landscape structures that deliver coherence and legibility. This is emphasised even further when we consider the varying speeds at which experiences within the peri-urban landscape occur—from that of the human scale of the walkable neighbourhood, to vehicular, bus or train networks used for commuting and even those brought about by commercial flight paths.⁸⁷ Subsequently, the subjects' experiences occur throughout moments of compressed and expanded time and space.⁸⁸ As an often overlooked patchwork of transitional spaces, and as neither city or country, the peri-urban lacks an aesthetic legitimacy because of its perceived transitional condition.⁸⁹ The transitional condition is even more divergent when we consider how socio-political disparities emphasise or distort the legibility of the peri-urban territory.

Lynch's imageability has limitations.⁹⁰ It has been challenged by a developing range of work that is "more-than-representational", where legibility is constructed by representation and encounter through the lived experience.⁹¹ If, for example, we consider landscape and phenomenology, then landscape meaning arises through a focus on human perception, sensation and understanding, and, as Wylie argues, landscape and meaning, nature and culture "cannot be conceived of separately from each other."⁹² In accordance with this perspective, to understand the peri-urban, to draw our awareness to these places, is to significantly alter our binary view of nature and culture and therefore landscape that is derived from the Picturesque and Romantic notions of landscape.⁹³

Notwithstanding the limitations of the Lynchian framework, supported by advances in environmental psychology and behaviour research, landscape architects have adopted the nomenclature of the structural components first described by Lynch as a way to gain a preliminary understanding of the morphology of the landscape—the spaces that give the landscape its structure (vegetation, water and topography) and function and from which we begin to derive legibility.⁹⁴ While viewing the landscape remains our primary sensory mode for locating ourselves within space, the subsequent scene reproduced in our minds, is complemented by our other senses and other modes of visual

87. Exemplified in the study by Appleyard, Lynch, and Myer, *View from the Road*.

88. Consider here the tension between time and space as proposed by Lefebvre, *The Production of Space*, 130.

89. Auge, *Non places*.

90. It is also rooted in the modern period. Theories concerning phenomenology, hermeneutics as well as politicised spatio-temporal conditions are inherently postmodern ways of thinking about human–ecological relationships of the world and its landscapes.

91. Lorimer, "Cultural Geography," 83. See also non-representational theories: Thrift, *Non-Representational Theory*; Howard, Thompson and Waterton, "Landscape and Non-Representational Theories."

92. Wylie, "Landscape and Phenomenology". Consider also the origins of phenomenological thinking from Heidegger, *Being and Time* and Merleau-Ponty, *The Phenomenology of Perception*.

93. Dixon Hunt, *Gardens and the Picturesque*. Here I challenge the romantic notions of landscape found in the romantic period of Western Europe during the late eighteenth and early nineteenth century whose influences in art, literature, music, science and philosophy shaped nature as "wild" and "other" a landscape outside of that which is constructed by culture (the city).

94. For example, as is used here, Dee, *Form and Fabric*; and Larice and Macdonald, *The Urban Design Reader*.

representation, such as photography.⁹⁵ Therefore to actively spatialise the city, or in this case, the peri-urban, a mixed-method approach is required to develop a sustained structural visual analysis of the peri-urban territory over time, so that its “imageability”, composed by its morphology and experiential legibility, can emerge.⁹⁶

As Dee argues, the landscape image can have a range of critical functions—‘dialogic, hermeneutical, polemical, rhetorical and analytical’—and therefore the making of images contributes to theoretical understanding by making us look at things in different ways.⁹⁷ Thereafter, the use of image in this research is not employed as a technique for the representation of a design but for analytical purposes, enabling an understanding of the subsequent visual-spatial (social, cultural and philosophical) dimensions of the landscape and the planning and design of the peri-urban landscape over time.⁹⁸ Essentially, to understand the spatio-temporal dimensions of the peri-urban is to understand its imageability.

As James Corner, one of the pioneers of critical visual studies in landscape architecture, explains: “Landscape and image are inseparable. Without image there is no such thing as landscape, only unmediated environment.”⁹⁹ Corner’s visual studies draw upon the work of Deleuze and Guattari and the expression of a non-linear thickness that is produced through the aggregated interrelations within a material substrate.¹⁰⁰ In this way, expression and content are extracted, each layer of material substrate within the landscape has its own form and corresponding substance and can be read in multiple ways as a virtual whole.¹⁰¹ In their book *Taking Measures Across the American Landscape*, Corner and McLean used aerial imagery to explore the hidden dimensions of the landscape arising from socio-political and economic forces and to reveal ways various ways of perceiving it.¹⁰² With this method, Corner evaluates the open-ended forms of creativity that arise from mapping: the critical interpretation of landscape that reveals and realises the potential of the landscape.¹⁰³ Here, potential emerges through mapping and thinking *with* the landscape, and unfolding the landscape as a repository of multiple past histories and the actualisation of potential for new ground.¹⁰⁴

95. Harvard GSD, “Topology,” Girot considers photography and video as modes that invite “intelligible distance” from the subject while conceiving the image and its construction as an image through artistic practice.

96. Dee, *Form and Fabric*, 1.

97. Dee, “The Imaginary Texture of the Real,” 14.

98. Raaphorst et al., “Reading Landscape Design Representations,” 1–35.

99. Corner, “Operational Eidetics,” 22.

100. Deleuze and Guattari, *A Thousand Plateaus*, 124–32.

101. Deleuze and Guattari, *A Thousand Plateaus*, 16.

102. See also Corner, “Ecology and Landscape”; Corner, “The Agency of Mapping”; Berger, *Drosscape*.

103. Corner, “The Agency of Mapping,” 188.

104. The emphasis on *with* (author’s emphasis) recalls Deleuze and Guattari’s description of the “rhizome”. See Bogue, *Deleuze and Guattari*, 132; Holland, *Deleuze and Guattari’s A Thousand Plateaus*, 28.

In this way, knowledge of the peri-urban (its imageability) is performative and its agency is expanded through its thickness—the layering and overlaying of techniques to engender possibilities.¹⁰⁵ Hirsch expands on the methods employed by Corner by adopting and expanding anthropologist Clifford Geertz’s critical ethnographic approach, to prove landscape’s agency, because (she argues) all landscapes are socially contested territories. More specifically, her emphasis here is on the interpretative practice within large-scale landscapes affected by the global forces of urbanisation, such as the peri-urban. Hirsch argues that it is the expanded thick description of these sites that can “shape interpretive and transformative practice of landscape architecture”.¹⁰⁶ In articulating a territory’s expanded thickness, Hirsch details a three-phase methodology (observation, interpretation and translation) explored through the creative process of drawing, with an emphasis on time-based representational techniques.¹⁰⁷

Hirsch’s methodology is akin to the conceptual frameworks ascribed by Sebastien Marot and Christophe Girot developed a decade earlier, which encourage a phased process of discovery of the landscape through an aggregation of the landscape’s thickness in order to reclaim and recover the site. Of focus here are those sites that have been left over and forgotten by the processes of urbanisation. Both Girot and Marot employ a four-part, sequentially-staged methodology. The first stage is one of direct encounter, where thickness is established by the site’s palimpsest, a remembering of the past that gives way to its current state and context. The second stage encourages inventory and collection; however, in the case of Marot, he proposes stage setting for future conditions. The third stage is one of discovery; it is operational and explorative through critical drawings that explore the more complex temporal patterns of the dynamic landscape and remembered elements of the landscape.¹⁰⁸ The final stage is relational, in that the method is generative and propositional. Each stage is similar in how it expands the thickness of a site with a clear progression of methods: from description and classification to interpretation.¹⁰⁹

However, one distinct opportunity found within Girot’s “trace concepts” is the permission given for the author’s intuition and prior experience of place to direct the unfolding of the project.¹¹⁰ This is important because it is not possible to remove this subjective bias of the researcher; as noted above, the researcher has frequently experienced the peri-urban landscape of Perth prior to commencing the

105. This follows Corner’s description of layering. See Corner, “The Agency of Mapping,” 213.

106. Hirsch, “Expanded ‘Thick Description,’” 150. It is important to understand that Hirsch proposes an “expanded” thick description. Unlike Geertz, Hirsch’s proposed expanded thickness includes the political, economic and social structures that ultimately enable spatial-temporal changes of the territory.

107. Hirsch, “Expanded ‘Thick Description,’” 155.

108. Schama, *Landscape and Memory*, 574.

109. Marot, “Reclaiming of Sites,” 45–58; Girot, “Four Trace Concepts,” 59–68.

110. Girot, “Four Trace Concepts,” 65.

research. In this way, Girot's trace concept methodology not only outlines a process for discovery of sites but also the relationship between subject and site through a series of acts of discovery as the subject acquires knowledge. In seeking to enrich the layers of inquiry and exploration (the thickness) of the peri-urban, Girot's four-part, sequential methodology provides as a constant reminder to explore new possibilities that open ideas of the imagination. Accordingly, image making is a critical tool in this process as it describes the landscape encounter as lived, embodied and affective of experience.¹¹¹

Girot's conceptual framework has been adopted as the structure for this thesis and the acquisition of knowledge of the peri-urban of Perth. As a result, this thesis posits that the root to understanding the peri-urban is through creative endeavour that, in turn, is identifiable through the peri-urban's imageability—its thickened potential.¹¹² Several research methods, derived from Swaffield and Deming's "Strategies for Inquiry" framework, distinguish how the staged thickness is implemented (see figure 0.1). In this way, the research is subjectivist, as it allows the researcher to become immersed in the creation of knowledge, and reflexive, as it operates between theory and practice through classification of peri-urban types.¹¹³ The methodology of design inquiry contributes to building a research-based discipline of landscape architecture and aims to inform the future direction of landscape practice and landscape strategy at the metropolitan scale.

Figure 0.2 explains the how the research methods and strategies identified by Swaffield and Deming, intersect with those of Girot within this study. It illustrates a mixed-method approach enables a staged inquiry to occur. The thesis moves from inductive and objective methods (description) to constructive and inductive (classification) before concluding at constructive reflexive (interpretation).¹¹⁴ This staged inquiry structures the mixed-method approach to scaffold the thesis, building upon each layer revealed, at each subsequent stage. In this way, knowledge emerges throughout the research in the same way that knowledge of the territory emerges with further discovery. Importantly, these layers become evidence of the physical pattern and hidden dimensions that develop the imageability of this territory. Nassauer concludes that:

Looking at extensive regions or specific sites through the landscape medium can focus the perspectives of disparate disciplines on the same object, a landscape pattern seen by all.

While different viewers are experts in different processes, they are unified in paying attention

111. Marot, "Reclaiming of Sites," 45–58; Girot, "Four Trace Concepts," 59–68.

112. This follows the premise of Lynch, *Image of the City*, where the arrangement of the built environment creates vivid mental maps for the observer. See also Dixon Hunt, *Historical Ground*.

113. Swaffield and Deming, *Landscape Architectural Research*, 9.

114. As described by Swaffield and Deming, "Research Strategies in Landscape Architecture," 34–45.

	Inductive	Reflexive	Deductive
Objective	Description	Modelling	Experimentation
Constructive	Classification	Interpretation	Evaluation + Diagnosis
Subjective	Engaged Action	Design Projection	Logical system

Figure 0.1 Methodology for design inquiry
 (After, Swaffield and Deming, Landscape Architectural Research, 37.)

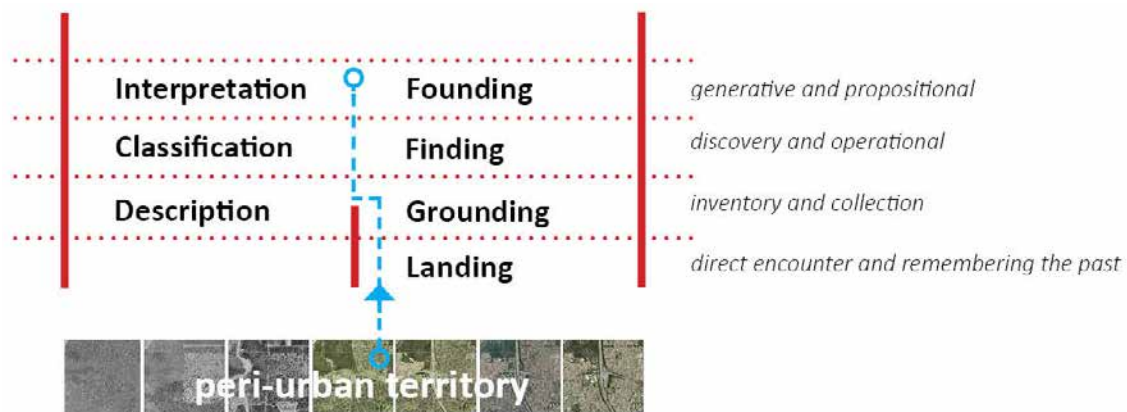


Figure 0.2 Sequential methods of inquiry
 (After, Swaffield and Deming, Landscape Architectural Research, 37; and Girot, "Four Trace Concepts," 61-65.)

to that pattern.¹¹⁵

The emergence of a composite pattern is a common thread that is found in the work of Cosgrove, who deduces that mapping provides interpretative readings of the landscape, as does Corner, who argues that mapping assists in the “rethinking of what is there”.¹¹⁶ Similarly, Bunschoten has engaged with several urban regions of Europe by identifying their condition and recasting this through various temporal readings.¹¹⁷ Therefore, the intentional layering that the thesis employs becomes a compositional tool for developing a relational understanding of what is a large-scale urban territory.¹¹⁸

Swaffield and Deming identify descriptive methods as the “writing of knowledge from direct observation and experience of the senses”.¹¹⁹ As previously disclosed, the researcher has existing experiential knowledge of the territory; therefore, part one of the thesis begins with Girot’s proposed *landing*, offering the researcher a direct encounter with the landscape and allowing for the subjective remembering of past experience and preconceived ideas of the territory to be challenged. A theoretical landing also occurs at this point, the initial discovery of peri-urbanisation and the relevant literature that formulates initial impressions and insights into its condition.

0.8 Peri-urban potential

From a Newtonian perspective, potential is explained by the attraction towards an object and the flow of energy within space across time. This could be scalar-based or vector-based and occurs across a field. Accordingly, potential theory includes points, boundaries and regions—all the components that determine the field in which potential is expressed.¹²⁰ This field is however determined by the insistence, priority and dependence of the centre, because without a centre, there is no periphery.¹²¹

A key gap within existing peri-urban research is understanding how the peri-urban condition might be capable of realising potential and, more specifically, understanding the role of the peri-urban as an incubator of ecological and cultural factors necessary for the city of today and the future. Here Low Choy’s description and position on peri-urban settlement in territory is adopted:

If we are dealing with a new form of settlement—one that is neither urban nor rural in the traditional sense, then the appropriateness and adequacy of our conventional urban and rural

115. Nassauer, “Landscape as Method and Medium,” 228.

116. Corner, “The Agency of Mapping,” 235.

117. See the work of his practice CHORA Conscious City Online, “Research.”

118. Corner, “The Agency of Mapping,” 240.

119. Swaffield and Deming, “Research Strategies in Landscape Architecture,” 37.

120. Blakely, *Potential Theory in Gravity*, 1–8.

121. See Koolhaas et al., *Small, Medium, Large, Extra-Large*, 1248–49.

planning process, tools and instruments must be urgently confronted.¹²²

Hence, peri-urban potential is positioned within the thesis as the expanded capacity for action and for change in the urban landscape, gauged through the contemporary discourse of landscape planning and design. For Perth, the potential of the peri-urban is not a new question, for even Seddon queried thirty-five years ago what the permanent carrying capacity of the SCP might be, including “its capacity to absorb noxious wastes and provide water and food and work and happiness for a very large number of people.”¹²³ Beyond the quantifiable figures that Seddon was clearly referring to is the SCP’s “potential” carrying capacity: what is possible, as opposed to actual. In this way, potential demonstrates the capacity for future, latent and prospective possibilities. Given this, situating potential within the research aim provides the permission to redefine the BAU approach to peri-urbanisation and the subsequent compartmental zoning of the city’s periphery.

Corner describes the “recovery” of landscape as the “yet to be disclosed potentials of landscape ideas and practices.”¹²⁴ Essential to this recovery is the development of ecological and relational landscape thought and practice that can fundamentally change the engagement between people and their environment.¹²⁵ Thus, potential (as in thickness) is an expanded relational capacity—ecology, spatial and social—that empowers and embodies change brought about by urbanisation. Potential is a central tenant of the thesis and is distinguished in the following ways throughout the thesis.

Potential to transform: Potential lies not only in how the peri-urban territory could be transformed in ways that empower socio-ecological relationships between the city and the natural world¹²⁶ but also in how conceiving the peri-urban as a territory might enable new governance and social practices to emerge.¹²⁷ Here, the methodologies of landscape architecture design and planning play an important role in reconceiving the peri-urban and the values contained within, as it seeks to explain the primary landscape in order to assert landscape agency¹²⁸ and thereby identify the settlement’s relationship (existing and future) to such territory.

Potential through relational thought and practice: Potential is explained through the everyday¹²⁹ landscape of the peri-urban we have come to know, understand and value, and through the intrinsic

122. Low Choy, “New Settlements on the Fringe,” 255.

123. Seddon, *Sense of Place*, 254.

124. Corner, *Recovering Landscape*, 1.

125. Wall and Waterman, *Landscape and Agency*, 3.

126. As Joan Iverson Nassauer explains the potential of emergent landscape values for society and ecosystems.

127. See Berger, *Drasscape*. An example here is how describes the waste landscapes of urban peripheries as potential sites for further entanglement of urban and ecological processes.

128. In the way that James Corner proposes landscape and culture as active agents of the landscape.

129. After Brinkerhoff Jackson, *Discovering the Vernacular*; Stigloe, *What is Landscape?* Hayden, *The Power of Place*; Hanlon, Hostetter, and Post, “Everyday Landscapes,” 1–5.

socio-ecological patterns that enable familiarity and interlocking of the landscape's ecology and human agency as well as experimentation.¹³⁰

Potential through representation: In accordance with the thick description of imageability outlined in the approach and method, peri-urban territory is situated as an operative ground for landscape invention. Representation, as a form of visual communication, assists in describing (drawing out) the territory beyond land-use planning zones or as an empty space waiting to be procured by the city, to a rich and complex aesthetic and ecological landscape composed of vegetation, water and topography.¹³¹

Potential as performance: The Landscape Architecture Foundation defines performance as “a measure of the effectiveness with which landscape solutions fulfil their intended purpose and contribute to sustainability.”¹³² Here, potential responds directly to the profession of landscape architecture by recasting the peri-urban landscape as a necessary site to achieve sustainability. All aspects of sustainability are dependent upon landscape. Therefore, increasing the performative nature of the peri-urban territory (as a collective), or sites within the territory (as points within the field), can increase the overall performance towards sustainability. In this way, the territory is charged with addressing the difficult and challenging problems of urban policy and planning.¹³³

This thesis provides an opportunity to discover what the peri-urban territory of Perth is and through an understanding of its structural and functional components and their interrelations, understand what potential the peri-urban might hold for strengthening nature–culture relations, in order to meet the parameters necessary to create a liveable metropolis.

0.9 Research questions and thesis structure

This research is concerned with unlocking the potential of the peri-urban territory of Perth through an inquiry into its condition to reveal its expanded thickness. The research has a creative component that is embedded throughout via the figures (images, drawings and diagrams) that describe, classify, interpret and transform the meaning of the peri-urban.¹³⁴ Collectively, these components illustrate a thickened conceptual imageability of the peri-urban and are explained in the accompanying theoretical discussion. In order to pragmatically understand the peri-urban territory, knowledge is developed

130. Reed and Lister, *Projective Ecologies*. For example, “safe to fail” experimentation within the landscape.

131. As declared by Marot, “Reclaiming of Sites,” 51.

132. Landscape Architecture Foundation, *Landscape Performance*.

133. Australian Government, Australian Public Service Commission, *Tackling Wicked Problems*. This report outlines the concern for the wicked problems of climate change, land degradation and obesity for Australia.

134. Swaffield, *Theory in Landscape Architecture*, 228.

sequentially. The thesis is in four parts, structured so as to build a thickened conceptual image of the peri-urban territory. The following is a brief description of the chapters in each of these four parts.

Part one, *landing*, is about recalling the past and situating the research agenda. Chapter one presents a definition for the peri-urban territory and identifies the peri-urban condition in its relationship to city form. This section theorises the peri-urban condition for Perth, explaining the drivers that form its condition. By understanding the peri-urban as a dynamic territory caused by city formation, it outlines the sequential act of discovery that the research undertakes and provides a foundation on which further discovery and exploration is built. In part one, the following question lays the foundation for the peri-urban's conceptual and perceptual thickness:

1. How have peri-urban landscapes come to be understood historically, and what implications does this have on peri-urban landscapes for the twenty-first century city, specifically Perth?

In part two, *grounding*, the thesis adopts elements of urban ethnography to trace the peri-urban. By moving to an objective approach, the process of discovery is enacted to re-situate the researcher within this place. Part two embraces the first act of discovery. Chapter two is a visually rich exploration of the peri-urban of Perth. Data extracted with geographic information systems (GIS) is used to expand upon the definition in chapter one while aerial photography is used to scan the peri-urban and identify components that allow us to become familiar with its condition. The final visual exploration of the territory is undertaken from the road along major infrastructure routes at the city's periphery. The subsequent descriptive survey in chapter two is an illustrative collection and inventory and describes the rich and diverse parts of the peri-urban condition. Chapter three presents several meta landscape architectural narratives that expand the theoretical layers introduced in part one by exploring successive aspects of landscape architectural narratives that occur within the territory. The narratives deduce how the peri-urban landscape is shaped as a territory and discusses how they continue to influence its evolution. Grounding begins to transgress an administrative reading of the peri-urban, where land ownership defines internal borders, by outlining a more extensive landscape.¹³⁵

In part two, the following questions expand this thickness:

2. How is the peri-urban territory of Perth defined spatially and what are the strengths and limitations of this spatial analysis?
3. What landscape narratives have positioned the making of the peri-urban territory?

In part three, *finding*, the thesis introduces the operational procedures that assemble a landscape architectural approach to discovering the structural and functional conditions of the peri-urban territory. Part three begins to operationalise the discovery through understanding the territory's potential. Chapter four proposes several approaches and methods required for the next sequence of discovery. It sets the stage for how the structural and functional characteristics of the territory will be distinguished. Chapter five distinguishes these characteristics through four structural components (paths, edges, thresholds and foci) and evaluates their occurrence and transformation within the territory. Chapter six evaluates these characteristics by explaining how they are valued and proposing opportunities for the structural characteristics to become further defined within the peri-urban territory. Through the classification of types, a unique peri-urban condition is revealed. These methods employ transferrable skills for comparable territories. In part three, the following questions expand this thickness:

4. What are the structural and functional components and descriptors of the peri-urban of Perth and how do these influence how the territory is experienced?
5. What are the pervading peri-urban types and how do these reinforce existing values within the peri-urban territory?
6. What is the value of peri-urban territory types?

In part four, *founding*, the previous three processes are synthesised and positioned as a propositional act of inquiry that moves knowledge of the peri-urban territory from the discipline of planning into that of landscape architecture. Part four synthesises the discovery. Chapter seven interprets the collective components of the peri-urban and focuses on the profession of landscape architecture and the opportunities available to develop a peri-urban agenda through research and practice. Chapter seven is propositional, as it describes how methods of discovery and inquiry can be transferable to other peri-urban territories. Chapter eight returns to the question of potential through the thickness of the peri-urban territory, offered in the introduction, by reviewing and evaluating the research aims. Limitations and directions for future research are also included. This section is propositional in the way that it re-configures the peri-urban territory for landscape architecture and for the methods of inquiry suggested for future research. In part four the following question expands this thickness:

7. What are the opportunities for the profession of landscape architecture within the peri-urban territory of Perth?

Finally, in adopting a multi-layered, mixed-method approach, the research finds its relevance by

addressing the findings from a landmark international research study that undertook significant consultation with academics and practitioners in order to understand the priority research areas for landscape architectural research. This 2015 study identified, as an imperative, several research areas that were required to build the base of the discipline of landscape architecture.¹³⁶ Two of these research areas are addressed directly within the thesis: firstly, “the human dimension of planning and design” and secondly, “built environments and infrastructure”.¹³⁷ The selection of the peri-urban territory as the site, as well as the extensive use of figures (images and drawings) as critical tools, clearly explain the human dimensions of spatio-temporal landscape change within the peri-urban due to human agency.¹³⁸ To this point, the thesis is as much about how people can begin to understand the peri-urban as it is about legitimising the profession of landscape architecture to reframe the peri-urban as a site of potential for the city.

0.10 The contribution to new knowledge

As the two key research questions indicate, the primary significance of this research is found in the contribution it makes to the academic literature concerning the peri-urban and critical visual studies of similar territories, in identifying how peri-urban types are representative of landscape values over time. Through an examination of the typologies of the peri-urban territory’s condition, this research seeks to offer a different perspective of the peri-urban in comparison to the one currently offered by land-use planning in Australia. To do this, the research combines a conceptual framework to structure the sequence of discovery with a mixed-method approach that incorporates critical visual studies in a way that will hopefully be of interest to urban researchers, to practitioners and to landscape architectural peers.

Because of the rich visual studies contained within, specifically the seventy, 2 kilometer x 2 kilometer square quadrats (see appendix A) that represent segments of the territory over time, the research offers the opportunity to communicate the territory to a broader audience outside the academic sphere. Just as these images have provided me with a rich and in-depth awareness of the peri-urban territory of Perth, I hope to offer insights into the territory’s thickened conceptual condition and a different perspective of the peri-urban to other disciplines. A rediscovery of the peri-urban is needed to bring attention to its condition, character and the potential it offers the city, residents and city-makers at the dawn of the Anthropocene.

136. Meijering et al. “Exploring Research Priorities,” 85–94.

137. Meijering et al. “Exploring Research Priorities,” 92.

138. Gobster, Nassauer, and Nadenicek, “‘Landscape Journal’ and Scholarship,” 55.

For this reason, the focus of this research is on examining the specific structural and functional components of the peri-urban and their value and potential to support socio-ecological systems for the city of Perth. The term *imageability* is used to describe the expanded thickened condition of the peri-urban that derives from critical image making as a scaffolded layering of the territory's condition.

0.11 Conclusion

This chapter outlined the importance for research of peri-urban territories worldwide, specifically in the context of rural–urban linkages and the role they play in strengthening the social, environmental and economic systems of cities in order to obtain the sustainable development goals set forth in the NUA. The importance of peri-urban research for the city of Perth, Western Australia was identified and the main challenges facing this peri-urban territory outlined. Furthermore, opportunities relating to understanding and interpreting the peri-urban were highlighted, as was the important role landscape architects can contribute to this. Finally, the research aims, direction and thesis structure were explained and the research contribution to new knowledge predicted.

Part One: LANDING

01 Peri-urban landscapes

*Throughout human evolution, most people lived in the countryside; few in the city. Only in the last century was that order reversed, and cities became top-heavy. Maybe Edge City is reversing it again. The Machine in the Garden, indeed.*¹

1.0 Introduction

The city is one of the oldest formations representing the cumulative record of human inscription on the land; as such, understanding how the peri-urban territory has manifested physically through city spatial form and the principles of modern urban and regional city planning provide an evaluation of the first layer of thickness to its condition. This chapter provides an overview of the peri-urban territory and its spatial evolution. It describes a range of definitions within the literature and conceptualises the spatial relationship of peripheral city confinement and advancement.

This chapter expands upon the definition of the peri-urban outlined in the introduction. The chapter explains peri-urbanisation more broadly in its international context before focusing on Australia. Regional planning theories that have determined the landscape spatial forms used to confine and support peri-urbanisation are identified. Several Australian cities are examined alongside Perth and their structural form components derived from the landscape are identified.

The term “landscape” is one that contains a tension. Landscape is a constant and emerging milieu between the competing definitions of spaces that are visible (to be looked at) and all around (lived within).² Landscape represents both observation and inhabitation, deliberately created to direct the process of nature.³ For the purpose of this thesis, landscape is used in an expansive way to describe the spatial form and structure—the physical and cultural representation of the space within the peri-urban territory, its value and the opportunities this provides for the lived experience of the territory in Perth.⁴

1. Garreau, *Edge City*, 58.

2. Wiley, *Landscape*, 1.

3. Brinckerhoff Jackson, “The Word Itself,” 8.

4. For a comprehensive discussion on the term as it relates to contemporary discourse and practice see Corner, “Introduction: Recovering Landscape,” 1-25.

1.1 Defining peri-urban

The term peri-urban originates from the Greek prefix “peri”, the spatial term for “on” or “around” and is derived from the Athenian school of philosophy when Aristotle walked within the grove of the Lyceum, outside the city walls, to conduct his teachings.⁵ Figuratively, this movement of The Academy,⁶ (and subsequently philosophy) outside of the city into the pasturelands ideologically distilled the boundary of the city as a wall and instead placed it into the peripheral territory of the city. Accordingly, the city’s boundary evolved not only as a physical feature as a wall but also as a peripheral site for significant social and cultural interactions of the city.⁷

If we consider the characteristics of an urban area to be a build-up of physical infrastructure with a sustained population and an order of governance across it, then applying the term “peri” not only demarcates the site as a physical area in which the urban area is contained but also the area which is excluded. Therefore, “peri” is a proposition that always qualifies the object that is the city and describes the relationship of the city (internal) to its external parts. As a noun, peri-urban describes the heterogeneous, fragmented territory of rural lands and as a verb, it describes the dynamic processes that undertake this transformation. The diminishing divide between city and country gives coexistence to the land within and beyond an urban centre,⁸ consisting of an inner and outer boundary.⁹ The peri-urban is a territory marked for future population growth and urban development¹⁰ consisting of urbanised countryside,¹¹ outside the metropolitan area.¹² The extent of the area can be spatially linked to relationships between services, employment centres and commuting range.¹³

Peri-urban has multiple terms used interchangeably including “rural–urban fringe”,¹⁴ “ex-urban”,¹⁵ “peri-metropolitan”¹⁶ and “after-sprawl”¹⁷ (see figure 1.1). In contrast, the term “desakota” describes

5. Oxford online dictionary, accessed August 13, 2014 <http://www.oxforddictionaries.com/definition/english/peri->. It is also worthy to note that the term ‘peri’ has Persian origins representing a mythical creature, and in Western culture, this creature appears in part four of Thomas Moore’s 1817 work titled ‘Lalla Rookh’ as ‘paradise in the peri’ whereby the mythical creature ‘peri’ has been banished from the Garden of Paradise and needs to redeem her sins to seek re-entry. Similarly, one might conceptually consider the peri-urban to be a collection of land uses, ‘banished’ from the city, often incompatible with urban life and therefore placed at the periphery.

6. Giesecke, *Epic City*, 85. Giesecke offers a thoughtful translation of Plato in Phaedrus where Socrates leaves the city to find beauty and truth in Nature and ultimately the “acquisition of fundamental human knowledge, of the self” that simply cannot be found in the city. See also Mumford, *City in History*, 129.

7. Giesecke, *Epic City*, 90. Specifically, the important role of philosophy and the Academy for society at the time.

8. Allen, “Environmental planning and management,” 135-147.

9. Bunker and Holloway, “More than fringe benefits,” 66-71.

10. Bunker and Houston, “Prospects for the rural-urban,” 303-323.

11. Sievets, *Cities without cities*.

12. Burnley and Murphy, “Exurban development in Australia,” 245-254.

13. Bunker and Houston, “Prospects for the rural-urban fringe,” 303-323.; Davis, *Exurban commuting patterns*;; Davis, Nelson and Dueker, “New’ Burbs The Exurbs,” 45.; Dodson and Sipe, “Oil Vulnerability,” 37-62.

14. Bunker and Houston, “At and Beyond The Fringe,” 23-32.; Low Choy et al., *Change and Continuity – Peri-Urban Futures*.

15. Davis, *Exurban commuting patterns*.

16. McKenzie, “Growth Management,” 83-99.; James and O’Neill, “Planning for Peri-urban Agriculture,” 179.

17. Xaveer De Geyter Architects, *After Sprawl*.

the diverse rural–urban spatial structures within Asia, consisting of high population density between major cities, with a mix of rural agricultural and manufacturing structures.¹⁸ A different view altogether is to consider the determination of the peri-urban by the absence of place; for example, when peri-urban lands have also been theorised as non-places¹⁹ or in-between places.²⁰

The degree of influence of the peri-urban territory is determined by the extent of processes that influence the metropolitan centre spatially through services, employment and commuting distance, among other factors. However, a review of the literature is problematic because the city is always foregrounded as prior to its edge. Therefore, the differentiation of lands that are other than those of the city, and potentially constitute richer ecological and cultural parts, are immediately considered secondary. More recent debate regarding the impacts of neoliberalism describe the peri-urban as a site “containing the building blocks of the global economy”²¹ with an expanding physical and functional influence in global markets.²² Central to this idea is the array of external processes, pushing outwards from the city. Conceptualising the peri-urban is made possible by urbanisation and, as explained by Low Choy, this is in direct contrast to a rural perspective:

A rural perspective regards urban expansion primarily as a threat, an urban perspective will concentrate on the needs of the city, and will regard nearby non-urban areas as the means to satisfy urban needs by providing land and resources.²³

Acknowledging this, the definition of “peri-urban” should also include “the space into which it expands” both rural and otherwise.²⁴ Although this space may be of a “perpetually unstable state between inner and outer boundaries”²⁵ or a “no man’s land”²⁶ and therefore difficult to describe, it could otherwise be ignored by those only interested in the city or rural hinterland respectively. Thus, collectively, the peri-urban is a space defined by the dynamic processes of urbanisation and city forming, of the “expanding city constantly absorbing its fringe area, creating new fringe”²⁷ in a city process of *urban phagocytosis*²⁸ (see figure 1.2). The difficulty of describing the peri-urban lies with the scale specificity as well as the extended influence of processes beyond what can be defined

18. Mc Gee, “Emergence of Desakota Regions in Asia,” 3–26.

19. DeSola-Morales, “Terrain Vague,” 118–123. Augé, M, *Non-places*

20. Marot, “Reclaiming of Sites,” 45–58.

21. Calthorpe, *The Regional City*.

22. Low Choy, Buxton and Wadsworth, *Peri-Urban Landscapes*.

23. Low Choy, *Change and Continuity*, p 29.

24. Burnley and Murphy, “Exurban Development,” 254.

25. Nelson and Deuker, “Exurbanization of America,” 92.

26. Augé, *Non-places*.

27. Augé, *Non-places*.

28. Allan Padgett, conversation, May 8, 2012. The process of Phagocytosis (Phago from Greek ‘devour’ and cytosis ‘process’) is a cellular process of engulfment describing the scenario as a cell engulfs a solid particle and digests it in order to acquire energy.

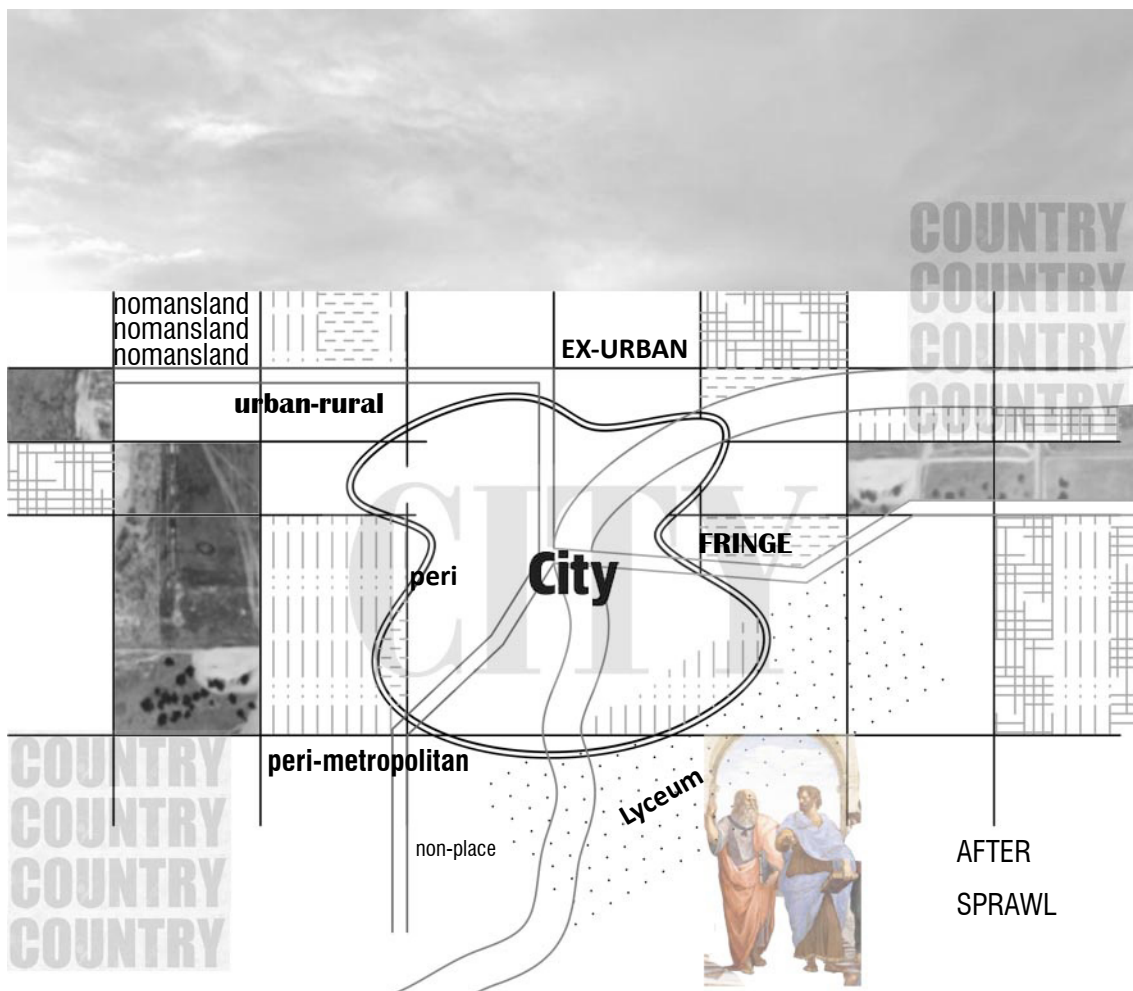


Figure 1.1 **Compounded layering of the peri-urban territory through a diagram of the city**
 (Author, 2019. Digital photomontage, 15 x 15cm.)

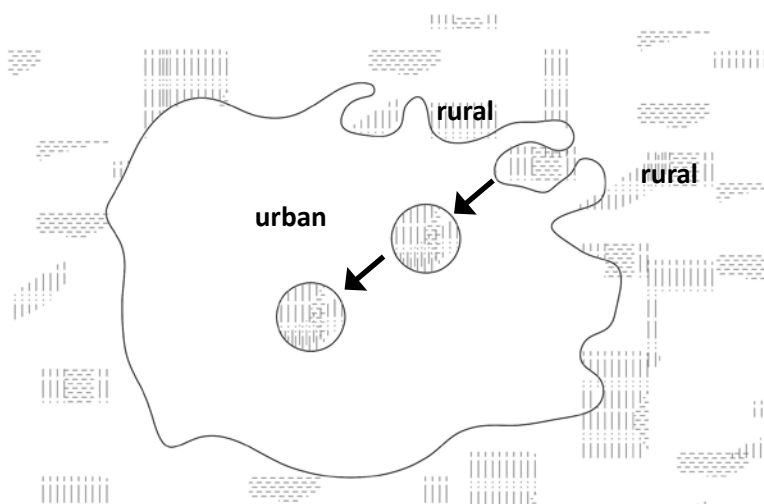


Figure 1.2 **Urban phagocytosis**
 (Author, 2019. Digital line drawing, 15 x 15cm.)

spatially. However, continuous unifying factors are the distinctive structural components made up of rural and urban lands and the historic continuum of this condition in settlements, from the urban “core” to peri-urban “edge”.²⁹

Henceforth, the definition used for this thesis adopts the term “peri-urban” to be the area of urban and rural land surrounding an urban centre, which is influenced by that centre and includes sites that in turn influence the urban centre. The peri-urban is a site earmarked for or adjacent to areas of considerable population growth and is physically distinguishable by the suburbanisation of traditionally rural lands, primary agricultural production zones and other, usually not homogeneous land uses.³⁰ It is a dynamic zone operating at multiple scales from the local to the regional and global level.³¹ While the urban centre continues to remain a focus for many cities; the definition adopted for this thesis predicts the need to reorientate this focus to the landscape structures of the city edge.

The concept was first explored through the dynamic interactions of urban–rural fringes in industrialised economies of Europe and the US and more recently in the context of Australian metropolitan areas,³² with particular concern given to the diminishing amount of agricultural land within the urban fringe.³³ As a result, many urban and rural areas have potentially vast differences between them.³⁴ In the examples of the US and Australia, a tangible consistent factor of the urbanisation processes is the dispersion of sprawl; the uncontrolled, single housing and automobile dependent urban form that has proliferated the development of cities within these regions throughout the twentieth and twenty-first century.³⁵

The range of descriptors for peri-urban territories outlined previously, and shown in table 1, describe the peri-urban as a relational construct of the urban area, as an extension of the urban area with close interaction with the urban centre. Conceiving the peri-urban as territory repositions what are otherwise considered to be mutually exclusive terms of urban and rural and the subsequent ideal image of each landscape type.

While a general description can be ascribed, an examination of the structural and functional components of a city’s individual peri-urban territory is required to identify and explain local

29. Nelson and Deuker, “Exurbanization of America,” 91-100.

30. In contrast, for instance, the suburban landscape of a city or ‘the suburbs’ would be described as homogenous – existing of essentially one land use character.

31. Consider for example, agricultural produce and logistics transport adjacent to the city’s airport as two examples of types with multiple scales.

32. Champion and Hugo G, *New Forms of Urbanization*.

33. Houston, “Revaluing the Fringe,” 210.

34. For a succinct overview see Simon, “Urban Environments,” 167-185.

35. Bruegmann, *Sprawl*.

conditions and nuances. Various disciplinary perspectives from planning, geography, agricultural sciences and design are likely to propose variations to the definition put forth here. For example, from the disciplinary perspective of landscape architecture, there appear to be notable absences including ecological, cultural and experiential qualities and dimensions and thus, corresponding conditions that make apparent structural and function expressions within the territory. It follows, therefore, that these absences also point towards the potential to explore other descriptors and spatial dimensions of the peri-urban as fundamental to the definition of the peri-urban.

For example, the peri-urban contains substantial “green” and “blue” areas, consisting of parks, conservation zones, water catchments (above and below ground) and rivers. As well as these areas, rural lands associated with peri-urban territories often contain deeply embedded cultural connections to place, often across multiple generations and cultural backgrounds. These connections typically reveal themselves through an association of landscape and built features evident through further structural and functional analysis.³⁶ Specifically in an Australian context, the descriptions provided here form an inscription of Western planning and colonial ideals onto the landscape that dismiss the deep and living connection to “Country” by Australia’s Aboriginal and Torres Strait Islander people that predates and transcends the formation of urban centres by some 60,000 years.³⁷

Non-spatial determinants of the peri-urban territory

While the definition has, thus far, focused on the physical expression of the peri-urban territory, further consideration of experiential and temporal qualities offers other layers, that further form a textual thickened palimpsest of envelopment of the city at its edges. While the terms “border”, “margin”, “fringe”, “frontier”, “periphery” and “edge” all invoke images of a physical boundary, they also infer temporal and thus psychological responses to this territory of the city. Australian media broadcaster Phillip Adams proposes that we are:

creatures of the Edge. The Edge is where old ideas run out of currency and philosophers search for new ones ... It’s the edge where you find the most innovation as well, the most eccentric ideas, the place of invention and the realm of madness.³⁸

36. This is evaluated in Chapters Four to Six.

37. This is an important point and the author acknowledges the Noongar People of South West Western Australia and the Wadjuk people of Perth for their past, present and continuing contribution to this landscape. In respect to the deep connections to country and the author’s lack of authority to speak on behalf of this country and its stories, the thesis will not explore this in any great depth but notes it as worthy for future research. Also to note here, 60,000 years is that time period determined by Western science. Aboriginal Australian’s speak of ‘time immemorial’.

38. Adams, “Prologue,” x.

Table 1. Various descriptors of peri-urban Territory

Terminology	Definition	Authorship	Geographical Location
Rural-urban fringe	A zone of transition extending outward into rural lands from the outmost suburbs containing the majority of population growth, into a landscape whose land values and lifestyles align with the urban.	Bunker and Houston 1992, 2003; Low Choy 2008,2010; Audirac 1999; Low Choy, et al. 2010	Australia, US
Ex-urban	The process of counter-urbanisation whereby there is a large amount of population movement from the city out to the countryside around an existing urban area and between suburbs and the "true" hinterland.	Davis 1990; Davis, Nelson and Dueker 1994; Calthorpe 1993; McKenzie 1997; Nelson 1999	US, Australia
Edge city	Concentration of business, shopping, leisure activities alongside (or in substitution of) suburban residential and rural areas.	Garreau 1991, Calthorpe 2001	US— (East Coast) metropolitan conurbations
Peri-metropolitan	Areas surrounding a metropolitan centre under spheres of influence from the city (functional or otherwise), including land, land prices, commuting habits and biological diversity.	McKenzie 1996; Houston 2006	Australia
After-Sprawl	Propositions that seek to introduce new methodologies in the diffuse urban network of sprawl.	Xaveer De Geyter Architects 2002	Europe
Urban deferred	A territory marked for urban expansion, most likely previously defined as rural.	Bunker and Houston 2003; Burnley and Murphy 1995	Australia
Peri-urban extent	Described by the area spatially linked to the metropolitan centre through services, employment and commuting distance. It is the space into which it expands both rural and otherwise.	Bunker and Houston 2003; Davis 1990; Nelson and Dueker 1990; Dodson and Snipe 2008; Calthorpe 2001; Buxton et al. 2006; Burnley and Murphy 1995	Australia
Edgelands	The transitional, liminal areas of space between country and town.	Farley and Symmons 2011, Jacobs 1961	UK, US
Non-places/Terrain vague	Attributed to spaces with an absence of experience of place.	Augé 1995, Solà-Morales 1995	Not specific to a geographical location
In-between	Landscape areas showcasing several occupancies and uses, successional phases and economic cycles.	Marot 1999	France

Here, Adam's description differentiates the edge as the extreme boundlessness of possibility (potential) and, at the same time, the margin of limits of humankind. He positions the edge as both a psychological threshold and a place of abandonment. Moreover, "the edge" becomes a site for inquisitive exploration, mediating the instructive relationship between city and country. Similarly, Farley and Symmons Roberts offer a peripatetic account of Liverpool and Manchester's peri-urban landscape.³⁹ Their exploration arises from a need to recast the places of their childhood, now fuelled by rapid industrialisation in two of the world's most mature post-industrial city terrains. Through interpreting this territory, they bring new understandings to it as opposed to fearing it. They argue that being able to *see and name* these peripheral lands is essential to (re-)establishing connections to it. Their suggested approach is through the naming of "signifiers" to describe and translate this landscape, situating the peri-urban as a landscape embedded with experiential values waiting to be "found".⁴⁰ Traversing the periphery, through the medium of walking, exposes a multitude of collective and personalised experiences that set this landscape apart from the neighbouring urban and natural areas.

Another dynamic interpretation of peri-urban territory is distinguished by Lynch, Appleyard and Meyer's short film *The View from the Road*,⁴¹ which illustrates the peri-urban as an "edge" compressed through the time and space of the automobile. Here, the metaphor of the "edge" is projected as a positive, lateral reference evoking a sense of transition, as well as a linear void in the urban fabric.⁴² The photographs and annotations derived from their assessment of the urban fabric are read concurrently in relation to one another as a sequence of images and moments, enforcing not only the importance of transition and sequence but also the necessity of reading these together as a collective. In this regard, the compressed and layered association of experience through various aspects of a subject's movement demonstrates an expanded comprehension of the cumulative record of human induced change within a particular place.⁴³ Importantly, the methods employed within these examples highlight that experiencing the landscape, and variations in the temporal components of these experiences (see figure 1.3), is intrinsically connected to human values and must therefore form an essential component of how the peri-urban territory could be defined.⁴⁴

Conversely, others have abandoned the territory completely because it is difficult to evaluate.

39. Farley and Symmons Roberts, *Edgelands*.

40. Farley and Symmons Roberts, *Edgelands*, 5.

41. And subsequent text. Lynch, Appleyard and Meyer, *View from the Road*.

42. Lynch, *Image of the City*, 62.

43. Meinig, *The Beholding Eye*. Further, American cultural geographer J.B Jackson's writings demonstrate a range of values attached to experiencing place.

44. Lynch, Appleyard and Meyer, *View from the Road*. For instance, mappings of view sheds and iconography of city and its signs along roadways.

Journalist turned urban historian Jane Jacobs described the periphery of the city as a stretched territory forming the edge of the ordinary city.⁴⁵ She identified the city's edge (and associated destructive neighbourhoods) as a "curse of the border vacuums."⁴⁶ Similarly, the description of this territory as a "non-place", to use the term theorised by French anthropologist Marc Augé, dismisses the historical aggregation of cultural practices and relational spatial implications of these practices entirely. Augé argues that if place is established through one's connections to history, then "non-places" exhibit tendencies that "cannot be defined as relational or historical".⁴⁷ However, while Augé argues that non-place permits an experience of freedom not possible in the related place, ultimately the assigning of non-place arises from a disconnection of experience to this territory. It follows that these places have no value, relative to the more familiar spaces of the city. Congruently, if the peri-urban territory is assumed to be without meaning and therefore diverse values, it is not surprising that the advancement of the city at its edges continues unquestioned.

There are similarities between the peri-urban territory as a non-place and those areas outside of the city defined as "other" spaces. As Whiston Spirn concluded, ideas of nature tell us more about society than non-human processes and features.⁴⁸ For example, consideration needs to be given to how the peri-urban territory has historically exemplified the conflict between nature and culture.⁴⁹ During the late nineteenth century, the counter narratives of nature included nature as an unknown place, "the other", a "deserted" territory that you feared to enter,⁵⁰ a territory "out there to shape"⁵¹ or personified as the unspoiled place—the site for redemption and renewal from the artificial and mechanical culture of the city and therefore deserving of preservation.⁵² Accordingly, the tension between the city as culture and nature as other validates the idea of their separation at the city's edge and prophesies nature and the outside world as a nostalgic sacred entity.⁵³

1.2 Peri-urbanisation—an overview of processes

Urbanisation is the major driver of landscape change. The UN predicts that by 2050, 68 per cent of the world's population will reside in urban areas, with most of this occurring within Africa and

45. Jacobs, *Death and Life*, 257.

46. Jacobs, *Death and Life*, 347.

47. Augé, *Non-Places*, 78.

48. Whiston Spirn, "The Authority of Nature," 251-252.

49. Sorvig, "Nature/Culture," 1-11. For a comprehensive overview of the use of nature within the discipline of landscape architecture.

50. Cronon, "The Trouble with Wilderness," 9.

51. Williams, "Ideas of Nature," 75-76.

52. Williams, *Keywords*.

53. Williams, *Keywords*, 254.



Figure 1.3 **Visual compression of the peri-urban territory**
(Author, 2019. Digital photomontage, 21 x 27cm.)

Southeast Asia.⁵⁴ Certainly, the rate of urbanisation predicted here indicates that containment is not enough to abate growth. Urban areas offer opportunities for education, higher incomes and better job opportunities. However, with these opportunities come challenges regarding the delivery of housing, infrastructure and services, as well as available arable land to supply food and water to a growing population. The most prominent land-use pattern of peri-urbanisation is the displacement of agricultural areas for urban uses.⁵⁵ Other major drivers include natural supply of ecosystem services⁵⁶ and requirements for water.⁵⁷ More so, as an imperative, the threat that climate change brings to these competing demands and the requirement and need to diversify and reduce energy consumption and greenhouse gas emissions contribute to the tension contained with peri-urban territories.⁵⁸

The literature on US and European spatial form of peri-urbanisation, concludes that this urbanisation pattern is a result of low density, car dependent development and the subsequent impact this has had on the resources derived from the peri-urban territory.⁵⁹ Garraeu identified “edge cities” as areas on the periphery of US metropolises driven by economic and infrastructure networks of employment, housing and leisure,⁶⁰ while Sieverts theorised a territory of “cities without cities” but a continuation of urbanisation and transport infrastructures.⁶¹ In Europe, the successful integration of edge cities is evident in the Randstad area of the Netherlands.⁶² Spatial dynamics aside, an alternative view is provided by Sassen, who proposed that peri-urbanisation arises due to cross-border dynamics of global flows of resources and economies.⁶³

Indeed, positioning the peri-urban as a transitional network between urban, rural, regional and global networks⁶⁴ also differentiates a space of transitional values.⁶⁵ While further assessment of this is made in chapter six, it is important to explain how transition effects our understanding of the peri-urban territory. Gallent, Bianconi and Anderson argue that the functions contained within the fringe are not located there because it is a zone of transition, but because it is the location of choice. That is to say, the function and structure relating to energy, water, waste, food, transport infrastructures and

54. United Nations Department of Economic and Social Affairs, *2018 Revision of World Urbanization Prospects*.

55. Allan, “Environmental planning and management,” 135-147.

56. Forman, *Urban Regions: Ecology and Planning*.

57. Champion, *Counterurbanization: The Changing Pace*.; Saunders and Fishman, *Sprawl and Suburbia*.; Davis, Nelson and Dueker, “New’ Burbs The Exurbs,” 45-50.; Burnley and Murphy, “Exurban development in Australia,” 245-254.

58. Maheshwari, et al., *The security of Water, Food, Energy*, 5.

59. Davis, Nelson and Dueker, “New’ Burbs The Exurbs,” 45-50.

60. Garraeu, *Edge City*.

61. Sieverts, *Cities without cities*.

62. Bontje and Burdack, “Edge Cities, European Style,” 317-330. Also, Hidding and Teunissen, “Beyond fragmentation,” 297-308.

63. Sassen, *The Global City*.

64. Mattingley and Gregory, “NRSP Project R8491 Synthesis of peri-urban interface knowledge.”

65. Further assessment of peri-urban territory values is explained in Chapter Six. See Douglas, “Peri-Urban Ecosystems and Societies,” 18-29.

logistics, for example, are peculiar and unique to the fringe condition.⁶⁶ Additionally, they conclude that the characterisation of these types of land use as transitional hinders the securing by each key component of its condition, especially components that are derived from the landscape (rather than built form) such as landscape character,⁶⁷ rural agriculture,⁶⁸ tourism,⁶⁹ recreation and amenity landscapes.⁷⁰ Critically, one's identity and the subsequent distinct connection to place is dependent upon a connection to landscape.⁷¹ However, other open spaces within peri-urban areas such as regional parks, recreation reserves, conservation estates and rivers and wetlands deliver essential ecosystem provisioning services⁷² of natural capital to the city, despite a general apathy towards ecosystem protection.⁷³ Likewise, Armstrong and McGee conclude that the diffused boundary of peri-urban territories resulting from increasingly global economies is part of what has propelled these zones into prominence.

The continuing separation of rural–urban issues remains problematic because of increasing social inequality⁷⁴ and issues concerning urban agriculture and the resilience of cities.⁷⁵ However, with these concerns comes the opportunity for potential—to improve and create new social, environmental and economic assemblages or hybrids of the urban–rural condition.⁷⁶ This approach is congruent with the NUA, which outlines several dimensions critical for integration within peri-urban territories, including:

1. The peri-urban territory exhibits spatial and non-spatial relations and therefore any activities that rewrite the geography of space also rewrite these relations (social, economic and environmental).⁷⁷
2. Integration of living infrastructure to support people's health and wellbeing as well as to support climate change adaptation and mitigation.⁷⁸
3. Coordination of food security and nutrition for urban areas as well as coordination of

66. Gallent, Bianconi and Andersson, "Planning on the Edge," 459.

67. Musacchio, et al., "The future of agricultural landscape," 140-154.

68. Bills and Gross, "Sustaining multifunctional agricultural landscapes," 313–321.

69. Oliver, Tove and Jenkins, "Sustaining rural landscapes," 293-307.

70. Luka, "Contested peri urban amenity," 256-276.

71. Brinkerhoff Jackson, *Discovering the Vernacular Landscape*; Brinkerhoff Jackson, *Sense of Place*; Stigloe, *Common Landscape of America*; Stigloe, *What is Landscape?*; Anderson, Kanaroglou and Miller, "Urban form," 7–35; Sudjic, *The 100 mile city*.

72. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being*, 330-360. For an explicit list of global ecosystem provisioning services.

73. Barau, "Tension in the periphery," 256-266.

74. United Nations General Assembly, "Transforming Our World," 21-22. As outlined in Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable."

75. Food and Agriculture Organization of the United Nations, *Food for the cities*. The urban and peri-urban food and nutrition action plan identifies elements for community action to promote social cohesion and reduce inequalities through local production for local consumption.

76. Gallent, Bianconi and Andersson, "Planning on the edge," 457-476.

77. Food and Agriculture Organization of the United Nations, *Food for the cities*. 38 (paragraph 136).

78. Food and Agriculture Organization of the United Nations, *Food for the cities*. 26-27 (paragraph 100-101).

food waste, transportation, energy, water and use of hazardous chemicals.⁷⁹

4. Integration of cultural heritage as a primary component of urban development.⁸⁰

Accordingly, to understand the peri-urban and its potential, we must begin with positioning the peri-urban as a deliberate space, not one that accumulates by accident during the urbanisation process. Furthermore, conceiving the socio-economic and cultural drivers that affect changes of the rural landscape needs to be spatialised because the biophysical characteristics and cultural features of the landscape give the territory its legibility.⁸¹ To do this requires interdisciplinary and transdisciplinary research, beyond the normalisation of the territory within spatial planning frameworks.⁸² Furthermore, greater consideration must be given to the Asia-Pacific region (in the context of rapid urbanisation) as well as to the uniqueness of Australian urbanisation patterns and to how social and economic infrastructure provision is delivered by state governments with federal support.⁸³ Australia's landscapes are unique, consisting of no fewer than 89 bioregions across the country, with several major metropolitan cities located in within these highly biodiverse areas.⁸⁴ Therefore, a critical factor in understanding peri-urbanisation in these contexts is the question of how local ecologies are valued.

79. Food and Agriculture Organization of the United Nations, *Food for the cities*. 32 (paragraph 123).

80. Food and Agriculture Organization of the United Nations, *Food for the cities*. 32 (paragraph 124-125).

81. Pinto-Correia and Kristensen, "Linking research to practice," 249.

82. Pauleit, et al., "Transformation of rural-urban," 1-10.

83. Gross, Lin and Legates, "Asia and the Pacific Rim," 312.

84. Australian Nature Conservation Agency, *An Interim Biogeographic Regionalisation*.

1.3 Peri-urbanisation in Australia

Around 87 per cent of Australia's population live in urban areas with a trend of rural decline.⁸⁵ While most of the population is contained within the metropolitan centres, which continue to be the major growth areas, there has been, over the more recent decades, a dispersal of the population to "sea and tree change" regional locations.⁸⁶ This movement has been a response to a lack of affordability in the major metropolitan cities, as well as lifestyle change driven by an ageing population and people seeking amenity lifestyle.⁸⁷ Since the early 2000s there has been consistent growth in outer local government areas (LGAs)⁸⁸ within the metropolitan area of Perth, such as Wanneroo, Rockingham, Armadale and Serpentine-Jarrahdale, as well as those LGAs surrounding the metropolitan area, including, in Gingin, Chittering, Toodyay, Mandurah and Murray.⁸⁹

Despite these statistics, areas in Australia have only begun to be defined as peri-urban in the last 27 years, even though the landscape structural components of the peri-urban condition is evident in some of the early urban forms of several cities.⁹⁰ McKenzie produced the first comprehensive critical examination of peri-urban phenomenon and the spatial policies effecting peri-urban areas in all Australian metropolitan cities.⁹¹ McKenzie identified the 100 kilometre commuting distance extending from the centre as one key parameter for determining the location of the peri-urban. Her evaluation of the peri-urban across these metropolitan centres concluded that there were strong correlations between land-use planning and transport infrastructure in the form of urban corridors, the allocation of green wedges between these corridors, the co-location of employment land with urban areas to reduce transport and the amenity and tourism value of rural land.⁹² McKenzie deduced that there was intermittent reference to peri-urban regions and generally the peri-urban area was overlooked when the impact of outward urbanisation was considered. Importantly, Her study highlighted the cumulative impacts of urban decisions that affect the peri-urban and set out the need for a greater understanding of peri-urban dynamics.

Bunker and Houston found similar conclusions to McKenzie in their examination of post-World War Two planning of urban–rural fringes in Sydney and Adelaide. In addition they found a growing complexity due to multi-faceted demographic change, economic diversity and increasing awareness

85. United Nations Department of Economic and Social Affairs *2018 Revision of World Urbanization Prospects*.

86. Salt, *The big shift*.; Costello, "Going Bush," 85-94.

87. Burnley and Murphy, *Sea Change*.

88. Local Government Areas (LGA) are the third tier of government in Australia and are geographically, politically and administratively distinguished.

89. Regional Australia Institute, *Pathways to Settlement*, 52.

90. For example, the 'hills' in Melbourne, or Castlecrag in Sydney.

91. McKenzie, "Growth Management Or Encouragement?" 83-99.

92. McKenzie, "Growth Management Or Encouragement?" 83-99.

of environmental concerns.⁹³ Alternatively, Burnley and Murphy identified several common features between peri-urbanisation patterns in Australia and the US, including service delivery, replacement of prime agricultural land, landscape character changes and environmental impacts.⁹⁴ Notably, Sydney and Melbourne have been analysed comprehensively because of their population characteristics and trends as the largest metropolitan centres, as well as their green belts.⁹⁵ In the case of southeast Queensland, urbanisation has been identified as a continuous band of urban form.⁹⁶ Similarly others propose the eastern seaboard of Australia from Sydney to Canberra⁹⁷ and even Sydney to Melbourne⁹⁸ as conurbations.

Collectively, these studies describe the wide range of traditional (i.e. forestry) and emerging (i.e. carbon sequestration) natural resource products management within the rural–urban fringe to suit the land values and lifestyle aspirations of the urban. There have been concerns for the continued fragmentation of peri-urban land and the impact that diminishing lot sizes have on land-use potential from an agricultural and amenity perspective. This has included an assessment of ad hoc land development impact on landscape qualities, natural values and recreational value.⁹⁹ Specific attention has been given to agriculture (perishable vegetables, poultry, flowers and turf) because of the ability to quantify and rationalise the economic value of these.¹⁰⁰

More recent studies have outlined a renewed interest in peri-metropolitan regions and the physical and functional expansion of the city and the area into which it expands.¹⁰¹ Furthermore, there has been an increased focus on the role peri-urban agriculture has played in contributing to metropolitan food bowl production and total gross agricultural production for Australia.¹⁰² An additional focus has been on how local food production has been distinguished for its contribution to sustainability and health and wellbeing.¹⁰³

Despite the evidence of the importance of the peri-urban territory for local food production, there is

93. Bunker and Houston, "Prospects for the Urban-Rural Fringe," 303-323. Water management issues are most prevalent and continue to be with diminishing rainfall and increasing periods of sustained heat.

94. Burnley and Murphy, "Exurban Development in Australia," 246.

95. Murphy and Freestone, "Towards edge city," 114-130.; Burnley and Murphy, "Residential location choice," 123-143.; Burnley and Murphy, "Exurban development in Australia," 245-254.; McKenzie, "Growth Management," 83-99.; Buxton et al., *State of the Peri-Urban Regions*; Buxton, et al. *Change and Continuity*.

96. Low Choy et al., *Change and Continuity – Peri-Urban Futures*.

97. Firth, "Another 200mile city."

98. Weller and Bolleter, *Made in Australia*.

99. Bunker and Houston, "Prospects for the rural-urban fringe," 303-323.; Bunker and Holloway, "Fringe City and Contested Countryside."; Audirac, "Unsettled Views about the Fringe," 7-32.

100. For example, agriculture in Sydney has been valued at 1 billion. See NSW Agriculture, Gillespie and Mason, 2003

101. Low Choy et al., *Change and Continuity – Peri-Urban Futures*; Buxton and Wadsworth, *Peri-Urban Landscapes*; Buxton, et al., *Change and Continuity – State of the Peri-Urban*.

102. Bunker and Houston, "Prospects for the Rural-Urban."; Bunker and Holloway, "More than Fringe Benefits."; Houston, "Re-Valuing the Fringe."

103. Maheshwari, Singh, and Thoradeniya, *Balanced Urban Development*.

still significant evidence of urbanisation being the preferred land-use type.¹⁰⁴ Undoubtedly, evidence of land holding or land banking, whereby investors buy up vast areas of peri-urban rural land adjacent to the metropolitan area in anticipation of urban growth in order to make large profits on the resale of the land to developers, is paramount.¹⁰⁵ Subsequently, rural lands located at the periphery are often considered to be productive landscapes of the past, empty or functioning with low agricultural outputs.¹⁰⁶ These lands have their zoning transferred to “urban” when the “time is right” and because of the degraded state of the existing rural land, it appears to occur without the demise of “productive agricultural land”.¹⁰⁷ Furthermore, this emphasises urban development as an improvement to their improvised derelict or denuded rural state.¹⁰⁸ Subsequently, when asserting the peri-urban territory’s potential, policy implications which ensure that peri-urban rural land maintains high productivity until land conversion occurs is one such opportunity. Other considerations for peri-urban rural lands might include small plot intensive farming, waste conversion and reuse, carbon sequestration or semipermanent energy landscapes of both wind and solar energy generation funded by public–private partnerships.¹⁰⁹ In each of these situations, there are explicit opportunities for intersection with social and ecological systems. This would ensure that the potential performative aspect of peri-urban lands is maximised and utilised as an active provisioner service for the city. Increasing the landscape performance of peri-urban lands might even provide the landowner with considerable income, or long-term income streams that are highly competitive to the value this land would have otherwise acquired from urban development.¹¹⁰ Further, it could also encourage innovations in new urban forms at the periphery that would either adapt or integrate into these landscapes, taking on some of their components if the land use does indeed transition to urban.¹¹¹

Increasing the value and productivity of the peri-urban for the broader metropolis could increase and diversify metropolitan agricultural output and strengthen Australia’s position in the Asia-Pacific region

104. The 70 quadrats in chapter four illustrate this.

105. Sue Neales, “Farmers combine one foreign land register,” *The Weekend Australian*, April 21–22, 2012.

Foreign ownership of peri-urban areas (semi-rural, rural and agricultural lands) is not known as foreign ownership laws only register properties with a value over \$40million. Often, these peripheral sites cost significantly less and therefore go undetected as they do not end up on the national register. Neale’s argues that Australia needs a singular land register to link all sales regardless of size or financial transaction.

106. Holmes, “Impulses towards a multifunctional transition,” 148.

107. Buxton, Carey and Phelan, “The Role of Peri-Urban Land Use Planning,” 153–170.

108. Sinclair, Bunker and Holloway, “From the outside looking in,” 15. Anecdotal evidence is that a 2 hectare lot with a house on it now sells for approximately \$1.5 million, whereas 5 years ago this land was less than \$300,000. This rise in price has been a reflection of the lifestyle choice of people to live in a bushland or rural setting on a large lot. The price of the land makes it difficult for developers to purchase a number of lots and develop them for residential development.

109. Argent, “Trouble in Paradise?” 183–205.

110. Armstrong and Lopes, “Re-Ruralising the Urban Edge,” 17–27. Many peri-urban farms or areas of intensive agriculture are developed by migrants from the mid twentieth century. These farmers are now of old age and see the zoning and development of their properties for urban development as valuable retirement income.

111. Western Sydney Parklands Trust, *Plan of Management 2030*. In Australia, the 27km Western Sydney Parklands demonstrate the conversion of the remnant Sydney greenbelt into a comprehensive multifunctional parkland setting. For international precedents, the Parc du Sausset on the outskirts of Paris is another example however on a much smaller scale. See Jirku, “Adding Third Nature to Second Nature,” 50–63.

as it faces rapid population increases and urbanisation.¹¹² Foreign investment could be encouraged to support this, possibly at a smaller scale than currently occurs, and with more focus in regard to type production and specific tradable development markets of ecosystem services within the peri-urban.¹¹³ Certainly, Australian peri-urban land is becoming a precious resource if it is required to continue to produce a large majority of the metropolitan region's perishable foods, while enabling suburban development to support a growing population.¹¹⁴

While natural resource issues remain high, there are few socio-ecological perspectives, despite the changing social dimensions and scales of the territory¹¹⁵ and several pieces of research championing more holistic, multidisciplinary research.¹¹⁶ In fact, several recent spatial and speculative proposals for Australian metropolitan regions (and thus peri-urban regions) within biodiversity hotspots have illustrated these conflicts and enabled new spatial representations of policy settings to be outlined. A common feature of this research has been the contribution made by landscape architects.¹¹⁷

Accordingly, the opportunities for contribution to new knowledge begin with conceptualising the peri-urban as its own place and as a ground for making (as proposed in the final chapters of this thesis), in order to establish a richer understanding of the connections between city ecosystems that have both real and perceived ecological and cultural value.¹¹⁸ As Riper et al. argue, this important socio-ecological perspective, or *salience*, is important because it incorporates the connection between multiple stakeholders and as a result, builds multiple forms of knowledge and methods of understanding ecosystems, their connection to humanity and their value.¹¹⁹ Conceiving the peri-urban territory as a relational place in accordance with its ecosystem is a significant departure from the generalised value attributed to the peripheral urbanised landscape where we see housing and infrastructure (roads, waste, energy and water) prioritised over the natural capital values of local and regional biodiversity systems and the embedded and active socio-cultural connections of people and place within the peri-urban.¹²⁰

In this regard, the need to theorise the peri-urban territory as a rich, multi-scalar connection between

112. Houston, "Re-valuing the fringe," 209-223.

113. Harman and Low Choy, "Perspectives on tradeable development rights," 617-635.

114. Sue Neales, "End of the Family Farm," *The Weekend Australian*, March 24-25, 2012.

115. Kennedy, Butt and Amati, *Conflict and Change*.

116. Gobster, "Mining the LANDscape," 21-30.

117. For example, Weller, *Boomtown*.; Weller and Bolleter, *Made in Australia*.

118. Van Riper, et al., "Incorporating Sociocultural Phenomena," 233-244. See also Daniel, et al., "Contributions of cultural services," 812-819.

119. Riper, et al., "Incorporating Sociocultural Phenomena," 244.

120. Nassauer, "Messy Ecosystems, Orderly Frames," 161-170.; Aronson, et al., "A global analysis of the impacts of urbanization," 20133330. Also, Haraway, "Anthropocene, capitalocene, plantationocene, chthulucene," 160., where she refers to this as multi species assemblages.

people and place might be further supported by the introduction of an ecological aesthetic derived from the landscape structure of the territory.¹²¹ This approach would foreground the value of landscape structure together with ecology and prioritise this within landscape planning, design and management.¹²² As such, landscape architecture, the profession that marries the instrumentality of the arts with the sciences, is well positioned to develop and lead this ecological aesthetic through a spatio-temporally rich language of eidetic image interpretation, making and design.¹²³ Importantly, being able to spatialise this relationship is the beginning of discovering the territory's potential.¹²⁴ As such, any alternative, thickened conceptual description of the peri-urban requires the abandonment of the dichotomy of city and country, and instead, a "survey" of structural descriptors (as this thesis proposes) derived from the landscape itself.¹²⁵

1.4 The impact of modern urban and regional planning on peri-urban spatial forms

Modern urban and regional city planning emerged at the turn of the twentieth century as a response to the impact industrialised cities were having on the health and wellbeing of their residents.¹²⁶ Access to the natural environment, clean air and recreation became important considerations, so too was the rational for economic opportunity for the urban poor.¹²⁷ In the US, the response from leading planners and urban theorists such as Lewis Mumford, Clarence Stein, Henry Wright and Benton MacKaye¹²⁸ was that of a "networked" approach in the idea of a Regional City. The ideas of a networked approach became important to ensure "the emerging region is not dominated by one thing—urbanism, nature, culture or economy—but by all simultaneously"; it is the "nexus of our culture and the armature of our economy".¹²⁹

Subsequently, the developed countries of Europe, the US and Australia displayed similar approaches to urban containment and growth. Due to Australia's isolation and parochialism, as well as planning not becoming a robust intellectually distinguishing field until the 1970s, Australia has a history of borrowing and blending city planning theories from elsewhere.¹³⁰ Australia's capital Canberra

121. Nassauer, "Cultural sustainability: Aligning aesthetics," 65-83. See also, Gobster, et al. "The shared landscape," 959-972.

122. McHarg, *Design with Nature*.; Gobster, Nassauer and Daniel, "The shared landscape," 959-972.; Meyer, "Sustaining Beauty," 6-23.

123. Corner, "Representation and landscape." 243-275.; "The Agency of Mapping," 188-225.

124. Colucci, "The potential of peri urban areas," 103-122.

125. Xavver de Getyer Architects, *After Sprawl*. This approach is identified in the work of Dutch firm Xaveer de Getyer Architects, whose survey explores the *processes* that hold this transitional landscape together through a range of projections that 'shift', 'overlay' and 'connect' these landscapes across the Netherlands. Their visually explorative text 'After Sprawl' explores the potential of the peri-urban as much as it reveals the lack of preparedness amongst the disciplines that are concerned to abandon city or country.

126. Kostof, *The City Shaped*.; Hall, *Cities of tomorrow*.

127. Relph, *The Modern Urban Landscape*.

128. All were founding members of the short-lived, but highly influential Regional Planning Association of American (1923)

129. Calthorpe and Fulton, *The Regional City*, 7.

130. Freestone, *Model Communities: The Garden City*.

adopted notions of the City Beautiful movement from the US and this ethos resonated throughout the country with city improvement schemes and the development of city plans.¹³¹ Alternatively, Melbourne continues to utilise an Urban Growth Boundary (UGB) to control its growth.¹³² However, the most influential to all Australian cities was the Garden City ideal developed in the United Kingdom (UK).¹³³

The Garden City ideal

One of the most recognisable and translated models for managing the divide between city and country was Ebenezer Howard's "Garden City of Tomorrow" model of 1898.¹³⁴ This model launched the era of modern city and regional planning as it sought to provide the best of both urban and rural landscapes and promoted the design and implementation of good urban design.¹³⁵ Proposed as a diagram, the garden city spatialised the way residents could live in the country and still work in the industrial city.¹³⁶ A large proportion of the proposed garden city model was allocated to agriculture, predicting the importance of the surrounding rural productive landscape for economic purposes and for health and lifestyle (see figure 1.4).

The model form of the garden city is important because it implies successful formation of planning, architecture and landscape. The model's carefully prepared plan was explicit in how the city should evolve to sustain its own future, so much so that the emergence of the garden city and subsequent garden suburb ideals and principals occurred throughout several Australian cities and regional areas.¹³⁷

Whereby earlier inscriptions of city form positioned the garden as either an external or internal mediator of space for the city, Howard's Garden City ideal identified the city enveloped to *become* a garden.¹³⁸ With a central garden at its core, the circular plan divided by six main boulevards created six equal parts filled with public town gardens at the centre. Moving out from the centre of the plan, homes are built facing parkland avenues and roads on converging rings. The outer ring locates what is now classified as peri-urban land—coal yards, clothing factories, allotment gardens, railway lines

131. Freestone and Hutchings, "Planning History in Australia," 78.

132. One of the most theorised UGB's is that of Portland, Oregon, United States of America.

133. Despite a history of Urban Growth Boundaries (UGB's) occurring elsewhere including Melbourne Australia, this mechanism has not been used to control growth in Perth. Lexington, Kentucky was the first city to implement an UGB in America (1958) with an aim to preserve the cultural heritage attached to horse farms located on its peri-urban landscape, the state of Oregon implemented a state wide UGB policy in 1973 that required each metropolitan area to implement a UGB in response to planned urban growth.

134. Howard, "Garden cities of to-morrow" It is important to understand the garden city ideal was largely promoted as an idea, rather than the actual way a city would be developed, despite been first actualised in 1904 in Letchworth, United Kingdom.

135. Clark, "The Garden City Movement," 26.

136. MacFadyen, *Sir Ebenezer Howard*, 32.

137. Freestone, "The Garden City Idea,"

138. This follows earlier mediations of garden and city as seen in Italian cities. See Dixon Hunt, "The garden in the city of Venice," 46-61.

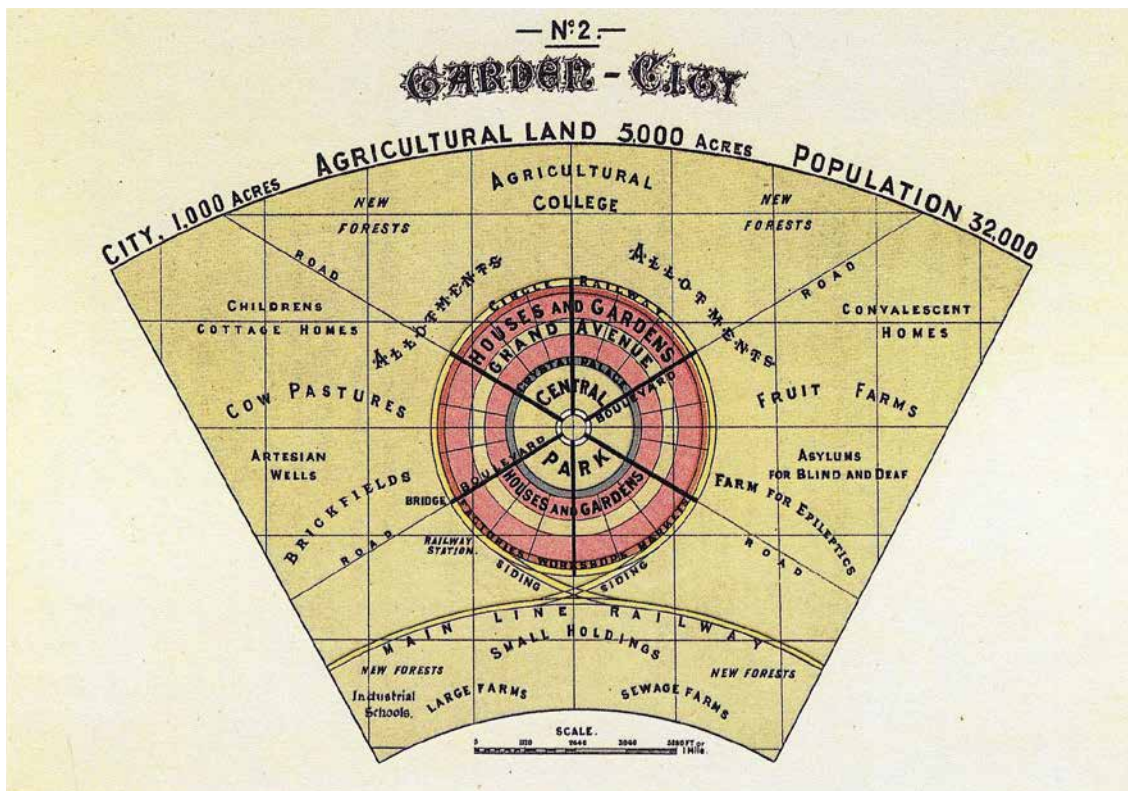


Figure 1.4 Ebenezer Howard's *Garden City of Tomorrow* diagram
(Ebenezer Howard. *Garden Cities of To-morrow*, 22.)



Figure 1.5 Perth Townsite 1838

(A.Hillman. *Plan from actual survey of Township of Perth showing Lots, Streets & Lakes bounded by Perth Water to South, Ellen Street to North, Mt Eliza to West & Swan River & Hierrisson Island to East.* 1838. [scale: 10 chains to an inch]. Retrieved from State Records Office of Western Australia

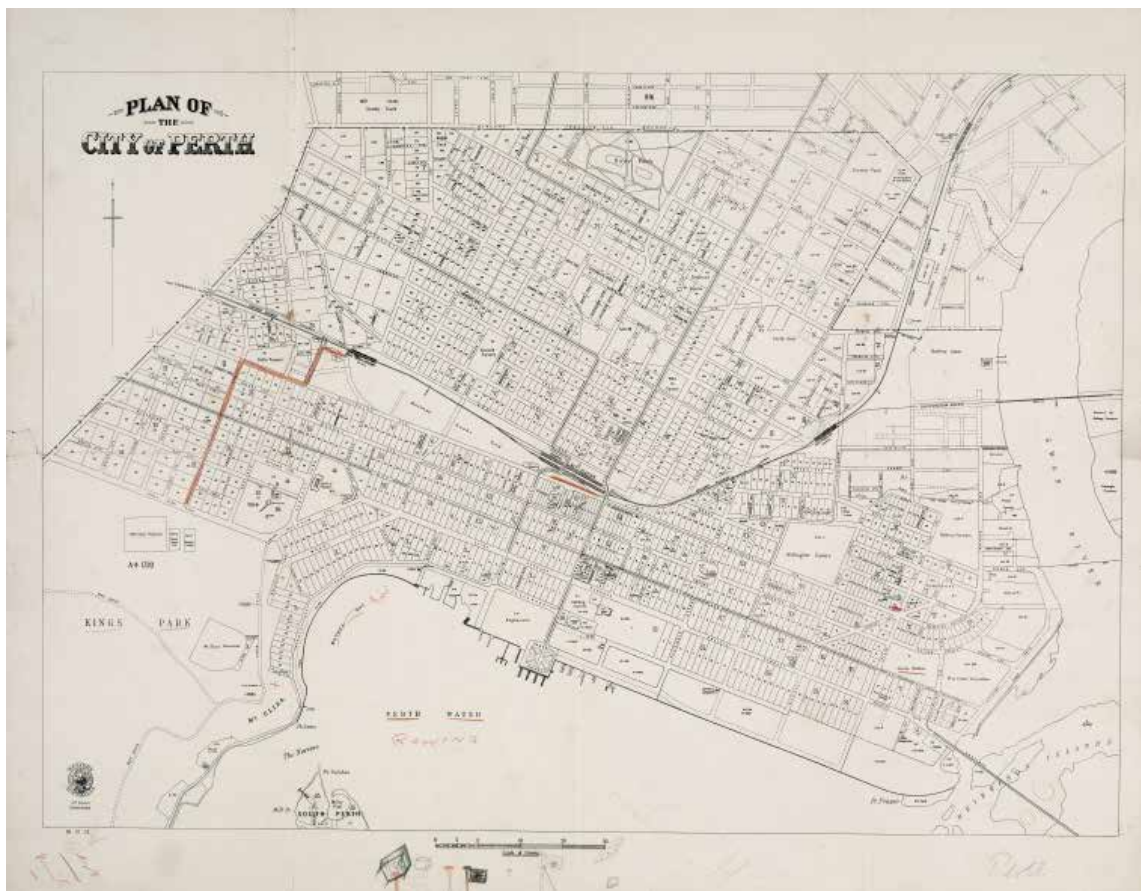


Figure 1.6 Perth Town Plan 1925

(Government of Western Australia. *Plan of the City of Perth.* 1925. Retrieved from State Library of Western Australia slwa_b1959717_2.)

and larger dairy and produce farms and artesian wells set among a domesticised rural landscape.¹³⁹

The abundance of gardens in the model proposed open spaces as being the sites where equitable social opportunity to live close to nature was available.¹⁴⁰ The model prescribed a hierarchy of city functions with those more compatible with the “country” (or not compatible with the central part of the city) being relocated to the periphery. However, the Garden City and Network City approach led to the dominance of nature as “sacred”, whereas the traditional city was cast as profane. By the second half of the twentieth century, even with the rise of landscape design, planning and ecology, particularly in the work of Ian McHarg, “landscape like architecture lost its long relationship with the city and therefore any earlier connections between city centre and the peri-urban territory.”¹⁴¹

Green belts

The Garden City ideal is important because it was the precursor to other forms of peripheral regional planning such as green belts. Green belts encircle major urban centres and consist of various topological forms (for instance park greenways, green wedges, park belts and green zones) and have a common goal of formalising the preservation of natural areas of “town or country” while also providing metropolitan structure and, in some cases, limiting urban growth. Green belts were part of the solution to containing the disparities between urban and non-urban areas.¹⁴² Their spatial form is represented by large tracts of interconnecting land demarcating and mediating the outer urban and inner rural edge of the city. Their role has largely been used as a preservation tool by way of structuring regional identity regarding natural and cultural assets, specific agricultural and productive lands and recreational opportunities.

Australia’s first attempt to define and articulate this peripheral territory echoed Howard’s Garden City ideal by incorporating green belts—enveloping park and agricultural lands surrounding urban form to sustain the resident population.¹⁴³ Nearly two hundred years later, several of these parklands continue to resist development at the city centre, despite the ongoing conversion of “country” areas to urban on the outer side of the original green belt.¹⁴⁴ This is important because the green belt began

139. Beevers, *The Garden City Utopia*, 50-52.

140. Fishman, “The Bounded City,” 58-66.

141. Dennis and McIntosh, “Landscape and the City,” 46.

142. Xaveer de Geyter Architects, *After Sprawl*, 158. An example of the greenbelt idea and the embedded topologies therein is exemplified in the regional landscape of the Netherlands, more commonly collectively referred to as the Randstad Green-Heart or “ring city” that links together Amsterdam, Rotterdam and The Hague.

143. The cities of Adelaide and Melbourne were largely shaped by these ideals from the early city grid through to their later expansion.

144. See *Character Preservation (Barossa Valley) Act 2012 (SA)* and the *Character Preservation (McLaren Vale) Act 2012 (SA)*. In more recent years, Adelaide has moved towards establishing a limit to urban growth as well as attempting to list the significant cultural, agricultural and viticultural landscapes of the Barossa Valley and McLaren Vale on heritage lists, reinforcing the importance of protecting non-urbanised areas on the periphery of the city through strong planning controls.

to establish the periphery as having value (aesthetic or recreational) beyond being a wasteland for the city.¹⁴⁵ The recognition of green areas for recreation and respite to support the urban population continued to be proposed as mechanisms to limit growth.¹⁴⁶ Furthermore, the green belt as an idea outlines the potential of peri-urban landscapes as a provisioning site for the city.

Despite a strong correlation between urban planning theories in Australia and the incorporation of green belts to connect natural systems (rivers, watersheds and conservation areas) across multiple hierarchies, this did not translate as successfully in the metropolitan planning of Perth. Beginning with Perth's First Town Plan (1838) (see figure 1.5), the city grid sits parallel to and facing the Swan River. To the north of the grid, the interconnected geomorphic wetlands of the Swan Coastal Plain first proved valuable for the colony due to their fertile soil (a rather rare commodity on the plain) and their ability to provide for horticulture, pasture and orchards. However, after 1933 the depiction of the swamp landscape was diminished and by 1938 they were fully absorbed into the town plan or transformed for their aesthetic quality as scenic lakes¹⁴⁷ (see figure 1.6).

The intent to adhere to the physical conditions of Perth's landscape was more apparent at the metropolitan scale. The Stephenson Hepburn report recognised the importance of the environment for environmental and social needs and set forth the creation of parks and reserves to support the development of the city:

In countries where open land is limited, and in cities where extensive urban sprawl has reduced enjoyment to an occasional glimpse of a park, countryside, river or sea, the lesson has been learnt and the painfully difficult process of trying to reclaim enough open land for a minimum amount of recreation has begun.¹⁴⁸

Subsequently, these values are evident in the first metropolitan plan. The plan shows a 60 kilometre long, north-south armature through the metropolitan area and areas either side of this set aside for intensive agriculture (see figure 1.7). Unlabelled areas appear as pockets of open space adjacent to the Swan River and as a thin line alongside the coast and within the Darling Range, indicating areas of amenity value.¹⁴⁹ However, the chain of wetlands of the Swan Coastal Plain (which are also some of the most biodiverse areas) were left with an unassigned value.¹⁵⁰

145. Saniga, *Making Landscape Architecture*, 18.

146. Harris, *Melbourne's Green Belt and Wedges*. For a period of forty years from the 1960's, seven urban growth corridors with both internal green wedges and peripheral agricultural land belt areas determined the limit of growth for the city of Melbourne. During this time, the non-urban zones, including green wedges, covered about half the Melbourne metropolitan planning area.

147. Morel EdnieBrown, "Layered Landscapes," 395-396.

148. Stephenson and Hepburn, *Plan for the Metropolitan Region*, 89..

149. Stephenson and Hepburn, *Plan for the Metropolitan Region*. See the "Land Availability: Plate 7."

150. Consider for example London's Green Belt in the early nineteenth century or Boston's 'Emerald Necklace' at the end of the

Two decades later, at a time of growing ecological and environmental awareness, the *Corridor Plan* for Perth¹⁵¹ (see figure 1.7) identified the in-between spaces as “green wedges” earmarked to provide open space, for recreation as well as for the provision of agriculture. At this time, corridor planning was already well established internationally as well as in Sydney and Canberra.¹⁵² The *Corridor Plan* offered several advantages, including a mix of urban and open space, economies of urban transportation and provision for further urban expansion.¹⁵³ Importantly, the *Corridor Plan* for Perth predicted that it would “enhance the urban environment while preserving the essential character of the non-urban areas”.¹⁵⁴ However, these were not sufficiently programmed to deliver these services or adequately protected in the shadow of future urban growth and therefore quickly became eroded of any significant landscape value.¹⁵⁵ McQuade proposed these ecological efforts as “imaginaries” and concluded they were limited in scope and application despite appearing from the 1970s onwards.¹⁵⁶ Similarly, prominent Western Australian landscape architect George Seddon explained:

There is no well-defined land use for most of the area; it waits uncertainly to discover its future. Much of this land is in fact simply derelict, especially south of the river, where there are huge tracts in which raw new roads cut through a wasteland: a mosaic of degenerate fire-blackened bushland, choked with urban junk of all descriptions from cans and bottles to rusting car-bodies; industrial enterprises, usually minor and often unsightly; quarries for sand and limestone; unsanitary landfill sites for urban garbage disposal; half-hearted farms that are hardly worth improving, given the poverty of the soil and the uncertainty of the future; and once-cleared land that is now reverting to scrub.¹⁵⁷

There appears to be tension between the values imparted at the metropolitan scale of planning and how these values are enacted on the ground by local areas of government and the citizens of the city. This can be evaluated further by considering how the principles of the garden city appear at both the regional and landscape scale, to those of the neighbourhood.¹⁵⁸ Freestone concludes that the transformation of Howard’s Garden City vision into reality brought complications and consequently in Australia, a selective adoption of concepts.¹⁵⁹ Furthermore, the adoption of the principles on a macro-

eighteenth century and the opportunities these landscapes provided to the city during a time of rapid industrialisation.

151. Metropolitan Region Planning Authority, *Corridor Plan*.

152. Hall and Tewdwr-Jones, *Urban and Regional Planning*, 48.

153. Hill, “Guiding Perth’s Growth,” 127.

154. Metropolitan Region Planning Authority, *Corridor Plan*, 36.

155. Kullman, “The Emergence of Suburban Terracing,” 593-621.

156. McQuade, “Shaping Perth’s suburban landscapes,” 185-204.

157. Seddon, *A Sense of Place*, 196.

158. Metropolitan Region Planning Authority, *Corridor Plan*. 10. Shown here is a typical urban corridor and peripheral parkway study.

159. Freestone, *The Australian Garden City*, 25.

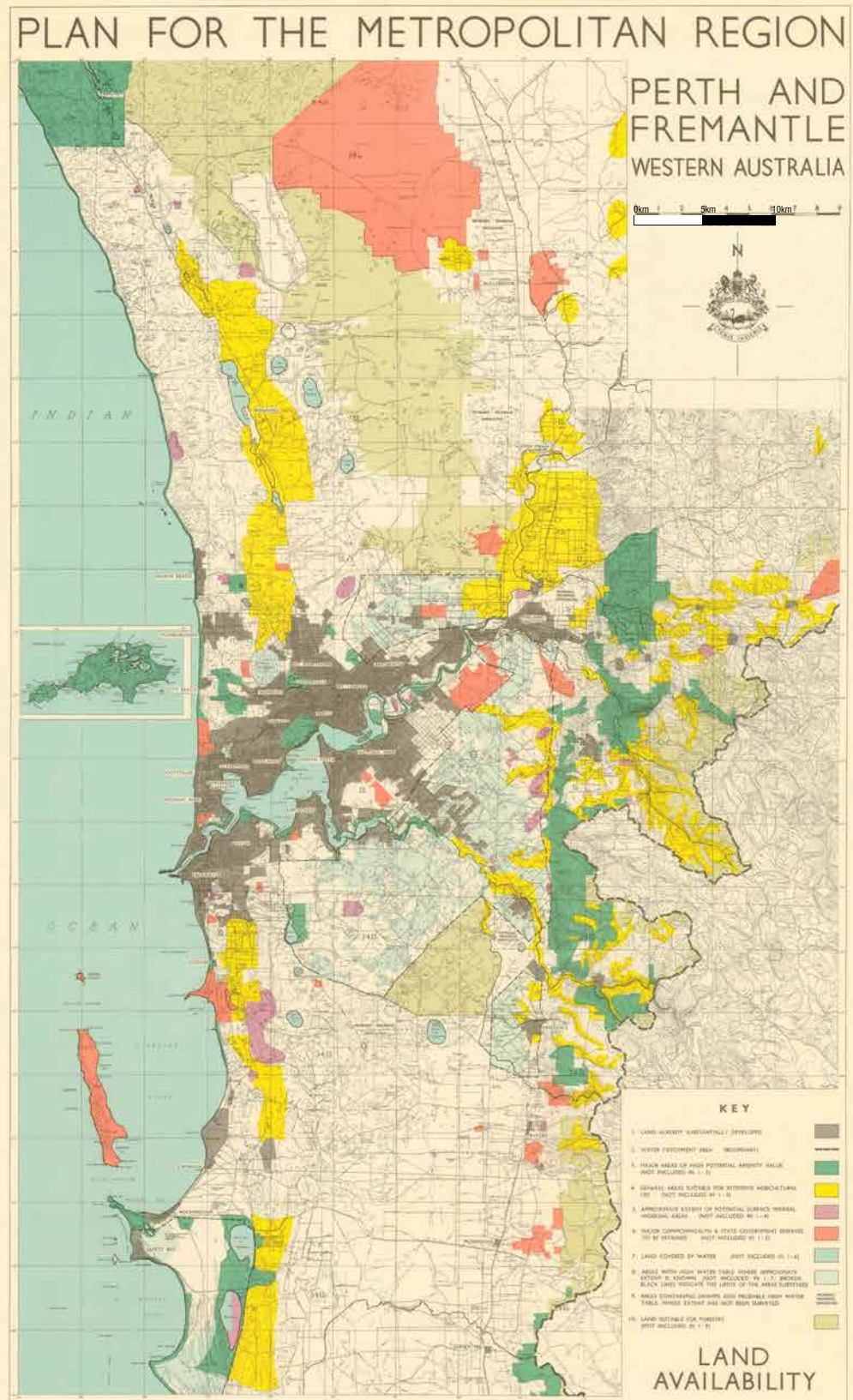


PLATE 7

Figure 1.7 *Plan for the Metropolitan Region of Perth and Fremantle, Western Australia*
(Stephenson and Hepburn. *Land Availability*, 1955. Plate 7)

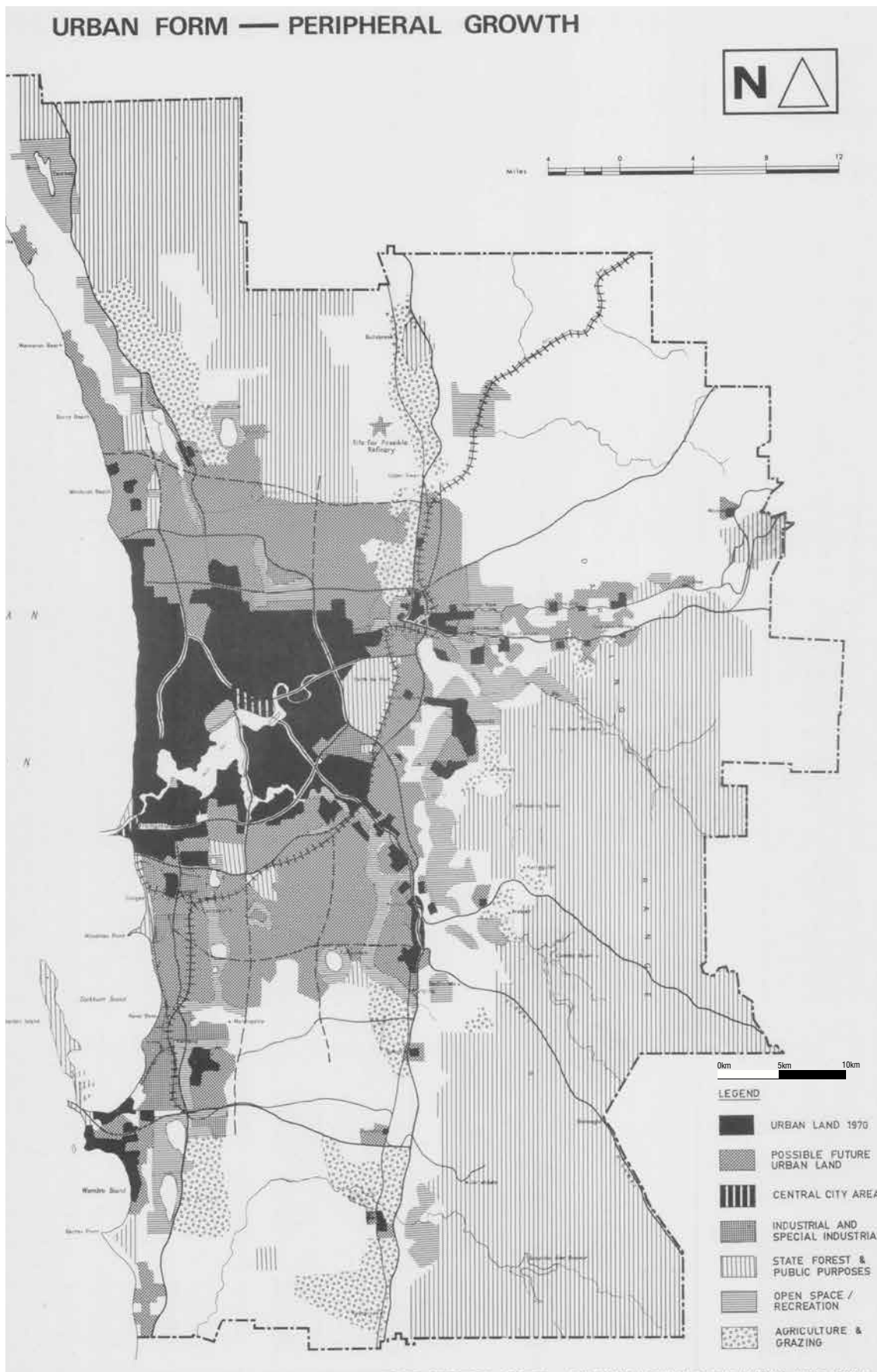


Figure 1.8 *The Corridor Plan for Perth*
(Western Australia Metropolitan Region Planning Authority. 1970.)

scale as well as a micro-scale, in the form of the Garden suburb in the cities of Sydney, Melbourne and Perth, added prestige to private land speculation.¹⁶⁰

The Garden Suburb

The garden suburb took the more generalised principles of the Garden City ideal without necessarily having the industrial or commercial areas attached to it. Specifically, the garden suburb included important characteristics that distinguished it from ordinary suburbs. These characteristics were predominantly derived from the landscape structure and included park-like environments (complete with trees, shrubs and lawns) and an abundance of well distributed, self-contained open space.¹⁶¹ There are several examples of the creation of the garden suburbs within Perth's peri-urban territories and the expansion of garden suburb principles in the creation of open space networks.

In the 1950s, land was provided gratis to the Anglo-Iranian Oil Company (subsequently BP Petroleum), who had decided to set up business in Perth, which subsequently gave rise to the development of the Kwinana suburb that would house 1,000 of the workers adjacent to their employment.¹⁶² The transportation of a theoretical model from the UK, without consideration to the local natural ecologies and setting, created immediate issues. The siting of the suburb in bushland north-east of the industrial site put the suburb in the direct pathway of prevailing south-westerly winds, which contributed to the subsequent air pollution and many families relocating to the better serviced area of Fremantle, north of the industrial area.¹⁶³

The establishment of garden suburbs closer to the central business district (CBD) occurred earlier than this and emphasised transport and the aesthetic and sanitary aspects in their development. The suburbs of Floreat (see figures 1.9 – 1.10) and City Beach were developed in the 1920s when the City of Perth Town Clerk, William Bold, introduced the Endowment lands between the city and coast to have control over development.¹⁶⁴ Bold encouraged the emulation of the Garden City principles of Ebenezer Howard, as explained by Ward:

The Garden City model was explicit in stating [the desirability] that “the collective ownership of land and communal enjoyment of the benefits of land value increase. Individualist ownership of landed property and private appropriation of increases in land values were

160. Freestone and Hutchings, “Planning history in Australia,” 78.

161. Freestone, *Model Communities*.

162. Alexander and Greive, “Metropolitan Development in Perth,” 53.

163. Alexander and Greive, “Metropolitan Development in Perth,” 55.

164. Berry, “The evolution of local planning,” 26. The *City of Perth Endowment Lands Act 1920* (WA), gave powers to the City of Perth to zone areas, lease public buildings and establish a home purchase assistance scheme.

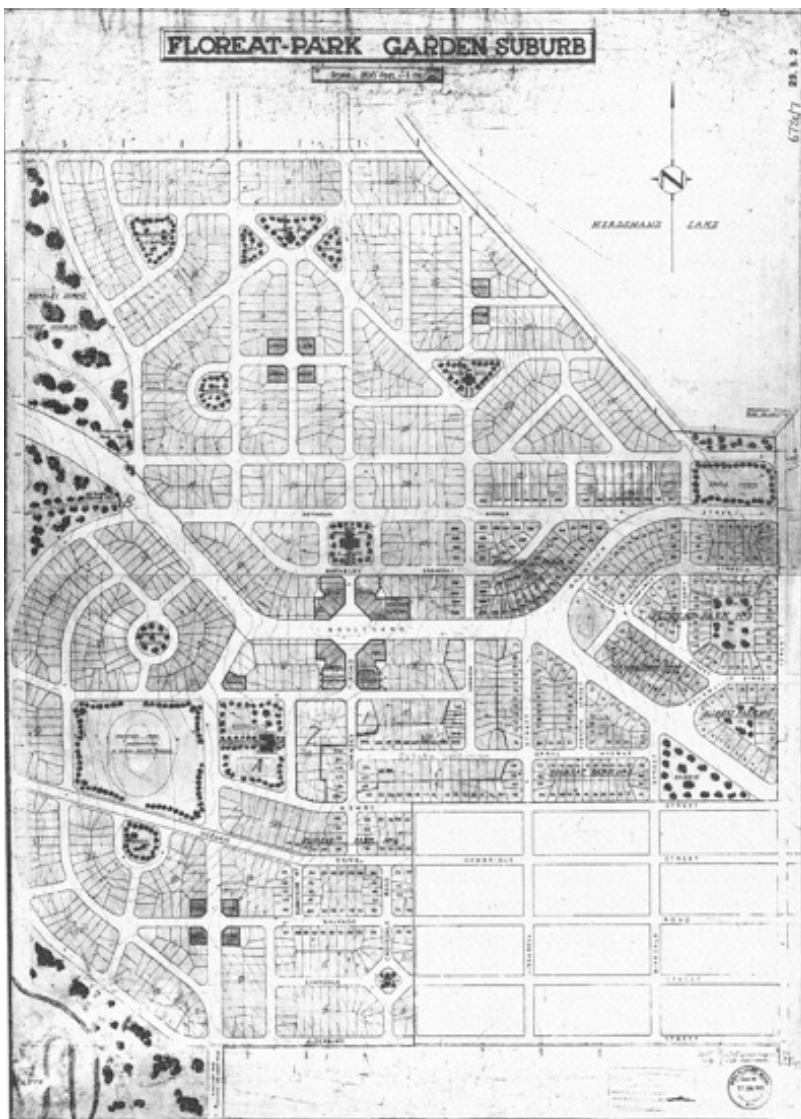


Figure 1.9 Garden suburb of Floreat, “*Floreat Park*.”
(Perth City Council, *Floreat Park - Garden Suburb*, 1925. <<https://www.udf.org.au/?s=Floreat+Park>>)



Figure 1.10 Aerial view of Floreat Park, Western Australia
(State Library of Western Australia, *Aerial view of Floreat Park, Western Australia*, 1957. Call number BA597/47.)

prohibited.”¹⁶⁵

Instead, however, these principles fulfilled the private development of the suburbs for the middle class. More so, privatisation has perpetuated the ambitions and desires of the land development industry, in direct contrast to what Howard set out to achieve. While the original principles of the garden city embraced utilitarianism, the development of the (then) peripheral suburbs of Floreat and City Beach was firmly embedded in capitalism.¹⁶⁶

Public open space

A common feature of these suburban developments is how the landscape structure of isolated or connected green parks is a distinguishing component of their form. These areas, also considered to be green belts, have been shown to play an important role in growing urbanisation by integrating natural systems and open spaces and in influencing urban form. Over time, in Perth, these areas have been reduced to preservation and conservation estates or more contrived public open space (POS) areas; a central component of the way new suburban development is planned in Australia. Furthermore, due to the diminishing size of new suburban backyards, POS areas have become more important as they serve as a forecourt to suburban development.¹⁶⁷ Consequently, these POS networks represent what used to be the back or front yards of the traditional suburban lot and should provide for recreation pursuits as well as urban agriculture, heat mitigation strategies, intensive attraction of typical suburban fauna (birds, insects and small mammals)¹⁶⁸ and the social and cultural community activities associated with each.¹⁶⁹

POS networks are a necessary component of suburban development and a key ecological imperative, particularly in highly biodiverse cities such as Perth. In Western Australia, POS areas are rigorously mandated to a minimum 10 per cent allocation of land in any new developments.¹⁷⁰ However, most of these areas are underperforming, in that they are used by small number of people at specific time periods, are usually heavily water reliant to maintain their “greenness” and, are located so as to arguably facilitate the suburban development’s drainage.¹⁷¹ Their inclusion as a central framework of new suburban developments has only promoted suburban expansion by allowing smaller lots and larger

165. Ward, “Ebenezer Howard: His Life and Times,” 23.

166. Whitbread, *Landscape Architecture in Western Australia*, 123.

167. Hall, “Where have all the gardens gone?”

168. Syme, Fenton and Coakes, “Lot size, garden satisfaction and local park,” 161-170. Interestingly, there has not been a correlation towards increased visitation to local wetlands despite the loss of backyard space.

169. Helphand and Melnick, “Eco-Revelatory design,” x–xi.

170. Grose, “Perth’s Stephenson-Hepburn Plan,” 20-21.

171. Grose, “Turf That works.”

housing footprints to occur.

Conversely, the allocation of peri-urban natural areas into preservation or conservation zones has been a response to the destruction of habitats as the metropolis rapidly expanded. Throughout Perth, policy settings have ensured the development of a regional parks network and isolated “bush forever” zones enclose areas of higher biodiversity.¹⁷² The three aims of the “Bush Forever Policy” are to create regional conservation system; protect and manage significant bushland; and to provide a policy and implementation framework.¹⁷³ However, in all areas where this is contested—urban, industrial and resource development sites (the peri-urban)—the Bush Forever Policy allows for a “balance” and negotiation values that are reasonably justified.¹⁷⁴ Accordingly, we must now re-evaluate what preservation and conservation means in the context of metropolitan planning in a biodiversity hotspot and in consideration of the community values for current and future generations. Furthermore, these diminishing natural areas are critical to ensure a high functioning peri-urban territory, particularly in relation to socio-ecological performance measures. This means not only ensuring the prioritisation of diminishing fauna and flora species, but also a range of recreational opportunities, landscape character types, cultural landscape characteristics, urban waste strategies and in an Australian context, bushfire mitigation strategies, water collection and recharge opportunities alongside native urban food systems and cycles.

While new strategic metropolitan plans continue to be developed for almost every state capital city in Australia, these plans employ similar principles regarding how to limit urban expansion into peri-urban environments while intensifying existing urban developments.¹⁷⁵ The physical extent of metropolitan areas is usually conveyed through the connection of large ecological areas in the form of local, state and national park systems, forming a modern day green belt that “abhors” the city.¹⁷⁶ Despite opportunities to explicitly structure these principles into peri-urban territories to suit specific locales, many of the specific elements of the peri-urban landscape necessary for the city to function are insufficiently recognised or are missing. The regulations and guidelines that bound the peri-urban zone have produced codes and standards that are obsolete in the face of our knowledge of ecological systems in urban areas,¹⁷⁷ and in the requirement for our cities in the twenty-first century to be performative across multiple levels. These codes and standards are limiting, as they are static in their

172. Western Australian Planning Commission, *State Planning Policy 2.8 - Bushland Policy for Metropolitan Perth*.

173. Western Australian Planning Commission, *Directions 2031 and Beyond*.

174. Western Australian Planning Commission, *State Planning Policy 2.8 - Bushland Policy for Metropolitan Perth*, 2747.

175. Buxton and Goodman, “Protecting Melbourne’s green wedges,” 61.

176. In addition to this, more recent evidence in Adelaide and Melbourne seeks to acknowledge peri-urban productive agricultural areas as a necessity for the ‘future’ metropolis.

177. Forman, “Horizontal Processes, Roads, Suburbs,” 35-53.

scale and deny the exploration of the potential value of the peri-urban landscape regarding ecological diversity, ecosystems services or cultural landscape character.

Metropolitan landscapes are not separate from the natural world but are intrinsically tied to, and formed by, the natural and cultural systems. Preserving “nature” not only denies the city a direct relationship with it but also diffuses the natural world from one that is continually constructed by our relationship with and between it.¹⁷⁸ In this sense, preservation has only extended our detachment from the city’s peri-urban edge, treating it as merely a relic to be locked up and looked upon.¹⁷⁹ The fallacy of preservation exists within the unwillingness to acknowledge the past iterative shaping of these landscapes by humankind.¹⁸⁰ As demonstrated in the seventy peri-urban quadrats analysed in chapters four and five, preservation only enables us to prioritise land uses that are of current value and inhibits, rather than enables, the appropriation and transformation of peri-urban lands into new or hybridised territories of human and ecological activity extending across the temporal scales of the past, present and future. As a result, I argued that peri-urban landscapes must move away from the passive need to “preserve”, brought about by the fear of urban development, and instead, consider how a creative dialogue of human intervention might actively conduct intersections across this space.¹⁸¹ Thus, the performative strength of these systems are possibly the greatest indicator of survival for the metropolis in the twenty-first century.

1.5 Reflection: Towards a recasting of the peri-urban territory

While a conceptual definition of the peri-urban begins to identify key characteristics of its condition and provides a generalised understanding of the concept, the variance of the peri-urban condition within specific locales is critical to framing a global rationale for the planning, design and management of peri-urbanised lands. This is because, as a result of the now unprecedented rate of urbanisation caused by the increase in population growth, density and migration, the peri-urban landscape of cities will be converted to urban lands faster and at a scale previously unseen.¹⁸² The conversion of peri-urban land is not only caused by urbanisation but also by the resources required to support the city and its residents.¹⁸³

178. Cronon, *The Trouble with Wilderness*; Sorvig, “Nature/Culture,” 1-11.; Oelschlaeger, *The Idea of Wilderness*.

179. Xaveer de Geyter Architects, *After Sprawl*, 21. See for instance the description of relic as a response to the continued dichotomy of city and countryside and the resulting scraps of landscape, between the formalised city that are then those areas tied up in preservation.

180. As evident in the theoretical perspective provided by cultural landscape theorists. For its origins see Sauer, *The Morphology of Landscape*.

181. Gobster, et al., “The Shared Landscape,” 959–972.

182. Dramstad and Fjellstad, “Landscapes: Bridging the gaps,” 330-332.

183. Cincotta, Wisniewski and Engelman, “Human populations in the biodiversity hotspots,” 990-992.

The aggregation of definitions for the term “peri-urban” situates the territory as an in-between landscape of occupancies and uses, successional phases and historic and economic cycles. Conversely, consideration of the territory as non-transitional and as a site created with intent to incorporate many city functions has been considered. Nonetheless, the literature outlines varying degrees of engagement with the territory. Collectively, the peri-urban is a site that “exerts and influences” the city and the landscape at its edges.¹⁸⁴ Certainly, experiential qualities enhance an understanding of this terrain beyond a purely spatial entity of the city–country divide. To consider this further, the peri-urban is a territory defined as much by what is “legible” as by what is “illegible” or, as this thesis argues, by what is yet to be discovered—its unknown potential. Embedded within the peri-urban are signifiers of a specific place, existing as neither the city nor the country but solely of the peri-urban.¹⁸⁵ Therefore, positioning the peri-urban territory as its own place within the city begins to differentiate it beyond the reductive assemblage of zones created by land-use planning, which ultimately restrict its meaning.

Indeed peri-urban landscapes consist of a mosaic of land uses, both compatible and incompatible with suburban development; however, there are common sensibilities across a series of relationships (processes) and uses (functions).¹⁸⁶ Collectively, the metropolitan plans of Australia’s capital cities exhibit both shared and unique characteristics of specific peri-urban typologies, which require adequate attention as these centres continue to grapple with expanding populations and the subsequent demand for suburban housing. Australia, having one of the lowest continental populations and least efficient land uses,¹⁸⁷ needs to ensure that the value of the peri-urban environments of the metropolitan regions is understood and that the efficiencies of a variety of land uses, including urbanisation, are maximised in order to build robust metropolitan cities and regions well into the twenty-first century. As Jo Studdert asserts: “We need to plug into the existing urban structure and utilise underutilised infrastructure rather than building new suburbs and new infrastructure.”¹⁸⁸

Therefore, reflecting upon the nature–culture conflict as a representation of the city–country divide, the potential of peri-urban territory is situated at the interplay of urbanisation, agrarian practices and preservation, as acculturating processes of “making”.¹⁸⁹ In this regard, the need to theorise the peri-urban as a rich, multi-scalar connection between people and place might be further supported

184. Jacobs, *Death and Life*.

185. As identified within the 70 quadrats and explained within chapters four and five.

186. Low Choy, *Change and Continuity*; Bunker and Houston, “Prospects for the Rural-Urban Fringe,” 307.

187. Thackway, et al., “Land Use Planning as a Collective Learning Spiral,” 263-278.

188. Helena Studdert, “Cities of the future,” *The Weekend Australian*, April 21-22, 2012.

189. Marot, “Reclaiming of sites,” 48.

by highlighting how landscape structure can promote an ecological aesthetic for the peri-urban territory that harnesses the complexity, diversity and interconnections needed between the peri-urban environment and people. These absences also point towards the potential to explore other descriptors of the peri-urban that would pertain to the experiential, ecological and cultural qualities and corresponding conditions that also render structural and function expressions within the territory.

1.6 Conclusion

This chapter has identified a broad, conceptual definition of peri-urban territory. Adopting a conceptual approach carries the potential to promote a richer understanding of the connections between ecosystem services that have both real and perceived ecological and cultural value.¹⁹⁰ Most problems facing peri-urban territories are a result of the processes of the city itself and therefore solutions must be sought there. The important synergies between ecological and cultural values and the benefits found within the socio-ecological milieu of the peri-urban territory are critical to addressing the growing division between culture and nature within the city and should be a necessary requirement of an urbanising world and the prevailing ecological crisis.¹⁹¹ Importantly, and perhaps critically, it will be the peri-urban territories of cities, as the drivers of global biodiversity loss, resource depletion and energy, where this tension plays out.¹⁹²

Furthermore, understanding the spatial structure of the territory over time is an important component in understanding how the territory has evolved and the values that are maintained there. The continued levelling of land for suburban development and under-utilisation of the city's rural land formulates a prominent, spatial composition of Australia's peri-urban territories. In this regard, peri-urban territories must be challenged and re-imagined; a re-imagining that might occur through the revealing of specific landscape conditions of the peri-urban and in doing so, might bring together the "collective imagination, informed and stimulated by the experiences of the material world".¹⁹³ Here, McPherson et al. conclude: "Developing methods and tools that can address the social, ecological and technical infrastructure complexity of urban systems is key to advancing the goals of improving urban sustainability, liveability, social equity and resilience."¹⁹⁴ Importantly, these methods and tools must be imbued with multiple spatialises of scale, connectivity and flow, to reorganise and disrupt the

190. Riper, et al., "Incorporating Sociocultural Phenomena," 233-244.; Daniel, et al. "Contributions of cultural services," 8812-8819.

191. See for example: Swyngedouw, "Metabolic Urbanization," 21-40.; Head and Gibson, "Becoming differently modern," 699-714.; Head, "The Anthropocene," 313-320.; Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene," 159-165.; Haraway, *Staying with the Trouble*.

192. McPherson, et al., "Resilience of and through," 152-156.

193. Corner, "Terra Fluxus," 32.

194. McPherson, et al., "Advancing Urban Ecology," 205.

local and global boundaries and relationships between humanity and global environmental limits.¹⁹⁵

02 Discovering the peri-urban territory of Perth

2.0 Introduction

Chapter one outlined a conceptual definition of the term peri-urban. It examined the definition in accordance with modern urban planning and the implications for the resulting spatial form more generally, and for the city of Perth. I argued peri-urban territories are important, not just for the land uses they contain that support the city, but for their cultural and ecological value and the opportunities for a more imbedded connection between the people and this territory. I explained the importance of re-imagining peri-urban territories in Australia and concluded by proposing an expansion of the methods and tools for evaluating the peri-urban and communicating its value.

This chapter commences part two of the discovery process of the peri-urban territory's thickness—*grounding*. The chapter illustrates the definition, assessed in chapter one, as it applies spatially across Perth's peri-urban territory, through diagramming and tracing. Tracing, as an eminent act of drawing, enables the subject to mediate the historical trajectory of the peri-urban territory and thus its sociocultural context through understanding the evolution of its spatial form. This, in turn, highlights a process of inscription upon the landscape through the iterative processes of city formation and how this is representative of the projection of cultural ideals historically. To “trace” aims to collectively draw upon the expression of the territory's spatial zone as it emerges as a physical presence on the landscape as well as the experiential phenomena of the peri-urban.¹

First, data derived from GIS identifies various spatial applications of the definition at the whole of metropolitan scale for Perth² (see figures 2.1.1-2.1.8). Second, a scan of the territory is undertaken using aerial photography, derived from NearMap to form an initial lexicon of the territory³ (see figures 2.2.1 to 2.2.17). The lexicon is an accompaniment to the quadrats in Appendix A. The lexicon sets-out alphabetically, the diversity of landscape functions found within the peri-urban territory of Perth. Not all the images from the lexicon appear within the quadrats however their easily identifiable form and non-urban function merit their inclusion. Each peri-urban function identified is understood by the urban development sector and general public. The inclusion of each type within the lexicon expands the meaning and explains the patterns of functional types. Finally, the lexicon illustrates the peri-urban at a finer-grain scale than what the quadrats in Appendix A provide. Third, image stills

1. See Girot, “Four Trace Concepts,” 59-67. Girot describes this unravelling as ‘trace concepts’ and the subsequent processes of ‘landing, grounding, finding, founding’ as elements that reveal memory (marking, impressing and founding).

2. This follows the work of Weller, *Boomtown* and Weller and Bolleter, *Made in Australia*.

3. This follows the work of Hayden and Wark, *A Field guide to Sprawl*.

derived from a visual sequence of the subject moving through the territory, from a vehicle, conclude the visual studies for this chapter⁴ (see figures 2.3.1 to 2.3.8). The visual sequence of the images from a vehicle are concentrated to an area in the north-east of the territory. The sequence illustrates the view-shed from the front window of a vehicle as the vehicle travels along a hierarchy of road types, from major highways to local suburban roads. Mapping and recording imagery of the territory enhances the definition outlined in chapter one and provides a rigorous and conclusive visual survey of the peri-urban for Perth. It provides an opportunity for an expansive understanding of the peri-urban across the urban development sector and for the general public. Furthermore, by illustrating the territory's features, it begins to identify values enacted within the territory.

Collectively, the figures explain the diversity of the peri-urban condition and form the first inventory of the territory's parts that contribute to its imageability. Thereafter, the action of mapping the territory is a creative process of unfolding the relationships that exist across it. This is not simply by reproducing drawings that already exist, but rather, through the creative process, engaging with the unseen or unimagined components of the peri-urban territory. The outcome leads to an uncovering of the territory's structure, it "unfolds potential; it re-makes territory over and over again..."⁵

In this respect, understanding the spatial form of peri-urban territory historically provides evidence of how the edge is utilised and valued.⁶ Thus the act of tracing becomes the systematic registration of how value is connected to this landscape and in doing so, awakens the potential of this zone to become a crucial determinant for the city. The act of tracing, explored in chapter two, commences the second stage of an expanded thickness of the peri-urban as its own territory and provides the parameters as to how it might be re-imagined for the city of Perth, Western Australia.

4. This follows the work of Appleyard, Lynch and Myer, *The View from the Road*.

5. Corner, "The Agency of Mapping," 188.

6. Mumford, *The City in History*, 93. As Mumford speculates "to define the city one must look for its organising nucleus, trace its boundaries, follow its social lines of force, establish its subsidiary and integration of its groups and institutions."

Legend

- Urban
- Urban deferred
- Rural residential
- Outer LGA
- MRS Boundary

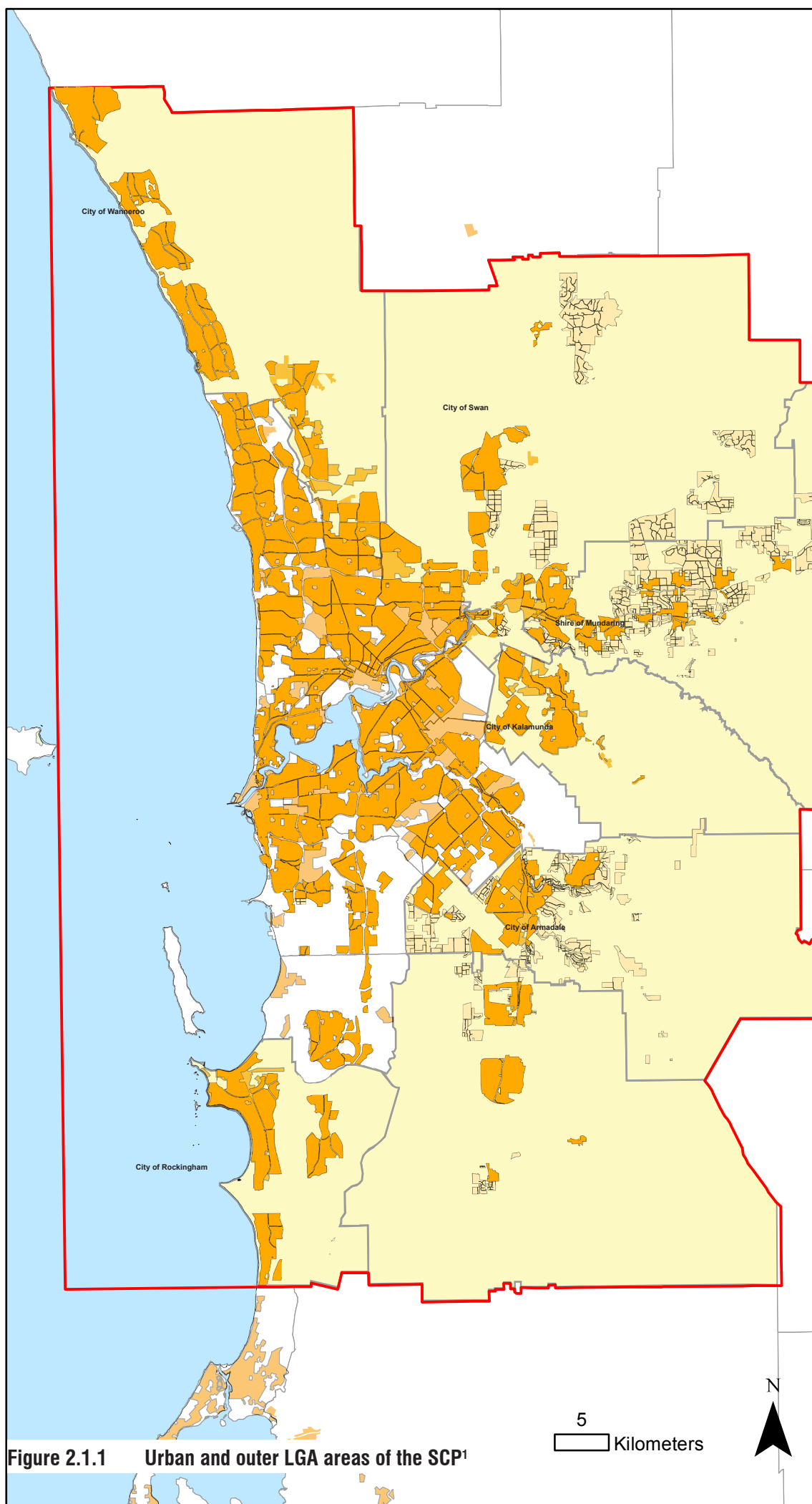
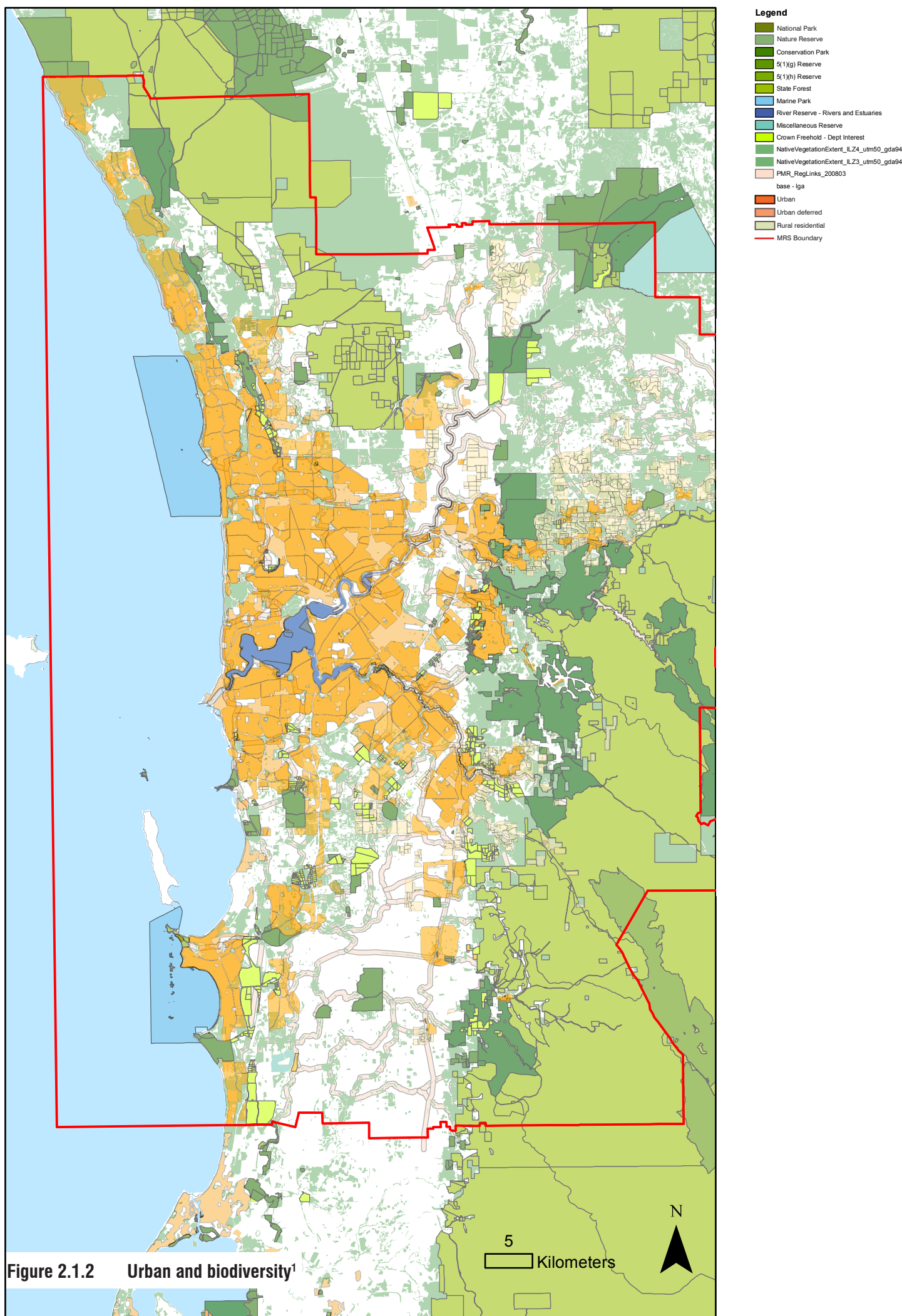


Figure 2.1.1 Urban and outer LGA areas of the SCP¹

1. Western Australian Land Information Authority (Landgate) 2017.



Legend

- Surface water courses
- Urban
- Urban deferred
- Rural residential
- MRS Boundary

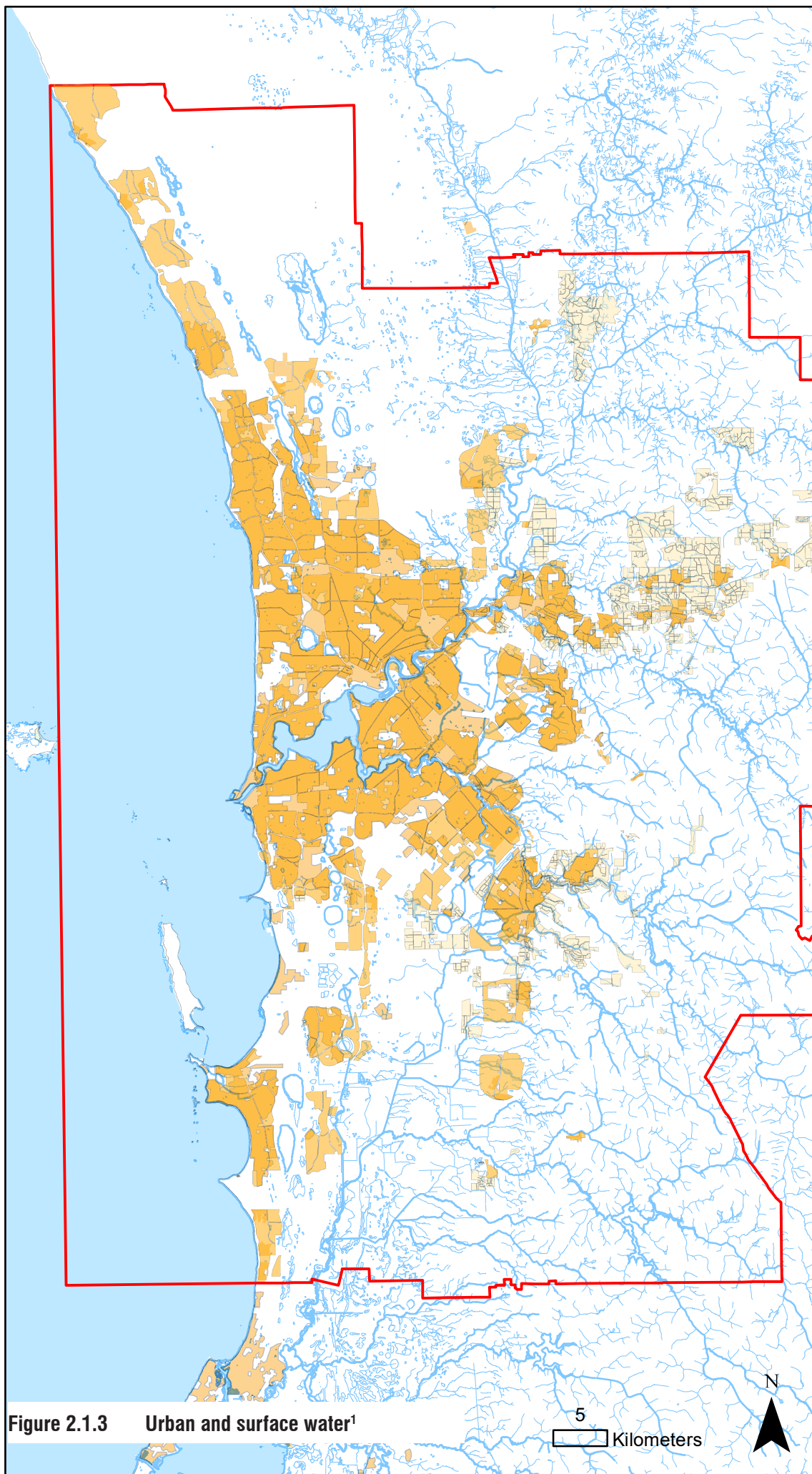
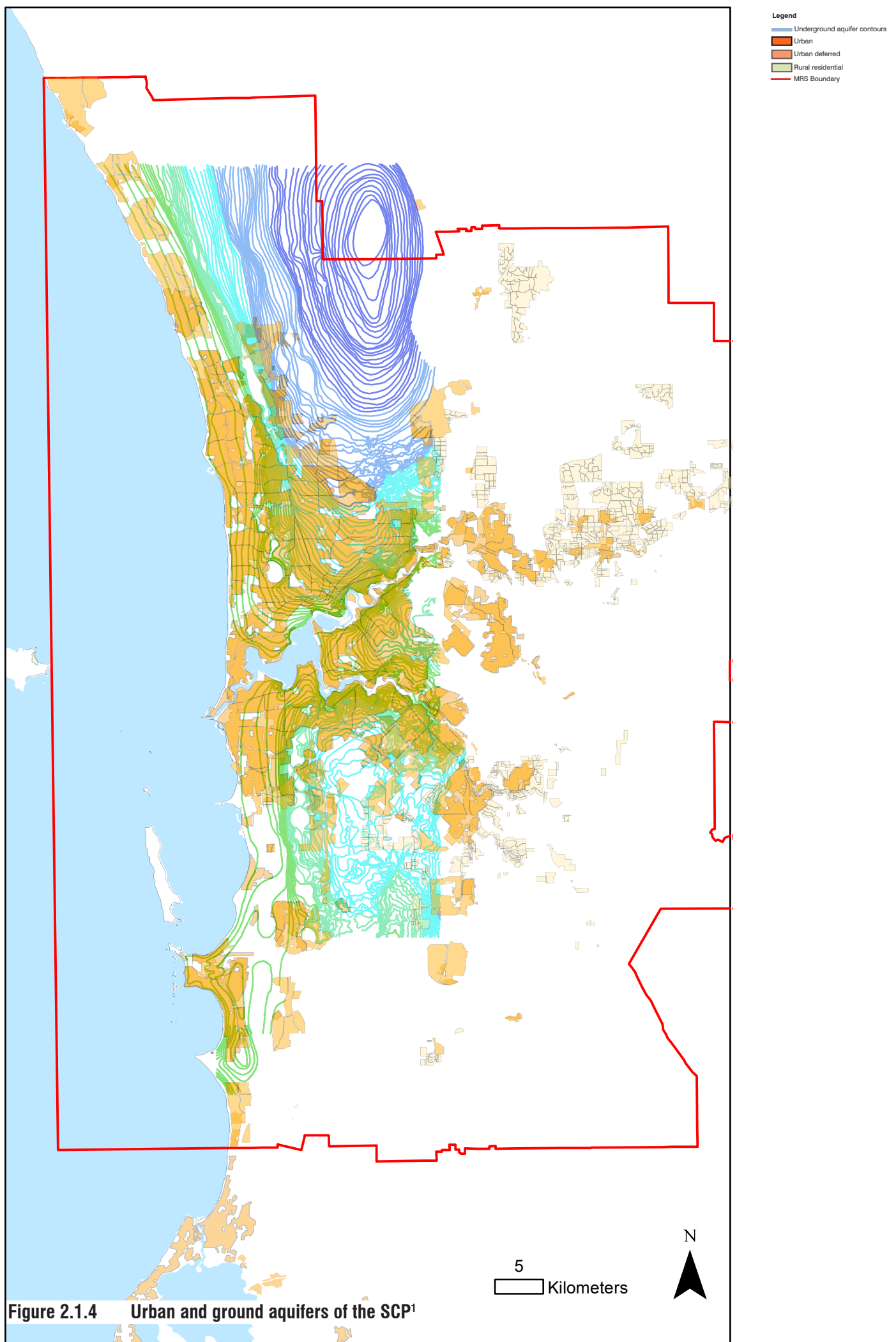
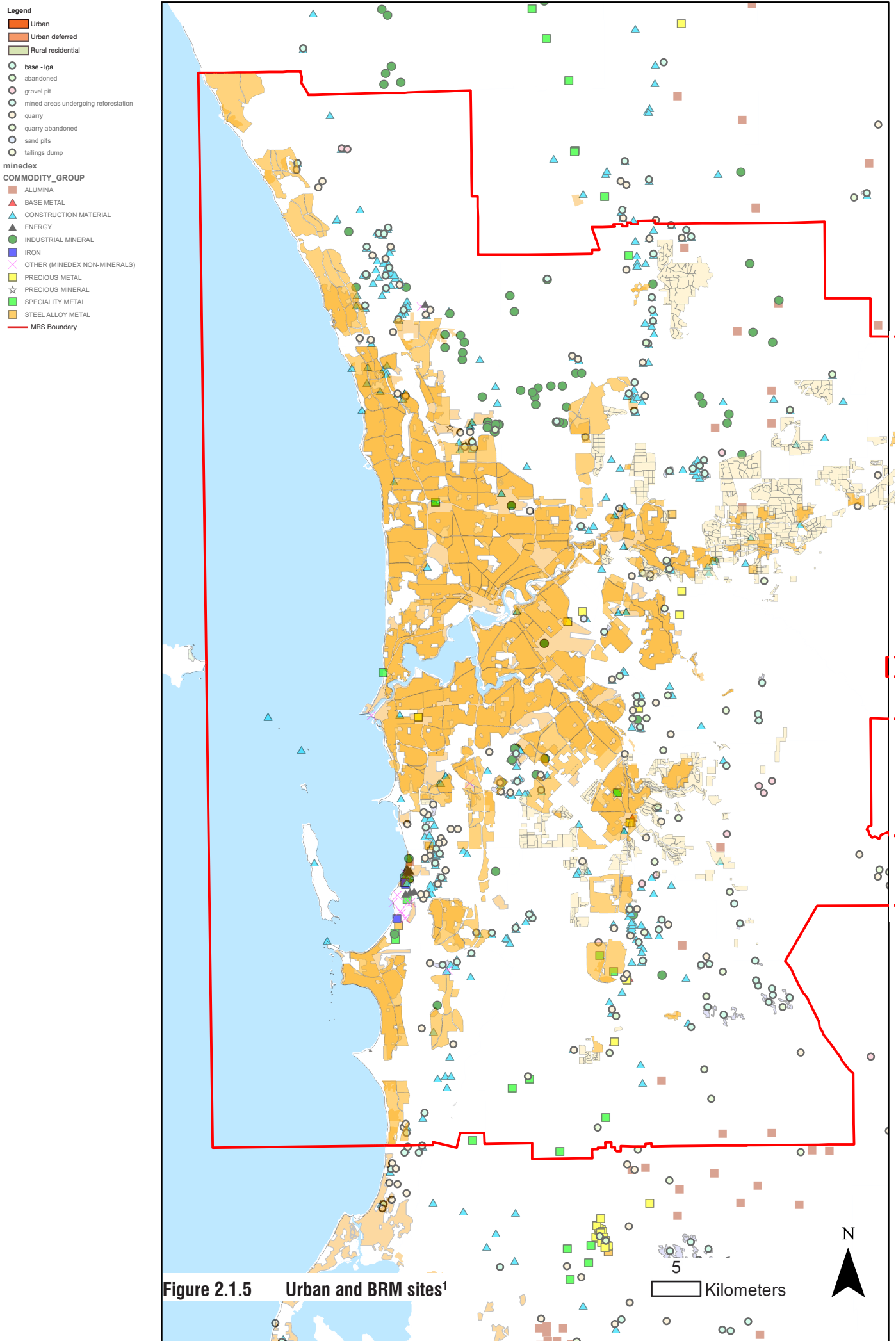


Figure 2.1.3 Urban and surface water¹

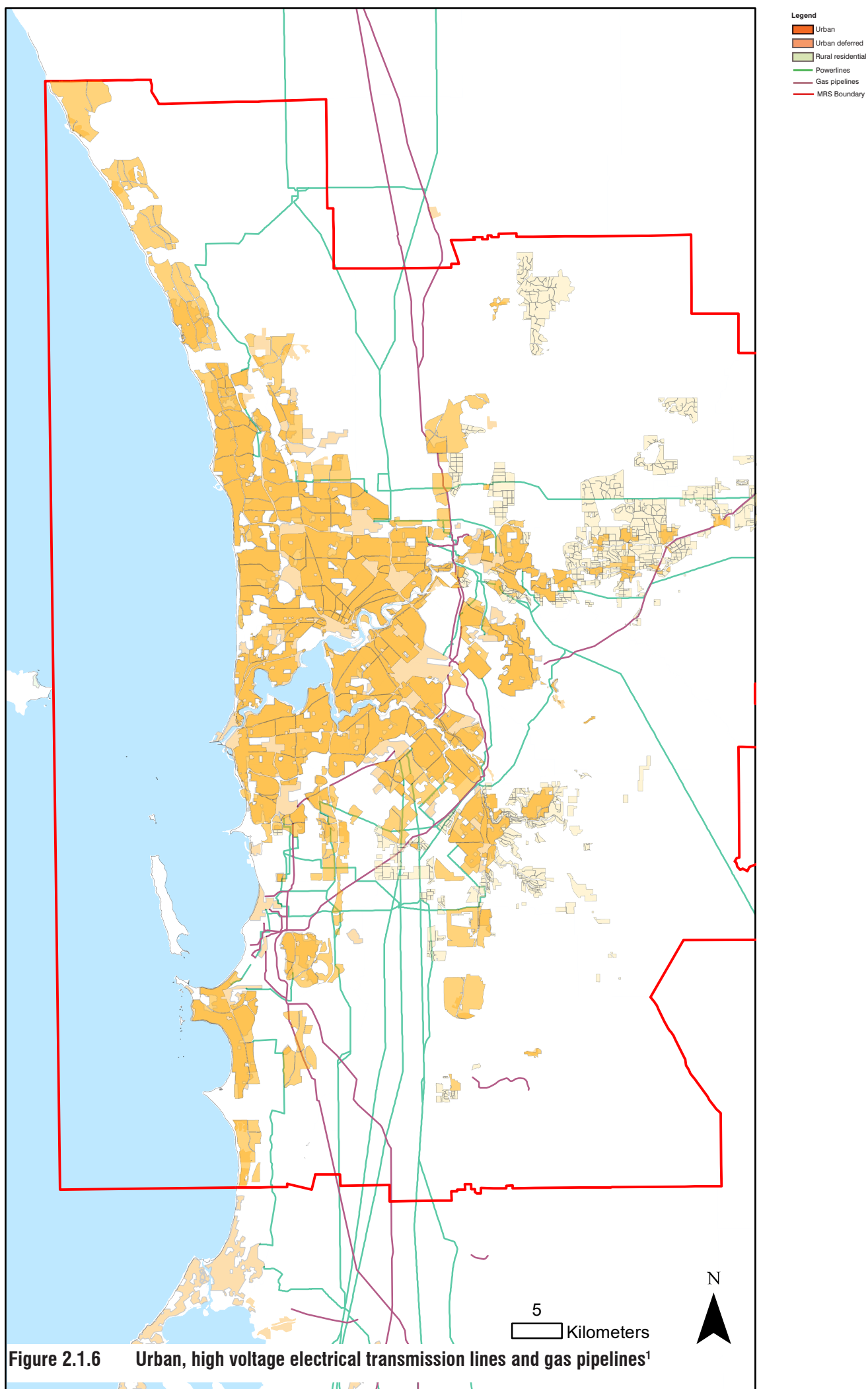
1. Western Australian Land Information Authority (Landgate) 2017.



1. Western Australian Land Information Authority (Landgate) 2017.



1. Department of Mines and Petroleum Western Australia, 2016.



1. Geoscience Australia, 2006. Geodata TOPO 250k Series (Shapefile format), Canberra. <http://pid.geoscience.gov.au/dataset/ga/64058>

- Legend**
- Urban
 - Urban deferred
 - Rural residential
 - Heritage walking trail
 - Ferry
 - MRS Boundary

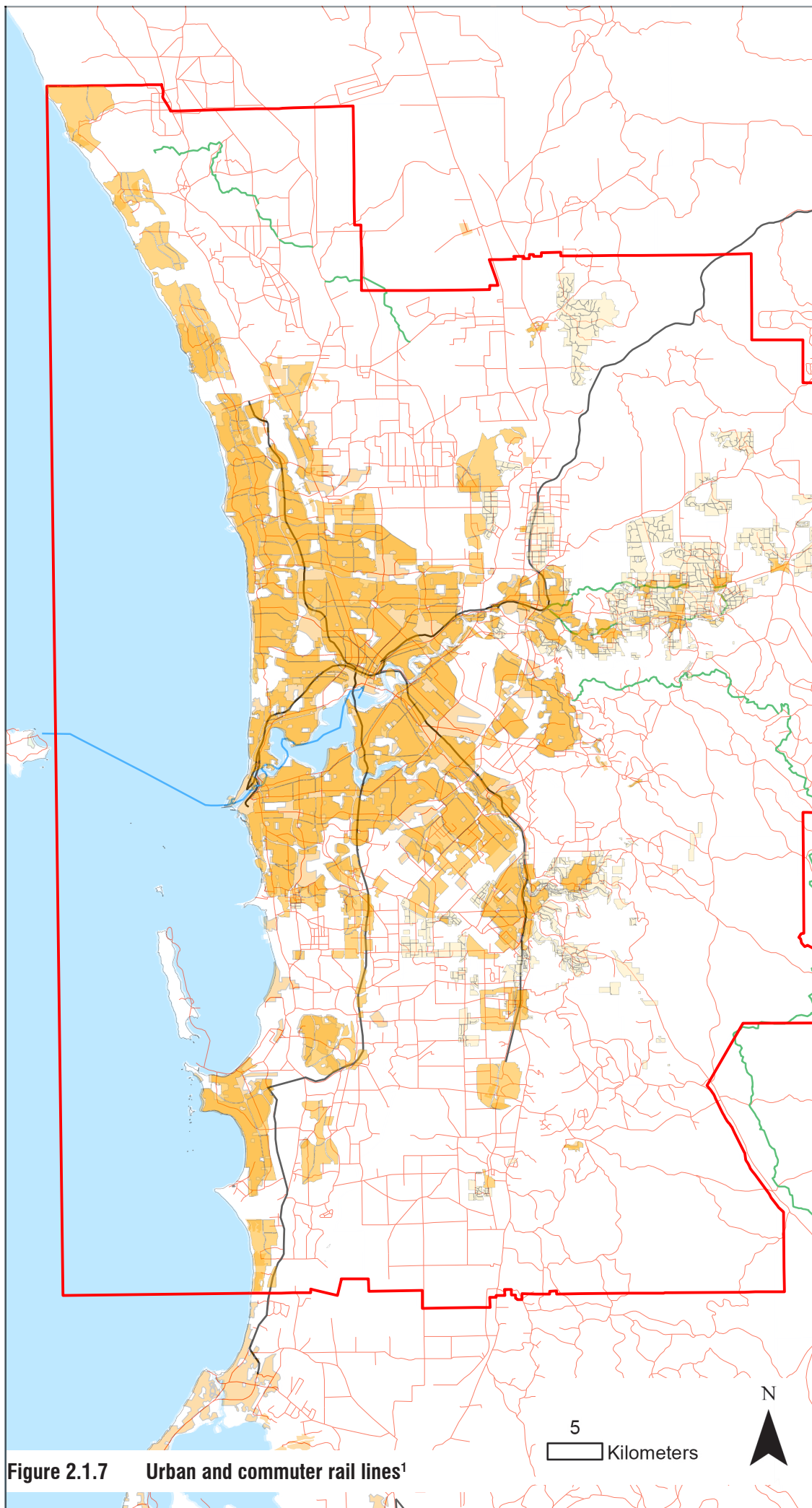
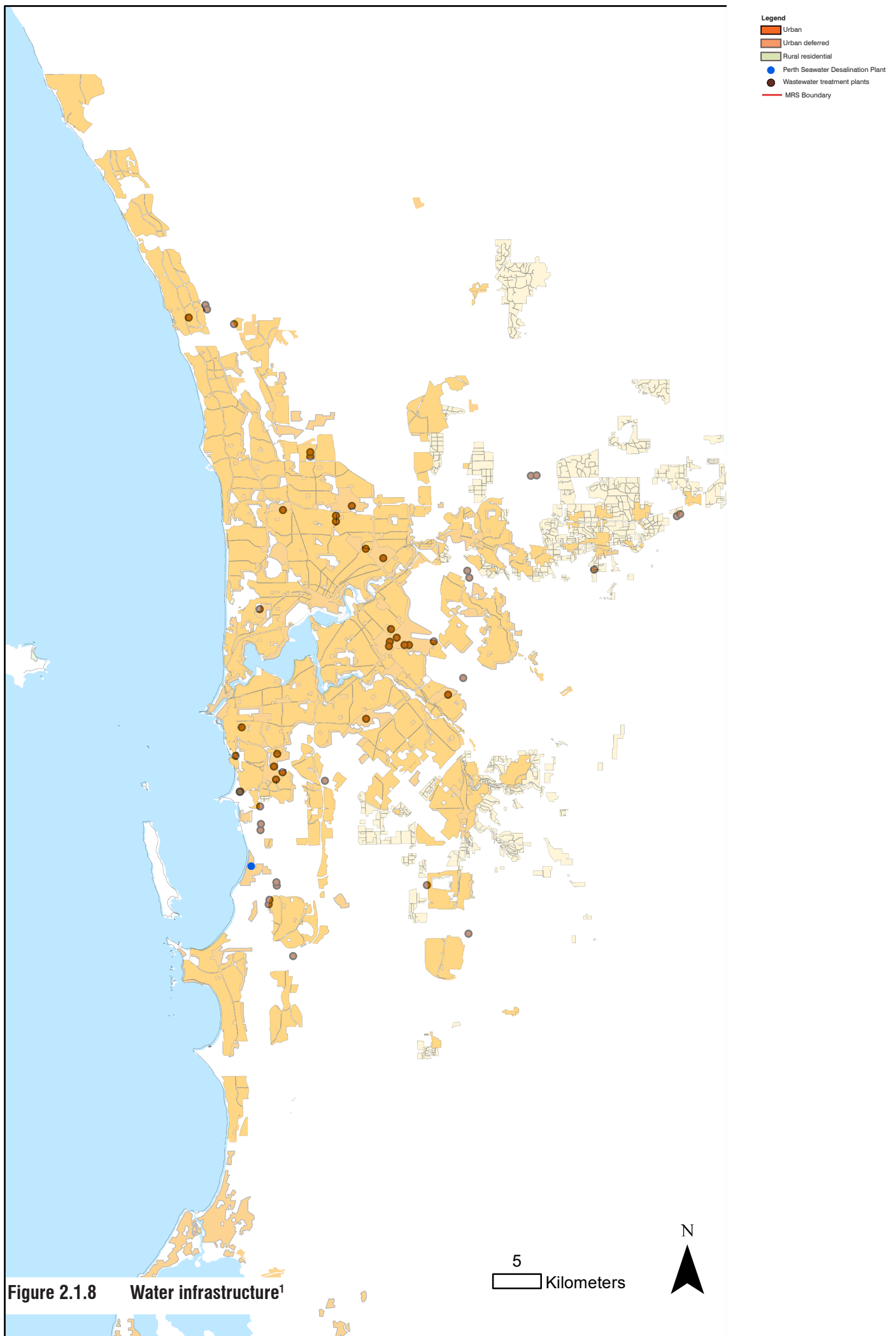


Figure 2.1.7 Urban and commuter rail lines¹

1. Western Australian Land Information Authority (Landgate) 2017.



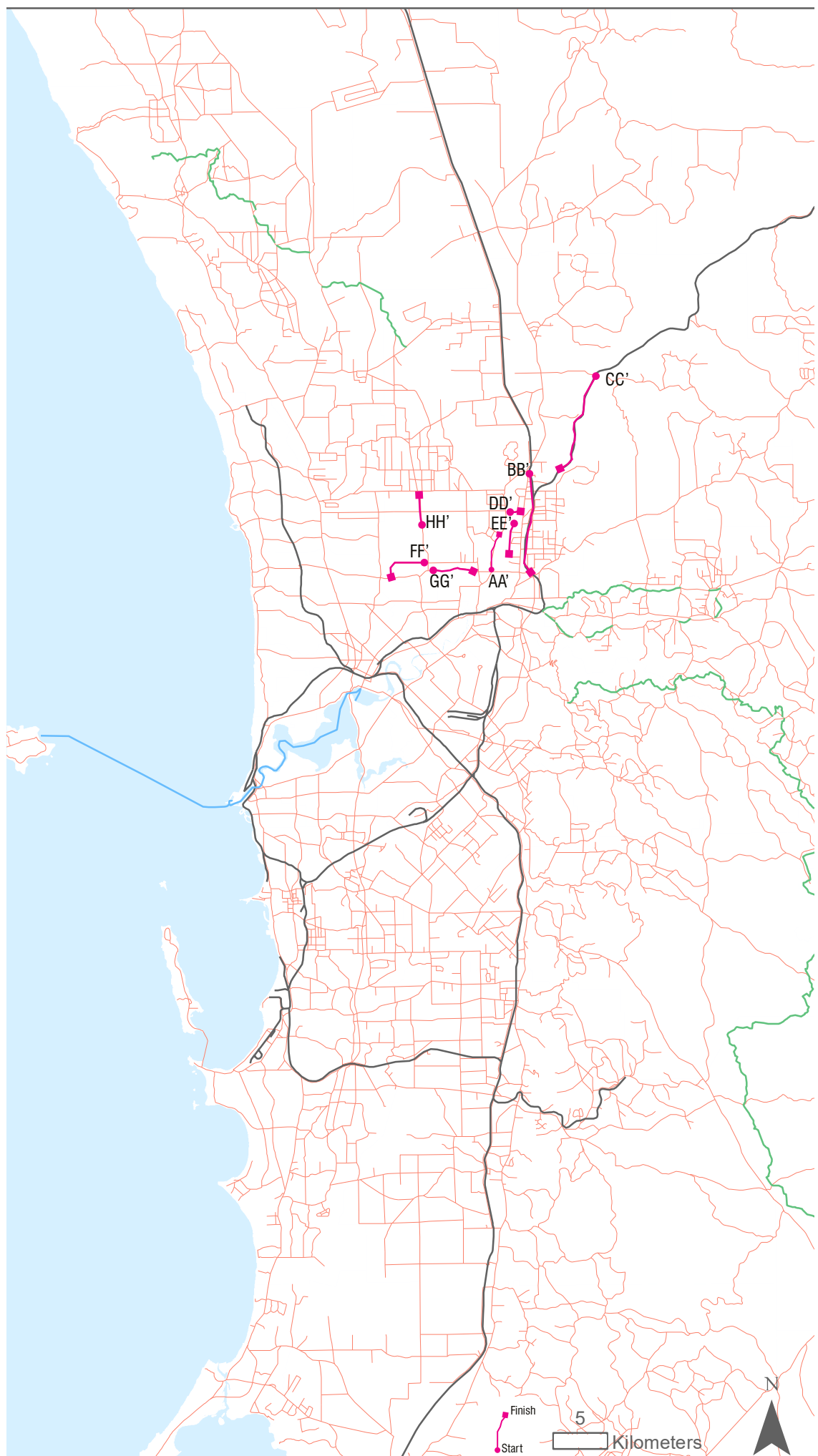


Figure 2.3.0 A View from the Road: Location of Transects



Figure 2.3.1 A View from the Road Transect AA' — Reid Highway to Lord Street, Dayton¹



Figure 2.3.2 A View from the Road Transect BB'— Great Northern Highway (southbound), Upper Swan²



Figure 2.3.3 A View from the Road Transect CC' — Great Northern Highway (southbound) Millendon³



Figure 2.3.4 A View from the Road Transect DD' — Park Street (eastbound), Brabham⁴

4. Author, *ground-truth mapping*, July 18, 2018, digital photographs, Perth.



Figure 2.3.5 A View from the Road Transect EE' — new residential, Brabham⁵



Figure 2.3.6 A View from the Road Transect FF' — Hepburn Avenue, Alexander Heights⁶

6. Author, *ground-truth mapping*, July 18, 2018, digital photographs, Perth.



Figure 2.3.7 A View from the Road Transect GG⁷ — Malaga industrial precinct⁷



Figure 2.3.8 A View from the Road Transect HH'— Landsdale⁸

8. Author, *ground-truth mapping*, July 18, 2018, digital photographs, Perth.

2.4 Reflection: gaining perspective

Chapter two provided an illustrative introduction to the peri-urban territory of Perth. Furthermore, the figures introduce the territory to the reader and provide an abridged insight into various spatial and functional conditions contained within. The figures demonstrate that, while many structural and functional conditions might be comparable to other cities, their uniqueness is emphasised by their position within a specific landscape. The chapter now reflects on how peri-urban thickness and potential are achieved.

Peri-urban thickness

As an illustrative chapter, the figures demonstrate a rich and layered collective of the territory's visual condition. Figures contained within section 2.1 express the opportunity for spatial reconfiguration when defining the peri-urban in accordance with landscape features of the metropolitan area. The proceeding figures expand upon the universally accepted definition of urban – rural, and demonstrate a series of relationships between the city and the broader landscape that are important (and necessary) for the city to function.

The figures contained within section 2.2 form a compendium of peri-urban functions specific to Perth. While not exhaustive, their intent is to demonstrate the many parts that constitute the territory. Furthermore, several of them express a uniqueness to the locale. For example, several recreational pursuits – kartway (figure 2.2.7); motocross (figure 2.2.8); rowing (2.2.11); ski park (2.2.12) and velodrome (2.2.14) begin to identify social connections between the territory and the residents of Perth. Additionally, figure 2.2.10 distinguishes the typical suburban POS that developers (and consumers) are prepared to buy into.

The figures contained within section 2.3 reorientate our perspective from above to the ground. They integrate ground-truthing of the territory and, in their compilation as a sequence, are differentiated from the previous sections. The inclusion of this section, "A View from the Road", examines a temporal dimension of the study.

Peri-urban potential

This chapter proposed that peri-urban potential arises from an intimate understanding of the territory's condition. The chapter identified, through visual representation, the opportunities when potential is considered specifically within a local context. Furthermore, potential is distinguished through the expression of its relational context - the method of discovery, and subsequently, the revealing of cultural and social engagement with the territory.

2.5 Conclusion

This chapter illustrated the peri-urban territory, identified its spatial qualities and accordingly argued for the differentiation of the peri-urban as a distinct zone within the metropolis.

A airport



B base materials (aggregate)
brickwork

Figure 2.2.1 Dictionary of peri-urban morphology: A to B¹

1. Nearmap. (updated Friday 18 October 2019). *Perth airport*; *RAAF base Bullsbrook*; *Jandakot airport*; *Holcim Australia - Gosnells Quarry*. Retrived from <http://maps.au.nearmap.com/>



C caravan park
cold storage

D desalination plant
drag racing

Figure 2.2.2 A Dictionary of peri-urban morphology: C to D²

2. Nearmap. (updated Friday 18 October 2019). *Midland brickworks*, *Banksia Tourist Park*, *Coles Distribution Centre*, *Perth Seawater Desalination Plant*. Retrived from <http://maps.au.nearmap.com/>

E equine



Figure 2.2.3 A Dictionary of peri-urban morphology: D to E³

3. Nearmap. (updated Friday 18 October 2019). *Perth Motorplex*, *Equine estate Jane Brook*, *Equine estate Dayton*, *Equine estate Gnangara*. Retrived from <http://maps.au.nearmap.com/>



F freeway
forest (state)
freight terminal



Figure 2.2.4 A Dictionary of peri-urban morphology: F⁴

4. Nearmap. (updated Friday 18 October 2019). *Kwinana Fwy and Rowley Rd*; *Roe Hwy and Welshpool Rd*; *Gnangara pine plantation*; *Kewdale Freight Terminal*. Retrived from <http://maps.au.nearmap.com/>

G

golf course
greenfield

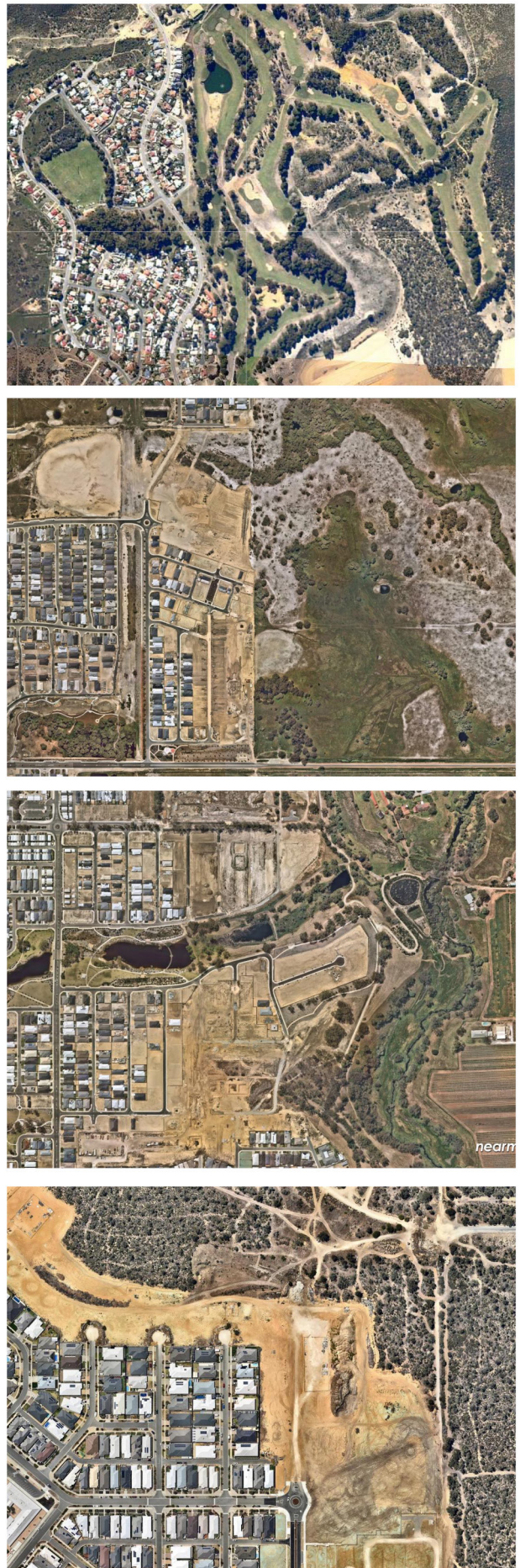


Figure 2.2.5 A Dictionary of peri-urban morphology: G⁵

5. Nearmap. (updated Friday 18 October 2019). *Sun City Country Club*, *Brabham*, *Aveley*, *Alkimos*. Retrived from <http://maps.au.nearmap.com/>



H hospital



I
 industrial
 intensive agriculture
 international telecommunications



Figure 2.2.6 A Dictionary of peri-urban morphology: H to I⁶

6. Nearmap. (updated Friday 18 October 2019). *Fiona Stanley Hospital*; *Russell Park Industrial Estate*; *Carabooda*; *Perth International Telecommunications Centre*. Retrived from <http://maps.au.nearmap.com/>

J junkyard



K kennel (dog)
kartway (international)



L landfill
lifestyle village

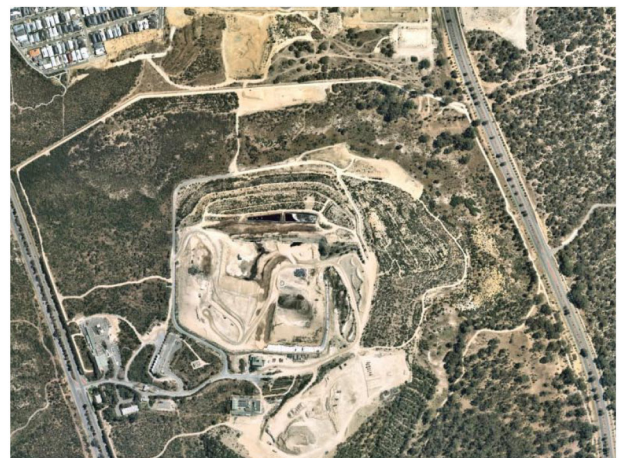


Figure 2.2.7 A Dictionary of peri-urban morphology: J to L⁷

7. Nearmap. (updated Friday 18 October 2019). *Junkyard in Gnaragar*; *Dog boarding kennels - West Coast Pet Care*; *Mega Fast Karts (Cockburn)*; *Tamala Park waste facility*. Retrived from <http://maps.au.nearmap.com/>



M mining (aluminium)
mining (bauxite)
motorcross

Figure 2.2.8 A Dictionary of peri-urban morphology: L to M⁸

8. Nearmap. (updated Friday 18 October 2019). *Riverside Gardens Estate - Over 50s Lifestyle Village*;; *Darley Aluminium*;; *Alcoa Myara mine site*;; *Wanneroo Junior Motocross Club*. Retrived from <http://maps.au.nearmap.com/>

N nursery



O ovals



P poultry farm
prison
POS
powerstation



Figure 2.2.9 A Dictionary of peri-urban morphology: N to P⁹

9. Nearmap. (updated Friday 18 October 2019). *Benara Nurseries*; *Mills Park Centre*; *Ingham Enterprises*; *Department of Justice - Bandyup Women's Prison*. Retrived from <http://maps.au.nearmap.com/>



Figure 2.2.10 A Dictionary of peri-Urban morphology: P¹⁰

10. Nearmap. (updated Friday 18 October 2019). *Mizzen Park* (Eglinton); *Congenial Park* (Aubin Grove); *Eden Beach Foreshore park*; *Neerabup Power Station*. Retrived from <http://maps.au.nearmap.com/>

Q quarry (auditorium)



R recreation (rowing centre)
rural estate
rural residential
railyards
rifle range

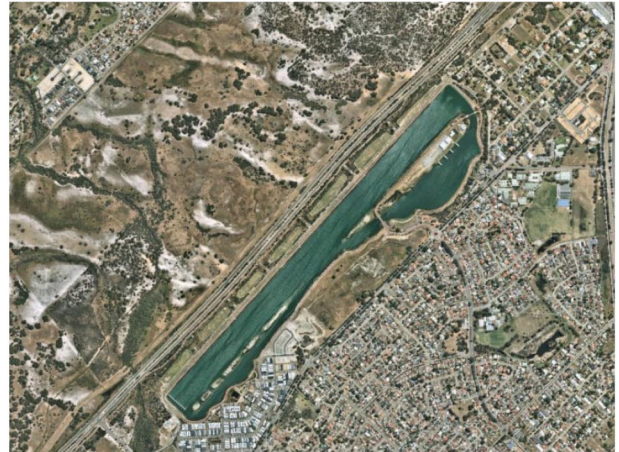
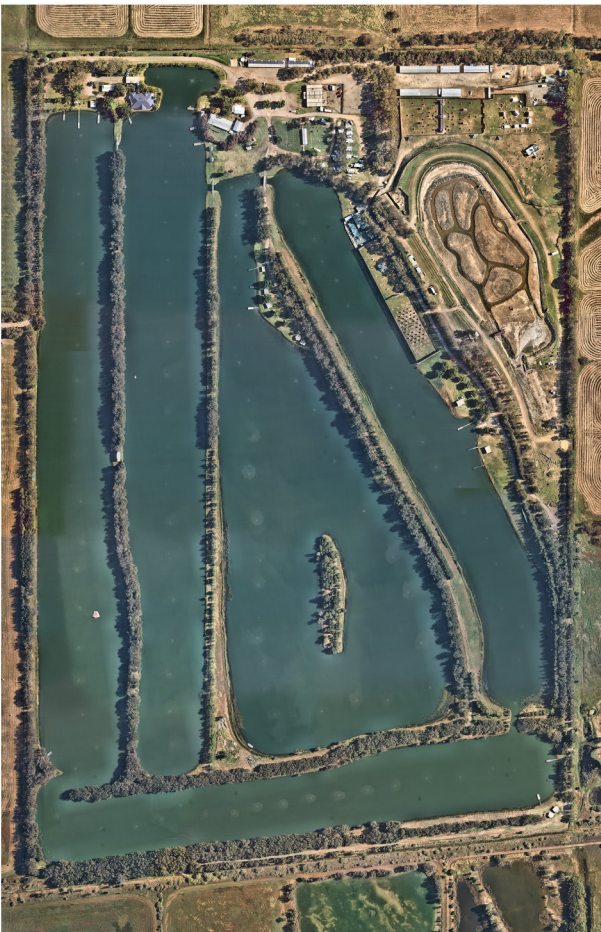
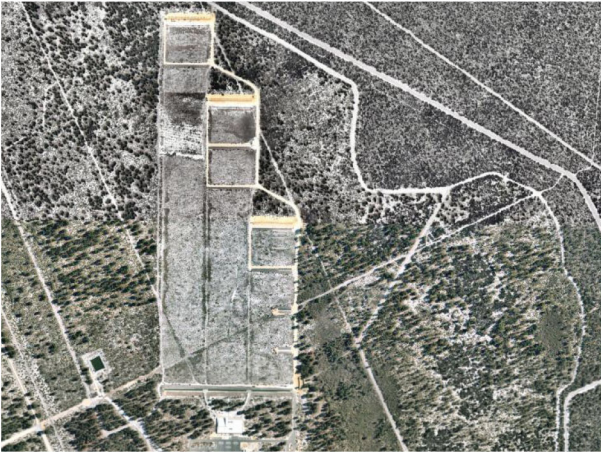


Figure 2.2.11 A Dictionary of peri-urban morphology: Q to R¹¹

11. Nearmap. (updated Friday 18 October 2019). *Red Hill Auditorium*; *Champion Lakes Regatta Centre*; *Rural residential (Herne Hill)*; *Rural residential (Swan View)*. Retrived from <http://maps.au.nearmap.com/>



S ski park

Figure 2.2.12 A Dictionary of peri-urban morphology: R to S¹²

12. Nearmap. (updated Friday 18 October 2019). *Transperth Nowergup Railcar Depot*; *Wanneroo rifle range*; *Bonney's WA Water Ski Park*. Retrived from <http://maps.au.nearmap.com/>

T

temple (Sikh)
temple (Buddhist)
temple (Christian)
terracing



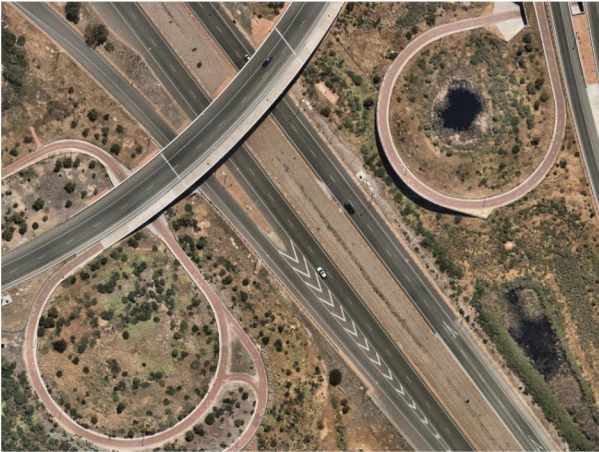
Figure 2.2.13 A Dictionary of peri-urban morphology: T¹³

13. Nearmap. (updated Thursday 17 October 2019). *Sikh Gurdwara Perth*, *Cambodian Temple*, *WA Chin Christian Church*, *Suburban terracing (Banksia Grove)*. Retrived from <http://maps.au.nearmap.com/>



U

u-turn (vehicle)
u-turn (bike)



V

viticulture
velodrome



Figure 2.2.14 A Dictionary of peri-urban morphology: U to V¹⁴

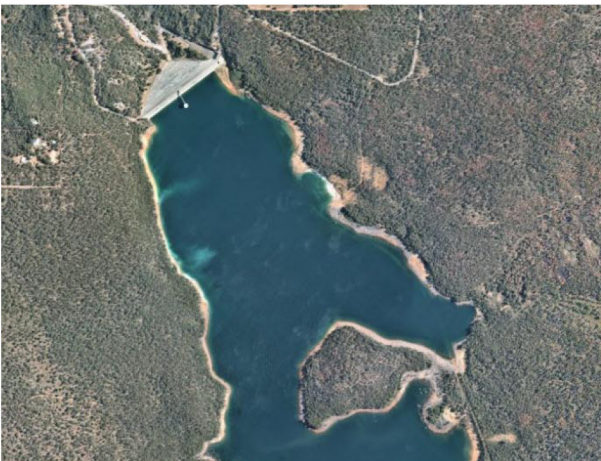
14. Nearmap. (updated Friday 18 October 2019). *Tonkin Hwy and Albany Hwy*, *Tonkin Hwy and Roe Hwy*, *Sandalford Wines*, *Speed Dome*. Retrived from <http://maps.au.nearmap.com/>

W wastewater plant
wetlands
weir



Figure 2.2.15 A Dictionary of peri-urban morphology: W¹⁵

15. Nearmap. (updated Sunday 27 October 2019). *Watercorp Alkimos wastewater treatment plant; Wanneroo Groundwater Treatment Plant; Australian Marine Complex; Lake Adams*. Retrived from <http://maps.au.nearmap.com/>



X X marks the spot...

Figure 2.2.16 A Dictionary of peri-urban morphology: W to X¹⁶

16. Nearmap. (updated Thursday 17 October 2019). *The Spectacles*; *Jandabup Nature Reserve*; *Wungong Reservoir*; *X-marking (West Swan)*. Retrived from <http://maps.au.nearmap.com/>

Y

Yanchep National Park



Z

zoo (petting)
zero (ground)



Figure 2.2.17 A Dictionary of peri-urban morphology: Y to Z¹⁷

17. Nearmap. (updated Friday 18 October 2019). *Yanchep National Park*; *Landsdale Farm*; *Amberton* from <http://maps.nearmap.com/au.nearmap.com/>

03 Landscape architectural narratives of the peri-urban

3.0 Introduction

Chapter two outlined the spatial characteristics of the peri-urban territory of Perth. The accompanying figures illustrated how various dynamics of creation and recreation of the peri-urban territory have been drivers for the physical advancement of the city outwards. Furthermore, these drawings helped distinguish the specific conditions of the peri-urban territory of Perth and grounded the conceptual exploration of the term's definition (in chapter one) to a specific context.

This chapter concludes the second phase of the research methodology—grounding. The chapter remains inductive and objective as it recalls the major landscape architectural narrative settings acting within the peri-urban territory of Perth. It expands upon the processes of peri-urban territory spatial formation demonstrated theoretically in chapter one and subsequent illustration of the spatial form of Perth's peri-urban territory in chapter two, by grounding the peri-urban territory within the landscape architectural narratives of sprawl and sense of place. The central premise of this chapter is that the identity of the peri-urban territory has largely been dismissed because the narratives of sprawl and sense of place have dominated policy formation and legitimised the city's expansion.

Narratives are the way people shape and share their experiences of the landscape through storytelling—a dialogue between people, place and self. Through stories, landscape is linked to memory and events, a sense of time, experience and sequence.¹ Narratives of the landscape help us make sense of the world around us through configuring our experience of a place.² Thus narratives are grounded in the lived experience. Potteiger and Purinton explain how landscape narratives and critical visual studies in landscape architecture can be examined congruently to explain place;³ they can collectively reveal how people understand and value the peri-urban landscape of Perth. The exploration of landscape architectural narratives evaluates how the peri-urban landscape has emerged as territory through the mechanistic processes and economies of the land development industry. In conclusion, the narratives reveal a rich topological ground for further investigation and a position from which the landscape structure types of the peri-urban can be examined and identified.

1. Whiston Spirn, *Language of Landscape*.

2. Potteiger and Purinton, *Landscape Narratives*, 2–3.

3. Potteiger and Purinton, *Landscape Narratives*.

3.1 Sprawl

Sprawl is identified as the unplanned and haphazard growth of the city outwards.⁴ The term emerged as a result of the effectiveness of modern planning and by the second half of the twentieth century, suburbia was everywhere at a rate previously unseen in metropolitan development. Sprawl has become a term used to describe the negative effects of the spatial expansion of the city at its margins and the consequences of rapid suburbanisation of the city at its edges.⁵ Until this point in time, the emergence and growth of suburbia was celebrated, as the economic and social conditions set around post-World War Two development were seen as an essential part of rebuilding the city and connecting people back to a sense of community that had been lost. Low-density suburban housing was not without complexity but rather without the urban tradition of what a concentrated population brings.⁶ Subsequently, the dispersed population and urban spatial model of sprawl is the multifaceted and fragmented entity of the external frontier of the city.⁷

The term “sprawl” originated in the US to describe urban development that is unplanned, uncontrolled, market driven and almost always rapid.⁸ What began as a US construct has been adopted to describe similar discourse of suburban expansion within Australian metropolitan cities.⁹ In fact, in Australia, sprawl is used interchangeably with peri-urban suburban development,¹⁰ and in doing so suggests that all new suburban development, at the edge of the city in greenfield sites, must be sprawl. However, this assumption contrasts with the definition of sprawl as “unplanned” because all suburban greenfield development in Australian peri-urban territories is planned. For most of Australia’s capital cities, the metropolitan policies since the mid-twentieth century convert rural to urban land. Over time, this process has been normalised in each iterative metropolitan planning scheme as the careful and considered control of urban sprawl.¹¹ Conversely, despite being planned, it conveys similar characteristics of the US sprawl including stretched urban conurbations of predominately low-density, vehicular-dependent, suburban housing; large scale automobile infrastructure networks; commercial strip developments; large shopping centre (mall) precincts; topographic manipulation; and significant

4. Kunstler, *Geography of Nowhere*; Calthorpe and Fulton, *Regional City*; Xaveer De Geyter Architects, *After-Sprawl*.

5. Garreau, *Edge City*; Gillham and MacLean, *Limitless City*; Berger, *Drosscape*; Hayden, *Fieldguide to Sprawl*; Talen, *Retrofitting Sprawl*.

6. Saunders, *Sprawl and Suburbia*.

7. Berger, *Drosscape*, 27.

8. For a more detailed account of US sprawl see Gillham and MacLean, *Limitless City* and Garreau, *Edge City*.

9. Weller and Bolleter, *Made in Australia*.

10. It is consistently used in this way in Perth’s metropolitan planning. See Metropolitan Region Planning Authority, *Corridor Plan*, 8; Western Australian Department of Planning and Development, *Metroplan*, 19; Western Australian Planning Commission, *Network City*, 3; Western Australian Planning Commission, *Directions 2031 and Beyond*, 1–17; Western Australian Planning Commission, *Perth and Peel@3.5million*, 1.

11. This contrasts with the US condition whereby suburban planning (and subsequent sprawl) occurs because of minimal regulatory frameworks. In the case of Perth, the modernist influenced *Stephenson-Hepburn Plan*, which was adopted as the *Metropolitan Region Scheme* in 1963, identifies the first steps towards planned growth for Perth in the context of a sprawling city.

endemic vegetation loss.¹²

The most important consideration for land development in the first metropolitan plan for Perth was housing, with the predominant housing type being a single family house on approximately two hectares of land.¹³ The control mechanism for this centred around the plot-ratio method based on diminishing density from the core of the city, with approximately 15-16 people per 0.5 hectares in new areas of single family homes, to 10 people per 0.5 hectares on larger individual lots in the outlying districts.¹⁴ However, in the last decade Australian metropolitan planning has begun to critically assess and evaluate what their actual growth limits might be in terms of population, how this population is spatially configured across the metropolitan region and how this population retains the values of liveability already inscribed within the city. The current statutory planning document *Directions 2031 and Beyond*¹⁵ and the strategic plan *Perth and Peel@3.5million*¹⁶ both affirm that liveability is the most important consideration when the city's population hits 3.5 million by the mid-2000s.¹⁷ However the strategic plan only identifies a few spatial variances to where new urban development should occur, with most of it still being identified in new greenfield sites within the peri-urban territory. Conversely, the strategic plan paradoxically concludes that, at this point in history, we must look elsewhere to realise the "suburban dream" and the values that underpin the type of lifestyle that this urban development model promotes.¹⁸

The values attached to home ownership and the reliance of the Australian Government on the value of this asset for an ageing population, continues to politicise this type of development.¹⁹ This aspiration has continued despite Australia having one of the highest proportions of home ownership of any western country in the world²⁰ at 66 per cent,²¹ and the second highest average new house floor area (252 square metres) in the world behind the US.²² Growing floor areas are ubiquitous with decreasing lot size in Perth, where the smallest median lot size in the country at 375 square metres can be found.²³ Furthermore, the growing social implications (and acceptance) of what constitutes affordable

12. See chapter two for an illustrative overview of these characteristics for Perth.

13. Stephenson and Hepburn, *Plan for the Metropolitan Region*, 14. "One fifth of an acre" has been converted to hectares.

14. Stephenson and Hepburn, *Plan for the Metropolitan Region*, 15. Acres have been converted into hectares, with twelve people per acre deemed normal for residential suburbs.

15. Western Australian Planning Commission, *Directions 2031 and Beyond*.

16. Western Australian Planning Commission, *Perth and Peel@3.5million*.

17. Australian Bureau of Statistics, *Population Projections, Australia, 2017–2066*.

18. Western Australian Planning Commission, *Perth and Peel@3.5million*.

19. Power, "Housing, Home Ownership," 233–46.

20. Kryger, "Home Ownership in Australia."

21. Australian Bureau of Statistics, *4130.0: Housing Occupancy and Costs, 2017–18*.

22. CommSec, *Economic Insights*. See also Housing Industry Association, *Window into Housing 2019*.

23. Tan, "Sydney, Melbourne Greenfield Housing."

housing when its cost is seven times²⁴ the average annual income wage at a national average of \$576,000 needs to be acknowledged.²⁵

As a result, the planned suburban condition, evident throughout Australian metropolitan areas, is characterised as sprawl. As illustrated in chapter two, new greenfield suburban development (sprawl) is a spatial identifier of the beginning of the peri-urban territory.²⁶ As much as our reverence for unspoiled nature is a defining value of Australia's national character and metropolitan plans, so too is the suburban sprawled landscape illustrative of our enduring devotion to progress.²⁷

Chapter two illustrated the spatial characteristic of the territory and clearly revealed the conflict between greenfield suburban development and the landscape characteristics of Perth's SCP ecologies, particularly the seasonally inundated wetland environments. This tension within the peri-urban territory between progress and preservation of our natural habitats is explained by Joel Garreau:

the forces of change whose emblem is the bulldozer, and the forces of preservation whose totem is the tree, are everywhere at war in this country.²⁸

However, it is not just natural habitats that are under threat from sprawl. For example, other land uses²⁹ within the peri-urban territory that are not conducive to suburban life are constantly conflicted. Those land-use types in Perth constantly under pressure from encroaching suburban development include intensive agriculture (piggeries, poultry farms), infrastructure (wastewater treatment plants, desalination plants, energy networks), lifestyle (equine facilities), institutions (prisons), waste (landfill sites) and sites of basic raw material extraction.³⁰ As new planned suburbs expand outwards, these peri-urban land uses, necessary for the city to function, are placed under further regulation or relocated. So too are the lands that are likely to be able to support their diverse structural and functional requirements. In this way, the conflict between the sprawled edges of the city and the peri-urban territory is akin to the functions of a city wall. New suburbs operate as a physical barrier to the outside world and everything that is "other" than the suburb becomes the peri-urban.

While conflict and tension are an exemplifier of the sprawling condition so too is one of the most celebrated forms of sprawl, the big box shopping centre. The consolidation of these forms as

24. It should be noted that a house price-to-income ratio above five is considered severely unaffordable. See Housing Industry Australia, *Dwelling Prices*.

25. Australian Bureau of Statistics, *6416.0: Residential Property Price Indexes*.

26. This interface is also considered the peri-urban interface. See Allen, "Environmental Planning and Management," 135.

27. Boyd, *The Australian Ugliness*, 12.

28. Garreau, *Edge City*, 11.

29. For example, refer to the array of land types from the initial scanning of the peri-urban in chapter two.

30. Davies, Singe, and McManus, "Rural Diversification Planning Strategy."

Activity Centres within the metropolitan area³¹ is reinforced by their development as economic hubs strategically located throughout the region.³² While a legible street network and well-designed urban form with public spaces is required,³³ their narrative is one of an incubator—a climate-controlled hub of social, cultural and economic exchange typical of the suburban condition. As Fisherman argues, the city has been turned “inside out”, as “almost every urban function that once required density and centrality now thrives in the fragmented environment of the low-density city”.³⁴

For landscape architecture, the sprawl of new suburban peripheries has become a historical reference point for the profession. As Sebastien Marot argues, the invention and formation of green systems—public gardens, parks and greenbelts—are a result of sprawl and have been largely derived from the suburban condition.³⁵ These landscape structural types, theorised in chapter one, emerged as a result of increases in population and the need for respite from the density of the inner city and subsequently form a fundamental component of much twentieth-century landscape architectural built work. However, they are by no means sacrosanct, with many of these landscape types translocated elsewhere as the demands of urban housing push outwards into the peri-urban territory.³⁶ Perth’s malleable sand plain, acid-sulphate soils and “easily removable” banksia woodland has only assisted in the ease to which the constructed suburban ground plane has advanced while further amassing a disconnection to the local landscape.

Recent bushfire policy development in Western Australia designates bushfire prone areas, as those urban areas that are within 100 metres of bushland that is one hectare or greater in area, as a significant threat to urban areas.³⁷ Many of these areas also have high biodiversity values.³⁸ As these areas are typically located within the peri-urban territory, there is an explicit conflict in the meta landscape narrative of the region and the implications for endemic vegetation as it abuts peri-urban suburban and urban development. The policy contradicts the intention to preserve the qualities and characteristics of green systems in the statutory vision³⁹ and to transfer development from the urban

31. Western Australian Government, *State Planning Policy 4.2*, 4139. Activity Centres are community focal points containing retail, commercial, entertainment and civic/community functions and are connected to the city through public transport and vehicular networks.

32. Western Australian Government, *State Planning Policy 4.2*, 4143–44. There is a hierarchy of their location across the metropolitan area with five of the nine primary strategic centres located in the peri-urban territory.

33. Western Australian Government, *State Planning Policy 4.2*, 4149. The urban form requirements pay little attention to landscape forms and qualities existing within the strategic location.

34. Saunders, *Sprawl and Suburbia*, xiii.

35. Marot, “Reclaiming of Sites,” 53. In the context of Perth, new suburban entry statements and man-made lakes can be added.

36. Western Australian Planning Commission, *State Planning Policy 2.8*. Consider Perth’s Bush Forever zones and the development processes that enable these areas to be “swapped” (cleared) by the developer in exchange for locking-up other bush areas or compensated through developer contributions.

37. Government of Western Australia Department of Fire and Emergency Service, Office of Bushfire Risk and Management, *Mapping Standard for Bush Fire*, 9. See also Western Australian Planning Commission, *State Planning Policy 3.7*.

38. Western Australian Planning Commission, *Planning in Bushfire Prone Areas*, 9.

39. Western Australian Planning Commission, *Directions 2031 and Beyond*, 2.

fringe into the city by limiting the supply of greenfield land.⁴⁰

Anti-sprawl

The momentum for anti-sprawl is consistent in metropolitan planning strategies. As a society, we believe in our essential right to home ownership, despite the economic, environmental and social consequences that this type of urban development delivers. The Charter of New Urbanism (CNU) is a significant movement against sprawl led by planners Andres Duany from the US and Leon Krier from the UK and subsequently imported into the Australian condition. The CNU movement capitalised on an ideal model that sets out to reject sprawl by placing culture and nature at opposite ends of a transect. The transect (see figure 3.1) aims to connect across a diminishing range of density from T6 (urban core) to T1 (natural zone) as you move outward into the peri-urban territory.⁴¹ While this celebrated model (also called Smart Growth) consists of a range of low-density housing and walkable communities encircling a higher density civic heart connected by public transport routes, single conurbations of greenfield suburban estates remain the primary model of development.

These policies have infiltrated to the highest level of statutory planning in Australian cities; for Western Australia, the “Liveable Neighbourhoods”⁴² policy continues to replicate the sprawled urban developments that it seeks to inhibit. Acknowledging the impetus for suburban development requirements in a rapidly growing city like Perth, is the direction for 47 per cent of its projected urban growth to occur as infill development.⁴³ This equates to some 280,000 homes required in grey-filled areas within a respectable distance from the CBD, some 10–15 kilometres. This mechanism is one tactic to counteract sprawl, with the aim to increase the density across middle ring suburbs, increase the number of residents living closer to employment centres and increase public transport links. Unfortunately, the resistance for a “sprawled city” like Perth to adequately embrace what this increased density looks like, and the influence it has on what we call the “family home”, has resulted in a severe inability to meet this demand, with only about 28 per cent of this projected infill target actually being achieved.⁴⁴

While the application of infill development policies are used to advance the anti-sprawl narrative, these policies prioritise density and public transport connections above all else, resulting in a significant

40. Buxton and Goodman, “Protecting Melbourne’s Green Wedges,” 73.

41. Davies, Duany, and Plater-Zyberk, *The Lexicon of New Urbanism*.

42. Western Australian Planning Commission, *Liveable Neighbourhoods*.

43. Western Australian Planning Commission, *Directions 2031 and Beyond*, 4. Also, Australian Government, *Planning for Australia’s Future Population*, 17. While Perth’s population growth has slowed over the past three years, it is susceptible to rapid growth, as was seen in the period 2011–2014 during the resource mining boom. Furthermore, Perth has had the highest population growth since 2004 of all Australian metropolitan centres. See Australian Government, *State of Australian Cities 2014–2015*.

44. Weller and Bolleter, *Made in Australia*, 91.



Figure 3.1 *The Urban Transect*

(Davies, Duany and Plater-Zyberl, *The Lexicon of New Urbanism*, 10.)

reduction of landscape structure. The loss of green canopies and subsequent increase in the urban heat island effect due to the vast increase and exposure of hard, non-permeable surfaces are common outcomes.⁴⁵ The complete build-out of suburban lots throughout the subdivision process in middle ring suburbs has occurred with the demise of established tree canopies. To counter this, one might draw attention to the increase in building technologies to include green roofs and walls in higher density development. However, to date, there has been little evidence of this occurring as a standard procedure in residential subdivisions or high-density apartment blocks, beyond the typical superficial green façade or roof terrace of more boutique builds.⁴⁶

As a result, new suburban housing, which is marketed as affordable, continues to be built in the peri-urban territory. Furthermore, the connection between where people live and work remains an ongoing challenge for peri-urban suburban development.⁴⁷ The impact this spatial divide has, can be seen in the subsequent impacts of rising petrol prices since “peak-oil” was achieved in 2005 and growing mortgages of typically low- and middle-income workers who reside in these new suburban conglomerations.⁴⁸ Half of Perth’s population reside in the outer subregion; only 33 per cent of the jobs available are in this location and over 70 per cent of the population in these outer areas commute by personal vehicle to their workplace.⁴⁹ Likewise, the expense of public transport from these areas to the CBD and the lack of adequate alternative transport modes only exacerbates these issues.⁵⁰

Dodson and Sipe describe this socio-political spatial distribution and accumulation of these factors as the VAMPIRE index.⁵¹ In regards to Perth, their research concludes that those most at risk of the impacts of rising housing prices and petrol prices are those located in the outer subregions, particularly in peri-urban areas in the north and south-east locales of the city. Equally, federal infrastructure funding of road networks within the peri-urban continues to enforce and propagate a car dominated culture.⁵² Undoubtedly, these issues become compounded with the impacts of food and water availability as the city continues to urbanise.

Subsequently, as we progress into the twenty-first century, sprawl, the unplanned and planned development of peri-urban territories characterised by low-density and vehicular-orientated transport

45. Brown et al., “Cool Communities,” 15.

46. Brown et al., “Cool Communities.”

47. Kelobonye et al., “Impact of Employment Self-Sufficiency,” 1488.

48. Australian Government, *Population Growth: Research Report 119*. For peak oil see Reeds, *Smart Growth*, x.

49. Martinus and Biermann, *Commuting Across Perth and Peel*, 6.

50. Transperth, “Transperth Fares.” The daily return, when read in accordance with the zone map, predicts adult cash fare ranges from \$11.60 to \$26.20 respectively.

51. Dodson and Sipe, “Unsettling Suburbia.”

52. Infrastructure Australia, *Priority List 2019*, 10–17. For a complete overview of federal funding allocated to road infrastructure projects see previous year priority lists.

en masse, is ultimately limiting. While the suburban dream is still alive, the limit of this type of development will be determined by what we value—both what we desire and what we are prepared to lose. This has been, to date, a value system that oscillates between the tension of landscape and local ecologies as a defining character of the city and the outward drive for affordable private homes and private vehicle ownership. Uniquely, the peri-urban territory is a crucial determinate of how Perth continues to expand because the landscape structure is critical in continuing to establish values for the city.

3.2 Sense of place

In the mid-eighteenth century, poet and landscape designer Alexander Pope declared “consult the genius of place in all”,⁵³ and in doing so, set forth the tradition for landscape architectural practice to design with and to adapt to the context within the location of a project. By the mid-twentieth century, theories about creating or recreating place emerged in design discourse as a response to the impacts of modernity and the unprecedented technological advances stemming from the Industrial Revolution and the subsequent affect this had on the growth of cities. Following the two world wars, strong per capita income, individual home ownership and immigration led to Australian cities rapidly expanding. The rate of suburban growth had implications for a “tabula rasa” development approach. Highways and suburban developments expanded across the landscape. In this context of city rebuilding the term “sense of place” became a reaction to the mechanisation and universalisation of the city and its landscape. and instead expressed a desire to return to an urbanism that is respectful of place.

The effects of the modern era on the form of rapid suburban advancement at the periphery displaced much of this essential city land and workforce, at a rate that meant cultural connections to the new formed places and the city could not be readily established. Within this context of the modern project, landscape architecture situates itself as the discipline to repair and amend the disconnection from existing landscapes caused by rapid urbanisation.⁵⁴ Subsequently, the desire to recreate a “sense of place” began to ground itself in the new suburban landscapes of the city.⁵⁵

In the post-modern period, theories of place (and subsequent form) became instrumental in how the design professions of architecture, landscape and urban design reacted to placelessness and re-engaged with the contextualism of the site.⁵⁶ Frampton saw the process of universalisation and the

53. Pope, *Epistles to Several Persons*.

54. This occurred at the same time ideas of stewardship were cementing themselves in the professional bodies of landscape architecture in the US and Australia.

55. Hayden, *Building Suburbia*.

56. Seminal texts include Frampton, “Towards a Critical Regionalism” and Norberg-Shulz, *Genius Loci*.

advancement of humankind as a paradox as it also constituted the destruction of traditional cultures and creativity of great cultures.⁵⁷ In accordance with peri-urban territories, he predicted that:

The *tabula rasa* tendency of modernization favors the optimum use of earth-moving equipment inasmuch as totally flat datum is regarded as the most economic matrix upon which to predicate the rationalization of construction.⁵⁸

As a result, the impetus of modernisation to insert “flat datum” across the peri-urban territory with disregard to landscape structural qualities of topography, vegetation or water legitimised the advancement of suburban development at the edge of the city. Furthermore, the ease at which this was enacted by the urban development industry and the subsequent manipulation of “elements predetermined by the imperatives of production”⁵⁹ only enhanced the facilitation of the urban development industry as a defining characteristic of city formation well into the twenty-first century. Just as the eradication of the ground plane removed the landscape’s structure, the ability for this to be “remade” as a gesture to what once existed before, formalised the control of the city over the natural world and the impetus for human development above all other forms of life.

At the end of the twentieth century, Norberg-Shulz revived a “sense of place”, a term that descends from the Greek term “genius loci”, which describes the “spirit of place” and the way oneself might belong within it.⁶⁰ For Norberg-Shulz, individual orientation, whether “visualised, complemented, symbolized or gathered” was critical to understanding a place and extended beyond the physical conditions of the site.⁶¹ Conceiving peri-urban areas as a territory, several other key figures provide relevant contributions. Adopting Malpas’ definition of place—space imbued with meaning—place emerges because of direct experience within space.⁶² For Malpas, place is relational because it is based on “our own affectivity as much as our ability to effect”.⁶³ Withers offers a similar assessment of the phenomena of place as the attention to place and the connections between places.⁶⁴ He is particularly concerned with the compression of time and space in creating a more homogenised world.⁶⁵ This too is echoed by Massey’s explanation of a global sense of place, whereby the local is situated within the wider global forces.⁶⁶

57. Frampton, “Towards a Critical Regionalism,” 18.

58. Frampton, “Towards a Critical Regionalism,” 26.

59. Frampton, “Towards a Critical Regionalism,” 19.

60. Norberg-Shulz, *Genius Loci*, 22.

61. Norberg-Shulz, *Genius Loci*, 58.

62. Relph, *Place and Placelessness*.

63. Malpas, *Place and Experience*, 1.

64. Withers, “Place and the ‘Spatial Turn,’” 637–58.

65. Withers, “Place and the ‘Spatial Turn,’” 637–58.

66. Massey, “Places and Their Pasts,” 183–92.

Australian landscape architects George Seddon and Bruce Mackenzie came to critically reflect on Australia's relationship to place within the context of its growing metropolitan regions. The finding of this domestic sensibility was spurred on by the severe destruction of landscape character and the disconnection between the traditional relationship of city and farmlands, which were replaced by industrialised agriculture and global hinterlands. Alongside land speculation and sporadic development, the loss of landscape structure and character perpetuated the idea that the landscape is wholly unproductive.⁶⁷ For Perth's peri-urban territory, this has included the vast decimation of Perth's inner city wetlands, longitudinal dune systems and coastal banksia woodland and the continued shifting of horticultural areas as the city continues to expand north and south from the CBD.⁶⁸

Seddon and Mackenzie were equally compelled to identify and propose their own manifestation of what a return to place might be in the Australian context. Seddon posed the question: Does landscape matter? He responded to this by arguing that indeed it does matter because each site is made up of distinctive ecological, aesthetic and psychological characteristics.⁶⁹ He proposed that there is an inherent "psychological dependence on regional and local identity" and it is through our "framing" of this identity, both as individuals and society, that shapes or experiences our actions as a culture.⁷⁰ Furthermore, he distinguished a range of associations that, once revealed, deepen both our experience and understanding of place.

Importantly, Seddon was explicit in the role of landscape architecture in developing people's experience of place.⁷¹ Subsequently, leading landscape architectural practitioner Bruce Mackenzie adopted Seddon's methodology to develop his own "design ethos" for Australian design. This consisted of four steps: definition, authenticity, sustainability and self-sufficiency.⁷² Mackenzie's design ethos focused on the connection between design excellence and functionality driven primarily by natural systems within the built environment, as a way to "decipher the complex language of the land and its myriad explanations boldly and subtly expressed."⁷³

Concurrently, a strong theme within the literature on place relates to the structural elements of the landscape. Moreover, in the context of self-sufficiency today, landscape is not sustained through society nurturing place but rather through the landscape's ability to sustain society.⁷⁴ Mackenzie

67. Hough, *Cities and Natural Processes*, 13.

68. Refer to chapter two for the illustrations explaining this.

69. Seddon, *Genius Loci*. Of which he used the term "genius loci".

70. Seddon, *Genius Loci*, 66.

71. Seddon, *Genius Loci*, 73.

72. Mackenzie, "An Australian Landscape Design," 129.

73. Mackenzie, "An Australian Landscape Design." 129–32.

74. Mackenzie, *Design with Landscape*.

strongly advocates for an Australian design sensibility that is intrinsically linked to the physicality of a site, which he suggests, in turn, creates an authentic cultural response. He cautions against the use of what is common practice nowadays of “design precedents”, by way of imposing design solutions and aesthetics from elsewhere in order to replicate functions and obtain design solutions.

However, despite both Seddon and Mackenzie advocating to reveal and project qualities of a site (both evident and embedded) by forming a “site inventory” of attributes, there are few examples of this translating to the design of sites within peri-urban territories.⁷⁵ As these attributes are aligned with “emotive facets” of how we respond to these places, for instance “recognition and familiarity; contrasts and subtleties and expectations and anticipation”, one would ask why not.⁷⁶ Seddon, when describing Perth, identifies the natural and built landscape as a “specific urban ecology”, neither self-generating nor self-perpetuating. He describes the major landscape amenities as the SCP, the Darling Scarp, the lakes, the swamps, the rivers on the plain, the coastline, the sea and the offshore islands. He adds to this the “man-made ones”, notably the vineyards of the Swan Valley and the individual buildings that demonstrate architectural and cultural value.⁷⁷ What is not demonstrated is their location within the peri-urban territory and therefore their direct connection (to each other) as systems. This in turn lacks both a recognition of the physicality of this landscape and its overarching structure. Thus, the authenticity of this place is difficult to ascertain and instead, a reading of the territory as a “non-place’ has only assisted the advancement of urbanisation as it seeks to recreate place.

Norberg-Shulz predicted that “the structure of places occurs in steps, the first being the distinction between natural and man-made phenomena, between landscape and settlement”.⁷⁸ This distinction is ever present in the peri-urban territory, as the inhabitants of the peri-urban negotiate the fluctuating heterogeneous terrain provided by the structure of their experiences of the built and natural landscape. Therefore enabling a landscape experience to emerge from both the structure and the inter-connection of the peri-urban built and natural landscapes, which ultimately enables a cumulative record of memory.⁷⁹ Furthermore, the making of memory and its connection to establishing a “sense of place” in the peri-urban terrain enables a “bottom-up” approach driven by those residents and users of this landscape. This contrasts with the top-down style of metropolitan planning and “diagrammatic map forms” that often fail to consider local differences filled with innate richness and history.⁸⁰

75. Appendix 2 provides a succinct overview of published landscape architectural projects in Australia between 2008 and 2018.

76. Mackenzie, “An Australian Landscape Design,” 130. For a broader range of emotive facets.

77. Seddon, *Sense of Place*, 196.

78. Norberg-Shulz, *Genius Loci*, 8.

79. Norberg-Shulz, *Genius Loci*, 78.

80. Marot, “Reclaiming of Sites,” 47.

Importantly, if local differences and variances create richness and demonstrate the quality of the landscape and place, then the totality of the peri-urban territory for all its variant “transitions, sequences, visual connections” must capture an overall sense of the terrain as a collective site.⁸¹ This idea is further emphasised by Meinig, when attributing the “clutter of the American vernacular landscape” to not what was wrong, but rather to the accumulation of variances and differences that fundamentally tell the story of “what was right”.⁸² In addition, the making of landscape is ultimately the making of place and the accumulation of landscape imagery across the peri-urban territory becomes the source for a biography of this landscape type. As explained by Samuels:

The makers of landscape imagery in the modern context are also often the makers of the landscape itself. Whether as purveyors of or makers of landscape designation, real estate agents, brokers, and developers are often good sources for a biography of landscape designation. Just as they convey and perpetuate landscape intentions cast by others, so too do they create, manipulate, and designate the forms and meanings of places ... Indeed between real estate broker, developer, banker, insurance agent, and client often lies but a thin red line of assigned or designated landscape value.⁸³

Therefore, place has a cultural specificity embodied in time and place. Similarly, making place assists in developing a coherent visual imagery or visual aesthetic, constructing a pattern of otherwise disparate visual parts by creating a “readable” legibility of the territory as a whole.⁸⁴ This is reinforced by Berger who suggests that “the in-between landscape should be valued because it provides a threshold, or platform, for liminal cultural phenomena to play out”.⁸⁵

Historically, finding “place” in an Australian context has been about discovering an authenticity of the physical attributes of the landscape and connecting these through to the built environment. The character of the metropolitan landscapes of Australia represents places and contributes to significant parts of the country’s persona and distinctiveness.⁸⁶ On a city-wide metropolitan scale for the city of Perth, the influence of the designer, or the design ethos at the metropolitan scale registers at two contradictory ends of the scale, that of suburban development (residential garden or POS of suburban development) and the bounding-in of large swathes of national or state conservation estates to preserve nature. For this reason, the *sensing* of a landscape experience within Perth has the potential

81. Marot, “Reclaiming of Sites,” 42.

82. Meinig, “Reading the Landscape,” 222. Consider also the accumulation of individual experiences to make landscape, see essays in the same collected edition such as Samuels, “The Biography of Landscape,” 51–88.

83. Samuels, “The Biography of Landscape,” 76.

84. Lynch, *Image of the City*. Kevin Lynch explored the legibility of the city through the mental image of its citizens.

85. Berger, *Drosscape*, 31.

86. Seddon, *Sense of Place*, 129.

to be reframed through a restructuring of the peri-urban territory—the site where built, rural and natural landscapes act to critically shape our experiences and memories of place within the city. As Seddon attests, this task, is “by far the most important, but hardest to write of”.⁸⁷

3.3 Reflection: Inherent agendas within the peri-urban territory

This chapter concludes the second stage of inquiry into the peri-urban territory. It introduced two meta landscape architectural narratives: sprawl and sense of place. These narratives have not only been instrumental in shaping the territory but also the attitudes of the profession of landscape architecture towards it. The paradoxical tensions caused by these narratives were assessed at the scale of the metropolitan region. The chapter now reflects upon the territory’s thickness and potential.

Peri-urban thickness

This chapter discussed how narratives contribute to and influence our understanding of the territory. Furthermore, as explained through the discourse of sprawl and sense of place, narratives can be used to legitimise urbanisation processes and the landscape structures that result. Narratives provide a figurative and literal layer of understanding of the peri-urban territory. Furthermore, in accordance with Withers differentiation of “place within places”, the imageability of the peri-urban territory can be enhanced through facilitating both visual identification and the structuring of seemingly isolated elements.⁸⁸ In the multifaceted landscape of the peri-urban, providing connections between the markers and signifiers of past landscape structures and natural systems is essential for orientating and creating new places as the city continues to expand and grow.

In this way, landscape architectural practice within the territory becomes critical. From a disciplinary perspective, design methodologies and strategies based on a process that builds the peri-urban territory’s imageability through identifying, orientating and establishing new places and connections is lacking. Certainly, a more encompassing methodology embedded in the experiential and intangible qualities of the built and natural world is needed to understand and act within the peri-urban territory. In this way, the dynamic condition of the peri-urban can be synthesised, resituated and remade again and again through various sequences of time. Importantly, conceiving the peri-urban as a complete territory does not just reveal what is visible, it also reveals its expanded, thickened identity through the “forces and events that underpin the evolution of its place.”⁸⁹

87. Seddon, *Sense of Place*, 125.

88. Lynch, *Image of the City*, 95.

89. Lynch, *Image of the City*, 62.

Evidently, to establish the peri-urban territory as a distinct place, inscribed spatially into the city so as to form a transition of the urban–rural condition, is where an expanded thickness of the metropolitan region awaits.⁹⁰ The multifunctional and disparate nature of land uses found within the peri-urban provide opportunities for landscape architects to bring together conflicting and dispersed value sets and in doing so, to reframe the way contemporary Australian society values this territory (and types) of landscape contained within. This would contrast with the predetermined design of new greenfield suburbs that is imposed onto this territory with little relationship to the “inherent characteristics of place” and its overarching systems and interactions.

Potential

Marot argues the need for landscape architecture to build upon the tradition of green systems that first emerged as a response to rapid urbanisation by embracing the temporal nature of the peri-urban territory to create a staged “third condition” that goes beyond the park, to capturing “transitions, sequences and visual connections.”⁹¹ Accordingly, the potential to transform our understanding of the peri-urban territory and, in turn, to influence the values of the territory in order to change our practices within it, has been identified. Essentially this calls for new narratives to be created that distinguish the peri-urban as a mechanism to assist urbanisation by creating a more meaningful, purposeful and imaginative connection of built, natural and diverse landscapes at the edge of the city.⁹² Crucially, this action and agency is only possible in a terrain that is open to disruption of temporal exchanges and landscape sequences—both inherent within the peri-urban territory.⁹³

Enhancing the memory contained within a natural and human-made genius loci of the territory has the potential to contribute to the city’s resilience as peri-urban territories are not only able to respond to change but can also intentionally reconstruct and recalibrate relationships as the city continues to urbanise.⁹⁴ A critical re-evaluation of sprawl is required so that the structural components of the landscape can be understood and the accumulation of exchanges and passages operating across, between and within the peri-urban can be harnessed to imbue meaning into the territory. This has high potential to capture rapid urbanisation in a way that nurtures a public memory of place, one that is embedded in historic urban landscapes and potential futures of a shared time and territory. As Berger explains:

90. Lynch, *Image of the City*, 7.

91. Marot, “Reclaiming of Sites,” 53.

92. Lynch, *Image of the City*. Even in the 1960s, architect Kevin Lynch’s text *Image of the City* perpetuated a visual identification and structuring of the city through a reading of points, lines and memory.

93. Sebastien Marot describes this as the “third condition”.

94. Holling, “Resilience and Stability,” 1–23. For the origins on “resilience theory” in ecological systems.

the negative space becomes its own form of collectivism by foregrounding constructed landscape (in the visual) to define image and spatial organisation of the after sprawl.⁹⁵

This provides an opportunity for the peri-urban territory to become its own site, to be seen for its uniqueness, responding not only to the projection of sprawl as an indicator of its physical surrounds but also as an “ideation of cultural creation” of place.⁹⁶ In this way, the peri-urban landscape represents both the external frontier of the fragmented metropolis and the internal frontier of composite landscapes marginalised in the urban fabric as the city has expanded.⁹⁷ Ultimately, peri-urban territories then become not an object left over after suburban advancement, nor rural lands subsiding to the advancement of the city, but rather a signifier of cultural identity, shaped through “social, historical and aesthetic imagination”.⁹⁸

3.4 Conclusion

This chapter introduced two narratives: sprawl and sense of place. Both narratives have been instrumental in shaping the peri-urban territory, both literally and figuratively. The origins of sprawl were introduced and comparisons between US and Australian definitions of the term were evaluated. The paradox of sprawled suburban development in Australia was outlined as were the values attached to the suburban condition. Counter arguments against sprawl were introduced and evaluated accordingly.

Various theories of place were introduced and differentiated. The disruption of place due to the removal of landscape structure or the inability to utilise landscape structure was explained. Comparatively, place within the discipline of landscape architecture in an Australian context was examined, with several gaps and opportunities for research and practice proposed.

Chapter four begins the third layer of peri-urban thickness—*finding*. Chapter four introduces the methods of observation and classification and in doing so, operationalises the research towards identifying and interpreting the structural and functional characteristics of the peri-urban territory of Perth.

95. Xaveer de Geyter Architects, *After-Sprawl*, 25.

96. Hayden, *Power of Place*, 9.

97. Berger, *Drosscape*, 26–27.

98. Hayden, *Power of Place*, 9.

04 Understanding the peri-urban

4.0 Introduction

Chapter three outlined the meta-narratives of sprawl and sense of place and explained how they configured the peri-urban territory and concluded the second stage of thickened imageability for the peri-urban territory of Perth. This chapter introduces the third layer of peri-urban thickness—*finding*. Finding operationalises the act of discovery. This chapter outlines and explains the methods of observation and classification used to interpret and identify the spatial structure and function of the peri-urban territory of Perth and subsequently to describe the territory's biography. Further, the chapter introduces a method that is comparable and transferable to other peri-urban territories.

Methods of observation allow us to record and interpret the spatial character of the peri-urban landscape, while the process of classification distinguishes several types. Observation is considered a secondary descriptive strategy. Descriptive strategies are proposed as those that build knowledge without complex analysis.¹ In this thesis, observation of the peri-urban territory occurs across a sixty-year period, beginning in the 1950s at the time of the development of the first metropolitan plan for Perth and concluding in 2016.² Remote sensing, using aerial photography, is the primary tool used in the analysis, while a conceptual framework of classification (derived from landscape architecture) will determine the landscape types. Types are categorised by their structure, function and transformation as they relate to the broader cultural context of the city and are discussed in detail in chapter five.

4.1 Landscape structure and function

As discussed in chapter one, peri-urban landscapes are heterogeneous, composed of differing landscape units relating to urban and rural land uses. Similarly, from an ecological perspective, landscape is defined by heterogeneous mosaics interacting under a prescribed phenomenon.³ Subsequently, landscape structure is derived from the environmental phenomena of landscape patterns of change and the social-cultural signifiers that are generated through human phenomena of experiences and actions on the landscape.⁴

Landscape ecology is the interaction of organisms with one another and their environment.⁵ It is

1. Swaffield and Deming, *Landscape Architectural Research*.

2. This period coincides with the planning of the metropolitan area of Perth, from the *Stephenson-Hepburn Plan* of 1955 to *Perth and Peel@3.5million* in 2015.

3. Forman and Godron, *Landscape Ecology*; Turner, Gardner, and O'Neill, *Landscape Ecology in Theory and Practice*.

4. Iverson Nassauer, "Landscape as Medium and Method," 82. For a comprehensive diagram of relationship between environmental and human phenomena.

5. Schreiber, "History of Landscape Ecology," 21–33.

a highly transdisciplinary practice, whereby biophysical and analytical approaches derived from humanistic and holistic perspectives of the natural and social sciences are frequently employed.⁶ Understanding the structure and function of landscape is fundamental to landscape ecology studies, because landscape formation and change are fundamental to the flows and processes of ecosystems. In this way, the method and tools derived from landscape ecology provide other disciplines (such as landscape architecture) the opportunity to interpret human-induced landscape change and inhabitation of the landscape.⁷ One method that is instrumental in developing the discipline of ecology (and is used frequently to describe and interpret the structural and functional components of heterogeneous landscapes) is aerial photography.⁸ Furthermore, analysis of aerial photographs, paired with ground observation, can further help determine the spatial structure of ecosystems.⁹

Ingegnoli differentiates three distinct characteristics of landscape: First, structure is shown through the spatial relationships of distinct components; second, function is the interaction and flow among these components; and third, transformation is the change of structure and function over time.¹⁰ He argues that these characteristics allow us to understand the fundamental ecological operations of the landscape; for example, shape and size, edge length and relative heterogeneity.¹¹ These operations relate to the pattern of homogenous areas of land differentiated from surrounding areas of land (patches), the connections between them (matrix), their boundary length and relative differentiation. Together the connections between make up the patch-matrix mosaic. Likewise, these characteristics have been identified as relating to the landform, ecosystem and human patterns of landscapes and the subsequent perception and aesthetics of landscapes themselves. Considering this, the fundamental principle of landscape ecology that is based on cultural change on and embodiment of landscape asserts landscape architectures mission to connect instrumentality with cultural values.¹²

There has been more recent criticism of approaches in landscape studies that deal only with the instrumentality of the landscape and those that have eradicated the concept of landscape

6. Wu, "Landscape Ecology," 179–200.

7. Forman and Godron, *Landscape Ecology*.

8. Kwa, "The Visual Grasp," 108–81. The patterns that emerged from aerial analysis of landscapes contributed to the early development of the field of ecology.

9. Forman and Godron, *Landscape Ecology*; Ingegnoli, *Landscape Ecology: A Widening Foundation*. For example, land-use change or vegetation cover, as they change between landscape scale and tesserae, the smallest ecological study module scale. Furthermore, statistical measurement that reveals ecological performance characteristics relating to the probability of occurrence and frequency of landscape types is outside the scope of this research; however, it could provide further opportunity to interrogate the change across the landscape.

10. Ingegnoli, *Landscape Ecology: A Widening Foundation*, 58.

11. Ingegnoli, *Landscape Ecology: A Widening Foundation*, 58. See also, Forman and Godron, *Landscape Ecology*; Forman, *Land Mosaics*.

12. Troll, "Landschaftsökologie," 1–21, quoted in Schreiber, "History of Landscape Ecology in Europe," 21–33.

interpretation and the formation of cultural and existential values.¹³ Leading landscape architectural practitioner and theorist James Corner argues the need for a “cultural animate ecology” that separates itself from the instrumentality of science in order to frame a discourse that is of both the scientific and artistic worlds. He calls for “an eco-imaginative landscape architecture” that “would be creative insofar as it reveals, liberates, enriches and diversifies both biological and cultural life”.¹⁴ So too does Cosgrove, who argues for cooperation between ecological and semiotic discourse and the importance of demonstrating the meaning-making qualities and processes of landscape.¹⁵ Equally, several landscape architecture and architecture theorists have characterised the structure of landscape (spatially) in order to highlight the important relationship between landscape pattern, landscape ecological processes and landscape aesthetics and preferences.¹⁶ Essentially, to demonstrate the landscapes imageability.

It is useful to consider how critical visual studies can make explicit the production of landscape.¹⁷ Landscape change is a representation of the cultural and political power of the landscape (semiotics) and it carries with it a collection of visual signs.¹⁸ This is heightened when landscape is viewed as a collective, as is proposed here through a territorial approach to the peri-urban.¹⁹ Landscape iconography contextualises the image over several historical periods—in this research, a sixty-year period. As deduced by Corner, representation of landscape, and the drawing and making of it (design), is also viewed as the cultural and political presentation of power that in turn influences the people within it.²⁰

Accordingly, “reading” the landscape through understanding landscape structure reflects how the landscape is perceived and experienced and reflects the subsequent cultural values that emerge in relation to specific landscape types. Because of this, understanding the landscape’s structure is a necessary component in the planning and design of the landscape and for understanding the territory’s imageability.²¹ Four components frequently identified in the literature (and theorised in chapter five)—edges, paths, thresholds and foci—have been adopted to construct a conceptual

13. Carter, *Ground Truthing*, 7–9. Paul Carter uses this phrase to describe somewhat the disconnect between aerial surveying of forested areas in regards to land resource management and what is then found at or on the ground; however, in adopting the absolute notion of “instrumentality”, I suggest that this could also apply to the profession of Planning.

14. Corner, “Ecology and Landscape,” 86.

15. Cosgrove, “Landscape: Ecology and Semiosis,” 15–21.

16. Dee, “The Imaginary Texture of the Real,” 13–30; Lewis, Casello, and Groulx, “Effective Environmental Visualization,” 85–106.

17. Groat and Wang, *Architectural Research Methods*.

18. Raaphorst et al., “Semiotics of Landscape Design,” 120–33.

19. Lindström, Kull, and Palang, “Semiotic Study of Landscapes,” 97–107.

20. Corner, “Drawing and Making,” 243–75; Cosgrove and Daniels, “Iconography of Landscape”; Corner and MacLean, *Taking Measures*.

21. Dee, *Form and Fabric*; Appleton, *Experience of Landscape*; Kaplan, “Aesthetics, Affect, and Cognition,” 3–32.

framework for analysis of the peri-urban territory of Perth.²² Edges are forms that interlock spaces that are varied or are in the process of transition together. They are areas of contrast within the landscape and may display a degree of permeability. Paths are a major element in the landscape that structure the experience through the landscape and are critical to the formation of interconnected networks for the movement of people and ecological processes. Thresholds are integrated spaces that are usually located at a central point within a perceived realm. Thresholds assist movement or people through the landscape from one point to another, or one landscape to the next. Foci are features, forms or places within the landscape that people are drawn towards and which help orientate people within the landscape.²³ Together, these structural components communicate how the landscape is connected and interrelated across scales, the patterns of past processes and the opportunities for future engagement (planning and design) within the landscape and, more specifically, the peri-urban territory.

4.2 Interpreting landscapes

Cultural landscape interpretation was first introduced by Carl Sauer in 1925. In his seminal essay on landscape morphology, Sauer proposed that “the culture landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area the medium, the cultural landscape is the result.”²⁴ Cultural landscapes have a long lineage within landscape architecture theory and practice, particularly through the trajectory of US landscape architecture responding to the change of rural landscapes and towns across the Midwest.²⁵ Subsequently, changes in landscape structure and function are a result of cultural change across the landscape.²⁶

The premise of landscape biography recognises that the accumulated material parts of landscape influence how people engage with landscape and, in turn, how people interact with the landscape while also shaping the formation of its material parts.²⁷ As Antrop proposes, the structure of landscape is highly subjective and forms a “chain of relationships” between past experiences and the knowledge of and our immediate interactions with the landscape.²⁸

These patterns and processes are specific to place. As discussed in chapter three, place is created

22. Bell, *Pattern, Perception, and Process*; Dee, *Form and Fabric*.

23. Lynch, *Image of the City*; McHarg, *Design with Nature*; Forman and Godron, *Landscape Ecology*; Forman, *Land Mosaics*; Dramstad, Olson, and Forman, *Landscape Ecology Principles*.

24. Sauer, *The Morphology of Landscape*, 46.

25. Stigloe, *Borderland*; Meinig and Brinckerhoff Jackson, *Interpretation of Ordinary Landscapes*; Brinckerhoff Jackson and Lefkowitz Horowitz, *Landscape in Sight*.

26. Antrop, “Concept of Traditional Landscapes,” 105. The term “traditional landscape” was first used in 1895 to explain the landscape change of the geographic region of Flanders.

27. Samuels, “Biography of Landscape,” 51–88.

28. Antrop, “Concept of Traditional Landscapes,” 107.

by the production of space through the purposeful engagement between people and their environment across time and the emergent future possibilities that emerge from this collective value.²⁹ Individual and collective value is subjective and drawn from our connections and immediate interaction with the landscape. Therefore how we perceive landscape informs our knowledge and in turn influences our behaviour.³⁰ In this regard, adopting a method that helps determine a range of peri-urban types (as identified in chapter five) in turn reveals attitudes and behaviours of society played out within the landscape at a particular time and place. Given this, it also reveals opportunities for the intentional design of space. Therefore, using a structural and functional landscape method to firstly interpret and understand the peri-urban territory provides opportunities for potential to emerge, whereby purposeful planning and design is used to influence and change attitudes and behaviours of how society interacts with the peri-urban territory.

Traditional landscapes have a distinct and recognisable structure that reflect a clear relationship between humans and nature and therefore their structural and functional elements hold significance for natural, cultural and aesthetic values. Peri-urban territories are places where remnants of traditional landscapes are apparent, despite having been greatly modified by the effects of urbanisation.³¹ However, their chronological change across the landscape demonstrates environmental and heritage, societal and economic values. Therefore, the value ascribed by society to specific landscapes can be described through an abstraction of their properties.³² Guided by landscape ecology and ideas of general systems theory related to Gestalt and landscape holism,³³ the creation of new symbiotic relations between human society and nature is what Naveh attests to being a “post-industrial symbiosis”.³⁴ Furthermore, to understand these relationships, one must be able to explain and identify the integration, connectedness and synthesis of the functional and structural components of the landscape at various scales and dimensions—essentially their patterns relative to the whole.³⁵ Those properties that are integrative and relate to holistic theories of the morphology and structure that explain landscape types are essentially indicators of landscape quality that enable deeper connections between people and their environment. Not only this, these relationships are an integral dimension of the emerging qualities that form a hierarchy of organisation and complexity.³⁶

29. Lefebvre, *Production of Space*, 68–71.

30. Iverson Nassauer, “Placing Nature: Culture”; Tuan, *Topophilia*.

31. Antrop, “Concept of Traditional Landscapes,” 105–17.

32. Naveh, “What is Holistic Landscape Ecology?” 11.

33. Antrop and Van Eetvelde, “Holistic Aspects of Suburban Landscapes,” 43–58; Naveh, “What is Holistic Landscape Ecology?” 7–26.

34. Naveh, “What is Holistic Landscape Ecology?” 8.

35. Antrop, “Concept of Traditional Landscapes,” 106.

36. Naveh, “Ten Major Premises,” 274.

In this way, potential emerges because the spatial condition of the peri-urban territory is framed to oppose the mechanistic and reductionist effects of urbanisation and instead it becomes its own condition that interacts and co-evolves with the urban and rural conditions.

Knowledge of the peri-urban territory, derived from understanding its mutability, forms its biography, which is essential in describing the evolving space and place. Consequently, the biography of a peri-urban territory is unique to its locale as it is derived by the policies determining social, economic and environmental change at the city's periphery. Accordingly, structural landscape indicators and values need to be interpreted in a regional context within landscape types rather than administrative units.³⁷

Table 2 conceptualises this from several perspectives across the ecology, design and planning literature and outlines the structural cues that can be interpreted or generated to establish connections between the landscape and those who experience it. As deduced in this table, there are similarities and commonalities that provide structural cues within the landscape. In accordance with this method, the table provides a set of clear attributes and landscape indicators that enable stronger connections between people and the landscape. In the same respect, indicators that diminish this experience are described. Moreover, potential exists in the chain of relationships available whereby the structural composition of peri-urban territory amplifies the connections between people and the environment of this territory.

Table 2. Disciplinary classification of landscape interpretation

	Landscape architecture ¹	Ecological sciences ²	Landscape aesthetics ³	Resulting structural cues
Complexity	The various elements of a scene that provides a degree of interest and sensory stimulation as well as the aspects of the scene that cannot be comprehended at once.	The way the ensemble is integrated in its larger environment.	Diversity and richness of landscape elements and features, including shape and size, as well as the interspersions of patterns in the landscape.	Connection to scales above and beyond. Various elements (and patterns) evident as well as those that are not (as a result of past processes).
Coherence Legibility	The ability to comprehend and see the inherent pattern in a scene.	The degree the elements of the ensemble fit together and how they are related to each other in a structural and functional way.	The presence and spatial arrangement, distribution and organisation of landscape elements. Specifically, those elements containing water and vegetation create coherence within the landscape. Furthermore, visual presence is affected by the degree of impact of disturbance on the land. Visual scale is important as this forms the degree of openness or obstruction of view. Too much complexity can create incoherent landscapes.	The ability to oversee the landscape as a whole. The connection between elements of the appropriate scale. The presence of water and vegetation as central to elements that provide coherence in the landscape.
Completeness	The degree of difference to which landscape spaces, form and elements form a unified whole landscape.	The degree to which all necessary elements are present to characterise the ideal ensemble.	The visual presence and degree of impact of disturbance.	The landscape variation within the landscape; however, not to the degree in which the impact of disturbance is more evident.
Authenticity	Evidence of relationship to existing qualities of place through the adoption, enhancement or restoration of natural and cultural processes.	The degree to which the whole as the elements represents the original condition.	The degree and pattern of naturalness of vegetation within the landscape.	The natural landscape qualities that appear to be from place. The cultural landscape qualities that demonstrate a level of care and connection to the landscape.
Identity	Development of space that communicates what places have been and what they could be in the future with a degree of robustness and inclusiveness.	The degree to which all necessary elements are present to characterise the ideal ensemble.	Relating to stewardship and the level of management (type, detail, frequency) of vegetation and man-made structures within the land. The ability of a landscape to create a strong visual image in the observer and thereby making it distinguishable and memorable; for example, those that are spectacular, unique or iconic.	The evidence of layers or natural or cultural elements. It is possible that care (landscape management, design or planning) has been shown in their arrangement.

1. Bell, *Pattern, Perception, and Process*, 85; Dee, *Form and Fabric*, 13–29.

2. Antrop, "Concept of Traditional Landscapes," 113.

3. Tveit, Ode, and Fry, "Key Concepts in a Framework," 229–55; Ode, Tveit, and Fry, "Capturing Landscape Visual Character," 89–117; Tveit, "Indicators of Visual Scale," 2882–88; Tveit, Ode Sang and Hagerhall, "Scenic Beauty," 45–54.

4.3 The role of aerial photography in interpreting the landscape

In his opening address of the publication *Landscape*, US cultural geographer and landscape designer John Brinckerhoff Jackson stated that: “it is from the air that the true relationship between the natural and the human landscape is first clearly revealed.”³⁸ Surprisingly, this statement was made nearly twenty years before the photo “Earthrise” (see figure 4.1), taken from the US spaceship Apollo 8 in 1968, was published.³⁹ This photo, and its subsequent reproduction, promoted further positive unity between humanity and nature, at a time of great social and environmental change.⁴⁰ Since then, the depiction of the landscape from above has continued to grow with global urbanisation.

Aerial representation has become the primary way we relate to and understand landscapes beyond the scale of those we experience in our day-to-day lives.⁴¹ Indeed, the relationship between the aerial image and urbanisation can be traced back to the earliest incarnations of the “bird’s-eye view”, a drawing technique established during the sixteenth century to justify the political stronghold a city had over its region.⁴² More recent innovations in aerial photography and the rapid increase in our ability to access the aerial view through global satellite imagery programs such as Google Earth and NearMap has only increased our understanding of human-induced change on the landscape. To this affect, high-quality satellite imagery programs have been instrumental to the archaeological mapping of lost ancient cities and their landscapes.⁴³ Aerial representation supports our collective ability to not only see the broader human occupation of this planet but also to attempt to understand these characteristics as a succession of values inscribed by human settlement over time. Our ability to do this is more pronounced than it has ever been because we are able to engage with the landscape as a whole and within an instant—we are able to compress both time and space in our fingertips on most handheld mobile devices.

The correlation between aerial imagery and the inscribed values on peri-urban territories is evident in the images produced for the land development industry. The marketing of new suburban or greenfield estates⁴⁴ in the Australian context (see figure 4.2), at the urban–rural edge of the city, represent

38. Brinckerhoff Jackson, “Need for Being Versed,” 4–5. This was Brinckerhoff Jackson’s opening editorial for the magazine “Landscape”.

39. Naveh and Lieberman, *Landscape Ecology*, 122. This technology was developed by NASA in the 1960s for the images taken around the globe by the Earth Resources Technology Satellites (ERTS), renamed Landsat in 1975, the longest running satellite imagery program on Earth.

40. Bill Anders, *Apollo 8: Earthrise*, 1968, digital photograph, NASA, <https://www.nasa.gov/image-feature/apollo-8-earthrise>.

41. It is common knowledge that aerial survey derived from the introduction of aerial mechanical warfare, in which the pilot became a surveyor.

42. Known as “pianta prospettiva”. Among the best known of these is Jacopo de Barbari, *View of Venice*, 1500, woodcut, 1345 x 2818mm, cited in Schulz, “Jacopo de’ Barbari’s View of Venice,” 425–78.

43. Parcak, “Satellite Remote Sensing Methods,” 65–81. Archaeologist Sarah Parcak used infra-red light from space to map building and landscape features such as past water courses and David Kennedy studied the ancient landscape of Jordan.

44. Burnley and Murphy, “Residential Location Choice,” 123–43.



Figure 4.1 *Earthrise*
(NASA, *Earthrise*, 1968. Digital photograph online. https://www.nasa.gov/multimedia/imagegallery/image_feature_1249.html)



Figure 4.2 *St Leonards Estate, Dayton*
(Authors own, 2015. Digital photograph.)



Figure 4.3

Foundations and Slabs, Lakewood, California

(William Garnett, *Lakewood construction*, 1950. Estate of William A. Garnett. The J. Paul Getty Museum (online), Los Angeles. <http://www.getty.edu/art/collection/objects/128617/william-a-garnett-foundations-and-slabs-lakewood-california-american-1950/>.)

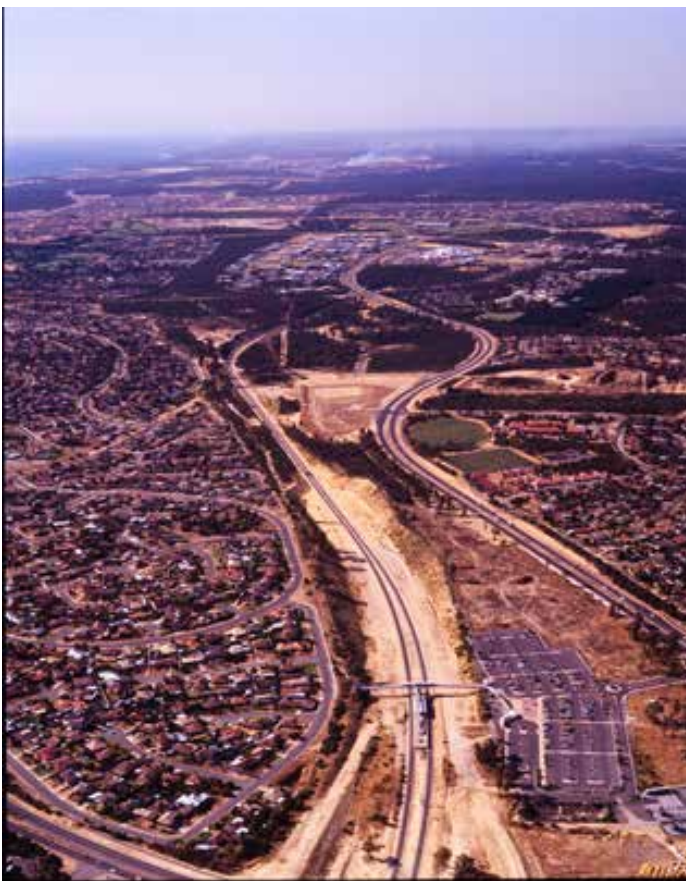


Figure 4.4

North from Edgewater Train Station

(Richard Woldendorp, *North from Edgewater Train Station*, 1995. Colour photograph, 7 x 6cm. State Library of Western Australia, call number 137129PD.)

evidence of inscription of the dominant cultural values of private home ownership. For example, this occurred in the US as early as 1920, when aerial images were used to promote the acquisition of the landscape for residential development and to validate large-scale, suburban advancement across the peri-urban areas.⁴⁵ This type of representation was repeated again in the 1950s by the US photographer William Garnett in his work for the Centre for Land Use Interpretation of California. His widely published series of aerial photographs of the Californian suburb Lakewood Park show a bulldozed landscape with no topographical features, vegetation or visible life. Subsequent photos from this series (see figure 4.3) show the re-creation of this landscape as “dozens of foundations in lines stretching indefinitely beyond the frame, except for the utility poles and the piles of lumber by each foundation, nothing rose more than a few feet above the ground”.⁴⁶ More recently, at the end of the twentieth century, James Corner and Ian McLean took to the air to explore the impact of widespread urbanisation and development networks. The resulting rich visual essay and commentary reveals the conventions, codes and schemes of cultural attitudes and the impact of these values on the broader US landscape.⁴⁷ Locally, the historical aerial photos of Perth taken by Richard Woldendorp document the expansion of the city at its edges (see figure 4.4) and the gradual encroachment of the urban development front across coastal dune and banksia woodland communities.⁴⁸ Implicit in all these images is the upheld value of “development as progress” as the city expands outwards with the associated eradication of local topography and vegetation complexes and nullification of cultural relationships to the landscape other than those that relate to a new urban condition.

Thus, aerial photography plays a critical role in advocating for suburban expansion and at the same time, becomes a tool to document this urban expansion. Surveying aerial photography across time can assist in the interpretation and critique of the normative practices of urbanisation where natural landscape features are erased or, instead, presented as “affectations adjacent to or outside of the city proper”.⁴⁹ In these images, the oblique aerial image is almost always framed by the urbanised landscape in the foreground, progressing outwards into areas yet to be cleared. In this way, urban development is placed at the centre, both literally and metaphorically, as the mandated action for city progression and in doing so, inadvertently classifies all other landscape features as having less value. As Denis Cosgrove reveals, the inevitable reversal of this logic occurs once you hit the ground,

45. Campanella, *Cities From the Sky*. This occurred with the founding of US company Aerial Surveys Inc. by businessman Sherman Fairchild.

46. Rome, *Bulldozer in the Countryside*, 1. See also, Brinkerhoff Jackson, *Crabgrass Frontier*, 3–11.

47. Corner and MacLean, *Taking Measures*.

48. See Richard Woldendorp’s photos for the Department of Lands and Survey as well as Aerial Survey’s Australia, available at State Library of Western Australia, *Richard Woldendorp Collection of Photographs*, accessed November 10, 2019 <https://data.gov.au/data/dataset/richard-woldendorp-collection-of-photographs>.

49. Brinkerhoff Jackson and Lefkowitz Horowitz, *Landscape in Sight*, 63.

as natural processes then become seemingly dominant and the urban “grid” seems irrational and disappears. Ironically, it is the sheer scale of natural attributes on the ground that also reduce the scale of human measure.⁵⁰ Here, Dramstad et al. conclude that when:

establishing a link between the birds-eye view of remote sensing data and the on-the-ground perspective of landscape photographs, several aspects of landscape content and spatial configuration, related to landscape character may be suitable as indicators for the visual landscape.⁵¹

Therefore, aerial landscape analysis allows the opportunity to reveal not only the structure (type), function (morphology) and transformation (spatial change) across time but demonstrate this change through the changing agency of culture.⁵²

As the peripheral landscapes of twenty-first century cities continue to be consumed by urban development, landscape interpretative and descriptive studies used to classify these landscapes need to be elevated, as these studies provide for a distinct and accessible method for exploring, disseminating and speculating on the values embedded within the peri-urban landscape. If landscape is framed as actively made by culture, then the transformation of the peri-urban landscape represents the cultural perspectives at a point in time. Thus, the peri-urban territory of each city must also be unique, expressing cultural values related to urbanisation and environmentalism within a specific place and locale.

A major challenge in landscape research is to understand the applied and generative forms of landscapes with methods that include the appreciation of aesthetic, ethical and intrinsic natural values in the decision-making process.⁵³ Accordingly, using aerial photography to capture landscape change that has been brought about by urban development provides an opportunity to reveal the cultural values associated with this making. Importantly then, knowing the peri-urban territory creates knowledge that identifies the values of a culture and the resultant landscape changes, but also mediates it. This enables the reimagining of relationships between people and nature in order to embrace the complexity and response needed for new culture–nature relations within the epoch of the Anthropocene.⁵⁴

50. Cosgrove and Center for American Places, *Apollo's Eye*, 8.

51. Dramstad et al., “Relationships Between Visual Landscape Preferences,” 473.

52. Troll, “Landschaftsökologie,” 1–21, quoted in Schreiber, “History of Landscape Ecology in Europe,” 21–33.

53. Naveh, “What is Holistic Landscape Ecology?,” 21–23.

54. Crutzen and Stoermer, “The Anthropocene,” 17–18. The term “Anthropocene” was first introduced by the authors in 2000. They used the term to describe the idea of a new geological era following the Holocene, which is shaped by the deep interventions into nature by humans as biological and geological agents. In August 2016, the International Geological Congress declared that the human impact upon the earth is now defined by geological change and therefore a new epoch. See, Anthropocene Working Group, accessed October 2016 <http://quaternary.stratigraphy.org/working-groups/anthropocene/>.

The challenges lying ahead for cities and their peri-urban territories as a result of Anthropocentric change, represent the largest opportunity for the founding of new relationships between people and the environment. Namely, the creative interaction of a “new lived experience” and thus the development of new meanings for individuals and for collective society.⁵⁵ In order to understand how we might reframe and build socio-ecological connections for the age of the Anthropocene we need to understand the territory’s structure. Subsequently, the third layer of thickness of peri-urban discovery involves unfolding the past relationships between humans and ecologies within the territory.

4.4 Method and approach

Aerial photography has proven to be a fundamental tool for the representation and communication of dynamic ecological and cultural landscape change over time. While the aerial image is alluring and reductive, as an analytical tool it requires very little technical training. In order to interpret the image prior knowledge is not needed, as compared, for instance, to metropolitan planning documents or the way ecologists use statistics to further understand landscape transformation. As such, the aerial image allows for large and diverse areas of landscape to be analysed and understood. The documentation and interpretation of the peri-urban territory of Perth, through aerial photos taken each decade from 1953 to 2016, is critical in understanding the value of the peri-urban. With a growing global consciousness of the impact of urbanisation on natural habitats and the homogenisation of landscape due to standardised suburban neighbourhoods, temporally-based aerial photography becomes one of the central modes through which to obtain the territory’s collective value and a data source that can influence decision making.⁵⁶

Metropolitan Perth extends across an area 150 kilometres long and 25 kilometres wide upon the SCP and foothills of the Darling Plateau. Perth’s overarching statutory planning document, the Metropolitan Region Scheme (MRS), conveys land-use zoning for the metropolitan area across a 1:25,000 metric map series. Devoid of specific information about the peri-urban territory, at this level of observation the peri-urban territory can only be seen as the sum of these fragmented urban, rural and conservation land uses, reinforcing the perceived insignificance of this territory in land-use planning and devaluing the peri-urban as a connected and multifunctional landscape.

Landgate, the Western Australian state agency, records the geospatial data for Perth and has photogrammetry data available as large-scale Metadata for public use. This data is available across

55. Haraway, “Anthropocene, Capitalocene,”. See also, Head and Gibson, “Becoming Differently Modern,” 699–714.

56. Antrop, “From Holistic Landscape Synthesis,” 37.

each decade and aligns closely with the updates to the statutory metropolitan plan. The MRS was first legislated in 1963 and followed on from the early Gordon Stephenson plan of 1955.⁵⁷ Following this, the *Corridor Plan* (1970), *Metroplan* (1990) and *Directions 2031 and Beyond* (2010) have been statutory iterations of the original MRS planning document for Perth.⁵⁸ Using aerial photography to map a selected site at a time period as close as possible to the release of each plan and in every decade in-between, enables a succinct and comprehensive compendium of landscape characteristics and embedded values.

4.5 Selecting the study sites within the peri-urban territory

The first and important task in all landscape studies is the definition of the scale at which the study will be done, a task that is mostly achieved indirectly by the definition of the study area, the scope of the study, the density of surveying and sampling and the resolution of mapping. To ensure that landscape characteristics remain legible, aerial analysis needs to occur at a consistent scale of observation. The scale needs to be both broad, but refined enough to capture human-induced change, daily patterns of land use and human visual limitations, as well as conservation and ecological connections. Scalar changes across the metropolitan region vary from that of the region down to the site, moving through landscape and local scale on the way. As Iverson Nassauer concludes:

Landscape pattern is what people notice and change as they remake the environment to suit their needs; it defines a scale at which people intentionally intervene to change landscapes, a scale of vernacular design.⁵⁹

For this study, the landscape scale of a few kilometres, relative to the scale humans perceive their environment, offers the best opportunity to predict the structural and functional characteristics of the territory; in terms of decision making, the landscape scale implies dealing with uncertainty.⁶⁰ Subsequently, seventy sites represented by a 2 kilometre x 2 kilometre square quadrats have been used, determined by aerial photos at a scale of 1:10,000.⁶¹ This scale provides adequate landscape information for the structure, function and transformation of each landscape type to be analysed.⁶²

57. Aerial survey data is only available from the 1950s, therefore information pertaining to the landscape character prior to this period is absent. This enforces this time period as the baseline for comparison; however, it is important to acknowledge that other processes have acted across the landscape previous to this.

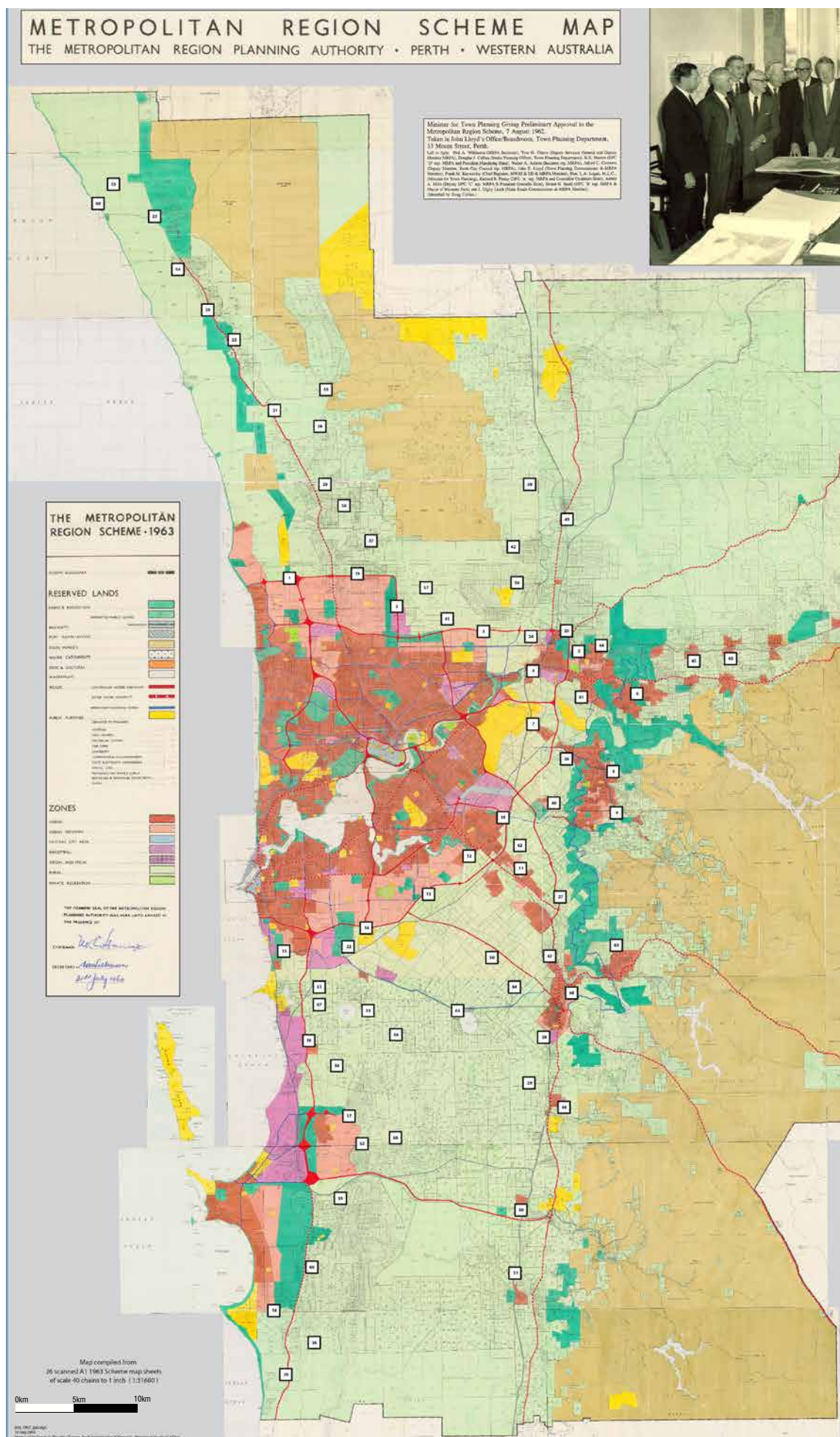
58. The metropolitan planning document *Network City* was never enshrined in legislation and throughout the analysis period of this research the Western Australian Planning Commission plan *Perth and Peel@3.5million* was still in draft status.

59. Iverson Nassauer, "Landscape as Medium and Method," 85.

60. See Forman and Godron's description of scales in *Landscape Ecology*. Also, Antrop, "Sustainable Landscapes," 187–97; Palang and Fry, "Landscape Interfaces," 1–13; Palang et al., "Revisiting Futures," 1820–21.

61. Dramstad et al., "Relationships Between Visual Landscape Preferences," 466. Dramstad et al. undertook a similar process to analysis areas of Norwegian countryside, using 1km x 1km squares of orthophotos at a scale of 1:12,500.

62. Buxton et al., *Change and Continuity*, 68. This follows the use of vignettes as a method within other peri-urban areas of Australia.



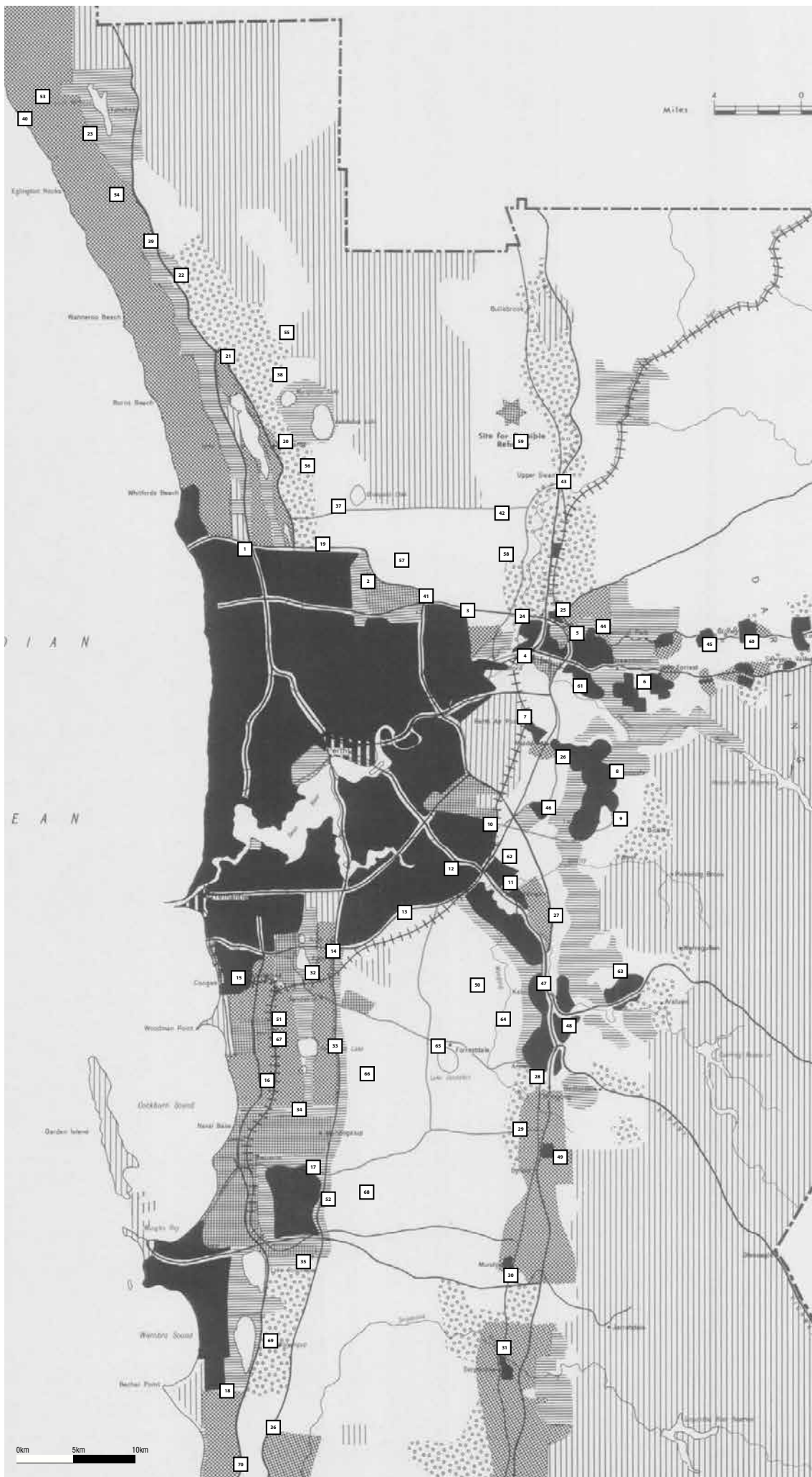


Figure 4.6 Location of the quadrats in accordance with the *Corridor Plan*
(After Western Australia Metropolitan Region Planning Authority. 1970.)

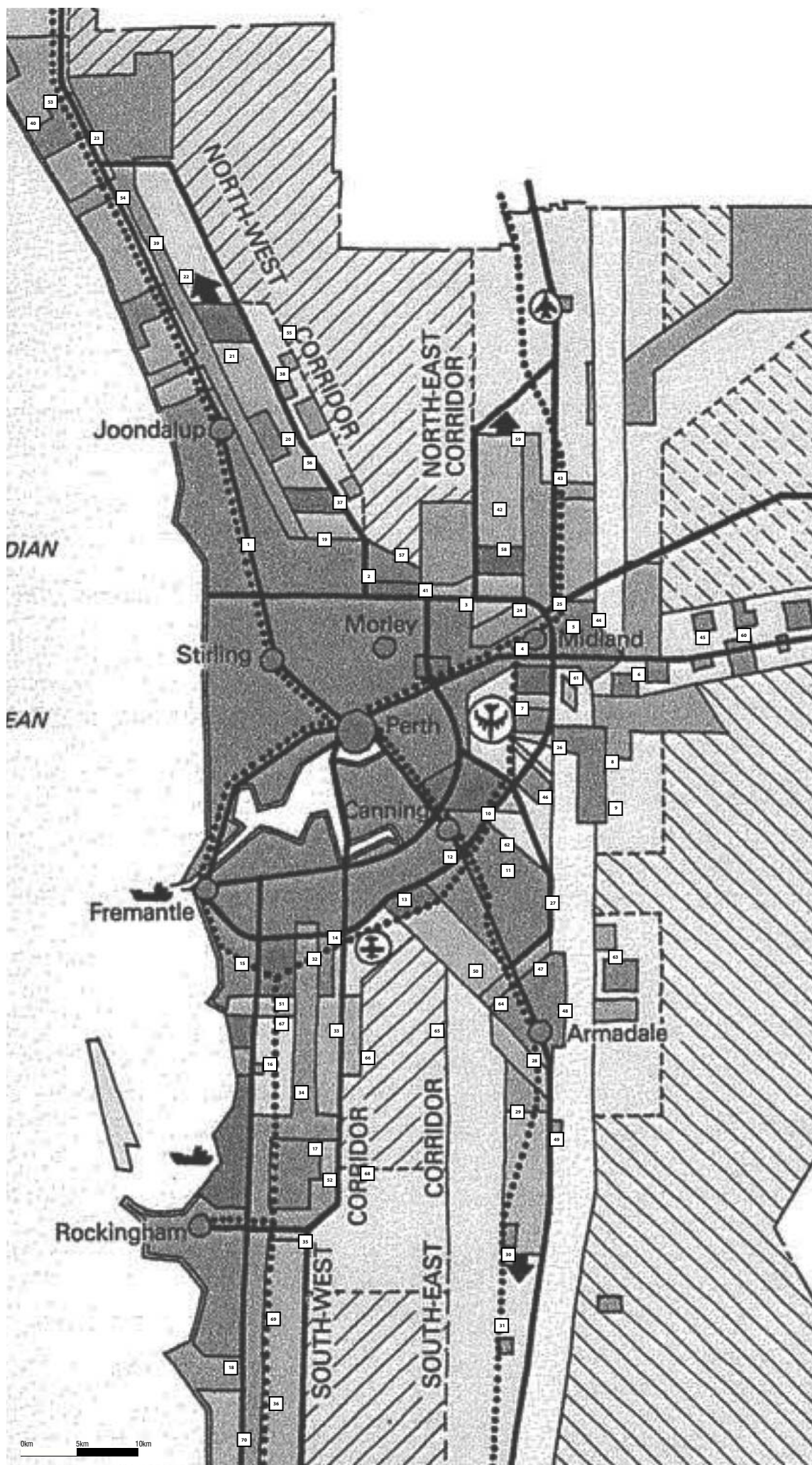


Figure 4.7 Location of the quadrats in accordance with the *Metroplan*
 (After Western Australian Department of Planning and Development. 1990.)

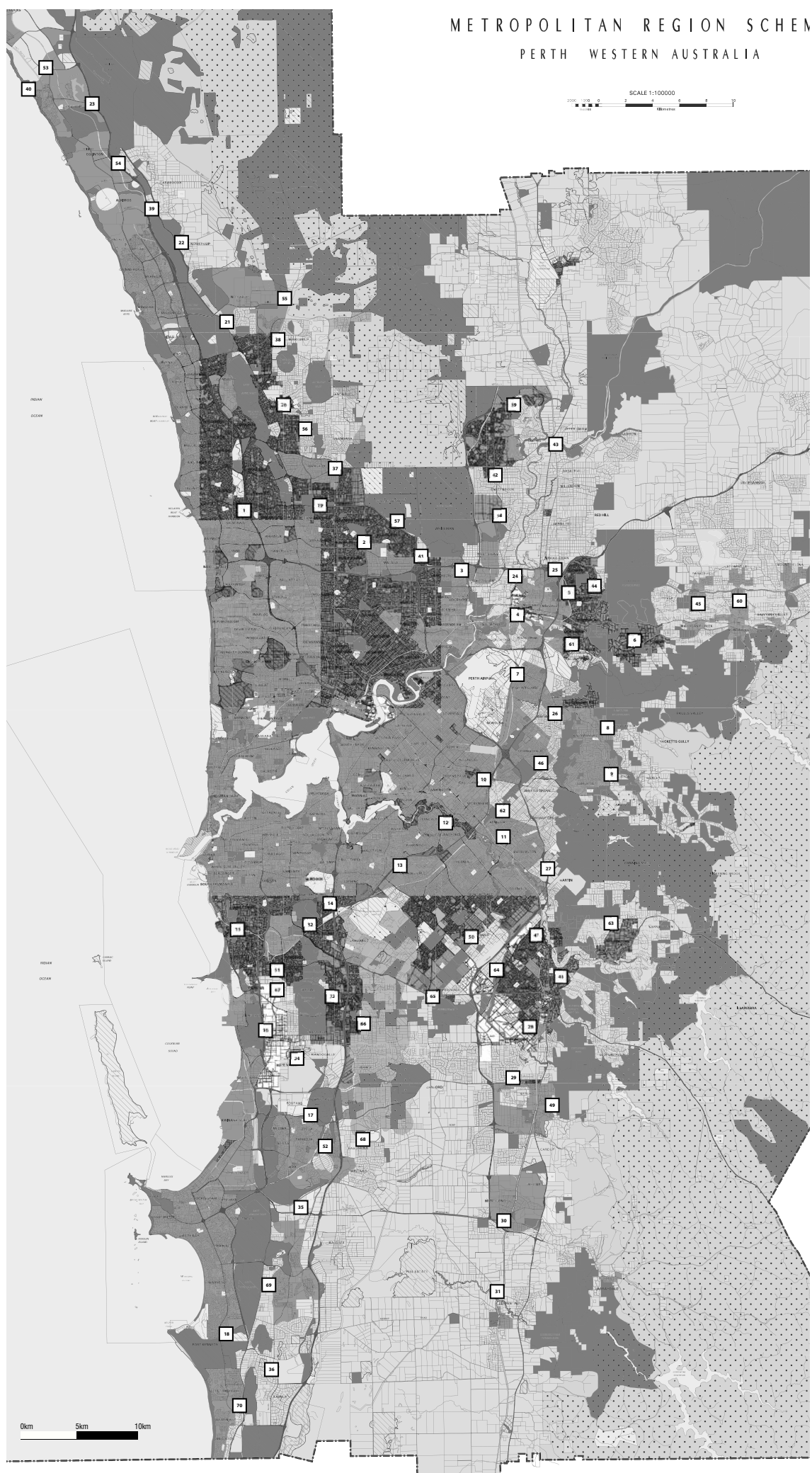


Figure 4.8 Location of the quadrats in accordance with the *Metropolitan Region Scheme*
(After Western Australian Planning Commission. 2010a.)

For each quadrat, the interpretative qualitative study produces an indicator of the peri-urban territory's "DNA" at a specific locale in time and space.

In keeping with the method outlined by Buxton et al.,⁶³ each site was selected due to its adjacency to urban and rural land uses (see figures 4.5 to 4.8), as determined by the appropriate metropolitan plan, as well as their different but characteristic peri-urban settings.⁶⁴ To begin with, in the 1963 plan (figure 4.5), these sites were selected to be no more than 10 kilometres from each other, to ensure that a diversity of landscape character and land-use types were represented across the whole metropolitan region. For each subsequent metropolitan plan, new sites were selected, using the same approach. As the metropolitan area expanded, the diversity of urban–edge interfaces increased. As such, the selection of sites became more subjective in order to ensure the base data for analysis was representative of the whole peri-urban condition (as derived from the literature in chapter one). In total, this resulted in seventy sites being selected, with the aerial imagery for each quadrat aggregating the previous components of the peri-urban into landscape types that demonstrate the structure, function and transformation of the territory of Perth.⁶⁵

4.6 Classifying the peri-urban territory: a study of types

The study of visual types to explain the relationship between a city and its peri-urban territory has been used progressively within the design disciplines. Crewe and Forsyth proposed a typological approach to landscape architecture, in order to synthesise the analyses of landscape as a cultivated expression of plural and ecological design.⁶⁶ Of particular interest is the use of typological study to describe the transformation of the peripheral territory of the city caused by centrifugal urbanisation and competing territorial occupancies.⁶⁷ In this way, the study of types becomes an integrative method as it provides legibility to the landscape through a synthesis of associated visual nomenclature and the connection of this visual nomenclature to cultural values related to its use and transformation.⁶⁸

However, one of the difficulties and limitations of this classification method is the dynamic, and thus elusive, nature of the peri-urban territory and the required subjectivity of the researcher to make

63. Buxton et al., *Change and Continuity*, 68.

64. Where an urban and rural adjacency was unavailable, the selection of a site located at the urban extent of the plan that contained either in adjacency with another land-use type was chosen. For example, urban and industrial or rural and conversation.

65. These sites have been comprehensively analysed and are available for viewing in Appendix A. Their geo-location is also found here.

66. Crewe and Forsyth, "LandSCAPES: A Typology of Approaches," 37–53.

67. For example, Blake, *God's Own Junkyard*; Venturi, Scott Brown and Izenour, *Learning from Las Vegas*; Berger, *Drosscape*; Lerup, *One Million Acres*; Banham, *Los Angeles*; Hayden, *Fieldguide to Sprawl*.

68. Several studies have employed this method to understand landscape character. See, Palang, Semm, and Verstraete, "Time Boundaries."

sense of these regions. For instance, Peter Blake broadly described the collective condition of the peripheral metropolitan landscapes of the US by assigning several types—“Roadscape”, “Carscape” and “Skyscape”. Blake sought to reveal what he described as the “interminable wasteland” of the suburban landscape of the US but in doing so, elevated their value by categorising their “collective beauty”.⁶⁹ Similarly, Rayner Banham adduced four “ecologies” in Los Angeles—Surfurbia, the Foothills, the Plains of Id and Autopia—which provide a relevant comparison to Perth’s biophysical and cultural condition.⁷⁰ In contrast, social geographer Dolores Hayden developed a typological method for analysing the landscapes of “sprawl”.⁷¹ Using aerial imagery, Hayden convened an urban visual dictionary that “spells out” the realities of a rapidly expanding urbanised landscape. The nomenclature Hayden assigns to describe these types—for example “noise wall”,⁷² “putting a parcel around a pig”⁷³ and “water feature”⁷⁴—showcases her disdain for, and the collective cultural values expressed towards, these typologies. In a similar way, albeit less subjectively, Lars Larup outlined an urban alphabet for Houston, Texas, describing the emerging “middle landscape” of sprawl and the “opportunity, complexity, contradictions” and, not least, “daunting challenges” that this landscape provides.⁷⁵

While Blake, Banham, Larup and Hayden focus on the collective types made evident in the periphery of US cities, Alan Berger identifies the “empty, abandoned, space” of the urban periphery through a critique of waste within US cities. Berger, in describing the leftover landscape as “terrain vague”,⁷⁶ develops the lineage of aerial analysis and typological classification of urban peripheries and the subsequent method of typology and morphological study.⁷⁷ As such, a range of landscape sites in the city such as the waste landscapes of landfills, former industrial manufacturing sites, infrastructure corridors, vacant urban land and mined and toxic landscapes are synthesised to describe their relationship to one another; sites. Berger suggests that these land-use types are markers for the changing values of US society at large, and the notion of “terrain vague” is explicit in revealing US

69. Blake, *God’s Own Junkyard*, 24.

70. Banham, *Los Angeles*.

71. Hayden, *Fieldguide to Sprawl*.

72. Hayden, *Fieldguide to Sprawl*, 72. Noise Wall: when highways penetrate neighbourhoods, cars, trucks and buses generate exhaust fumes and noise at night and day.

73. Hayden, *Fieldguide to Sprawl*, 86. “Putting parsley round the pig” means landscaping a bad spot or a bad project. Initially used by Martha Schwartz in a lecture to describe efforts to soften unfriendly landscape, roads or buildings.

74. Hayden, *Fieldguide to Sprawl*, 116. “Water feature” is any artificially constructed display of water—either active, such as a fountain or a waterfall, or passive such as a pool or canal. Water features are part of sprawl because developers frequently disregard the limits of the natural environment.

75. Larup, *One Million Acres*, 58.

76. Berger, *Drosscape*, 35. Berger uses Ignasi de Sola-Morales’ theory of terrain vague is a working theory for designing with urban land that appears to be empty. Abandoned space has a much clearer translation in the landscape discourse through the confluence of environmental issues and rapid horizontal urbanisation.

77. The term “dross” was adopted by Berger from Larup, *One Million Acres*, to describe the peripheral wastelands of US cities.

society's attitudes towards waste.⁷⁸ Furthermore, he argues that this accumulation of waste types is representative of the loss of place at the city's periphery.

If typological studies differentiate landscape structure and subsequently cultural values (however subjective), the consequence of this is that seeking to classify this landscape, in order to explore its constituent parts, also removes it, albeit temporarily, from the dynamic state of flux that is essential to its formation and reformation.⁷⁹ Despite the tension evident in this methodology, the effectiveness of a classification using aerial imagery has been persistently and successfully used within the design disciplines. This is because the aerial image creates a highly accessible and broadly interpretive visual tool that can reveal the peri-urban landscape's constituent parts. In the context of this study, the identification of types—each decade in correspondence with Perth's statutory metropolitan planning—grounds this typological study further in its local context.

Furthermore, the preceding studies of peri-urban territories have been conducted across the US. In fact, there have been very few visually descriptive studies of the periphery of Australian metropolitan regions and none of these have been extensive in incorporating the design disciplines. The largest study of Australian peri-urban landscapes occurred for the regions of South East Queensland and Greater Melbourne by a team of planning, geography and sociology researchers at Griffith University in Queensland and RMIT in Victoria.⁸⁰ Here, too, typological classification was used to provide an alternative methodological framework in which the landscapes of these regions can then be critiqued.⁸¹ Through classification, this study defined various degrees of spatial, physical and structural form and functional land-use typologies.⁸² As a result, this research has been successful in complementing existing strategic metropolitan and regional plans for these areas and it has provided more distinct information regarding the value and collective potential of each peri-urban territory.

As seen, several studies demonstrate the building of new knowledge of metropolitan regions through deducing their imageability through the categorisation of visual types and the assigning of types. In the first instance these studies demonstrate the act of the researcher attempting to understand the peri-urban landscape of a metropolitan region before disseminating it to a larger audience. The studies employed are semiotic, where the language of the landscape, examined through a dictionary of visual images, and the supporting descriptive text, interprets the large-scale areas of the periphery. Furthermore, identifying types extends the method of typological study beyond symbolisation to a

78. Berger, *Drosscape*, 36.

79. Turner, *The Ritual Process*, cited in Berger, *Drosscape*, 29.

80. Low Choy et al., *Change and Continuity*.

81. Low Choy et al., *Change and Continuity*, 21.

82. Low Choy et al., *Change and Continuity*, 25.

more engaged relationship between landscape, people and place by interweaving the idea that the city is a dynamic ecosystem and that the structural integrity of this ecosystem lies in the sum of its components rather than in its individual parts. The overwhelming use of aerial imagery and ground truthing of types on site provide a “way in” to understand and interpret what might otherwise appear, to those without prior knowledge of this landscape type, to be disparate components of the city.⁸³ More specifically, these studies demonstrate a method of approach to categorising that embraces the physical, cultural and social dimensions of the city at the centre of identifying the peri-urban territory.

Typological study not only reveals peri-urban territory types as markers on the landscape that represent the changing values of society, but, through the development of critical visual studies, categorises and names each landscape type so that new meanings may be attributed. It is in this approach, where the potential exists to shift from what is traditionally a suburban or urban city-centric discourse of the city to one that is generated out of and from the peri-urban landscape. Typological analysis also suggests how the cultural associations pertaining to peri-urban territories can be strengthened. Although (at times) this requires the sampling to be grounded in the subjectivity of the researcher, similarly with how the research is categorised and organised, it is a tested method that inverts the traditional “city-centric” land-use planning approach and is critical in order to reposition the peri-urban as a territory for the city. This is an important repositioning for the peri-urban at a time when the impacts of a rapidly growing population, drying climate, over extraction of potable water sources, diminishing biodiversity, food security threats and the transition to renewable energy sources are becoming key components of the “cityscape” of the twenty-first century. Given such impacts, these once passive perimeters of metropolitan areas should become active landscapes that are fully utilised for a broader suite of metropolitan uses in order to increase the performance capability of the city and to establish how its periphery may be optimised this century.

4.7 Reflection

This chapter commenced the third stage of inquiry into the peri-urban territory of Perth. The chapter introduced the method of observation and interpretation to be employed and explained how the individual sites of the territory were selected. The importance of understanding landscape structure and function, in order to understand the territory’s imageability, was demonstrated, both theoretically and conceptually, and was enacted for each of the quadrats over the sixty-year period. Appendix A

83. Hayden, *Power of Place*, 66. For instance, the founders of a British environmental organisation called “Common Ground” (1983) felt landscape history should be a more prominent part of environmental efforts and developed an alphabet of local distinctiveness, for example “Tottergrass, twitched, tor, tarn, titherbarn”, to describe their landscape and encourage a swath of poetic possibilities.

forms a comprehensive in-depth analysis of each quadrat and explains how the structure, function and morphology changes across this period. The chapter now reflects and summarises how peri-urban thickness and potential are achieved, beginning by summarising the contribution of landscape structure to landscape design, then by proposing the peri-urban territory's potential.

Peri-urban thickness

The introduction discussed how analytical processes that engage with the socio-ecological and temporal components of the landscape contribute to its imageability. Furthermore, I outlined how imageability is constructed through an aggregation of the interrelations within the landscape. The method of analysis proposed in this chapter and illustrated in the seventy quadrats that form Appendix A provide a rich, in-depth and comparative visual dialogue of landscape change within the peri-urban territory of Perth. The subsequent analysis of the structure, function and morphology of each quadrat, across each decade from 1953 to 2016, differentiates these elements in the landscape. Furthermore, the interrelationships between several of the structural elements over time. The method is intentionally explorative and brings together the subject's knowledge of the territory as more information about the territory is revealed as the number of quadrats are analysed. Moreover, the method permits us to understand the past history of the territory and expands our understanding from chapters two and three. In this way, the quadrats form evidence of the signifiers of cultural change and in doing so, recover a more sensitive meaning of the individual sites and as a collective.⁸⁴ The discovery of the peri-urban, and the subsequent knowledge derived from this discovery, communicate the essential information for design professions to act with agency that is logical and legible in accordance with the structural formation of the territory, as well as communicating how the ecological systems (through their erasure or emergence) provide potential for further coordination and design of the temporal relationship of components within the territory.⁸⁵

Peri-urban potential

The introductory chapter introduced the concept of potential and framed it as the expanded capacity for change. Of the four components outlined, two have been addressed here. Firstly, potential through relational thought and practice of the everyday and secondly, potential through representation.

The analysis of the seventy quadrats distinguishes the landscape structural elements of the peri-urban territory at approximately ten-year intervals. As deduced in the individual analysis of each quadrat

84. Girot, *Course of Landscape Architecture*, 335.

85. Grose, *Constructed Ecologies*.

series, human activity across the landscape has had the largest effect of change and modification of the territory. The analysis highlights the practices of human activity that have changed and modified the landscape and the resultant landscape structure. Furthermore, the analysis also identifies those structures of the landscape that are somewhat regenerative, that is, those that appear again after their initial removal.

Structure is about legibility and the peri-urban phenomena arises from understanding the accumulation of changing structure and function across the landscape. In total, there are approximately 490 different aerial images (2 kilometre x 2 kilometre square quadrats) that distinguish the peri-urban territory of Perth.⁸⁶ An important component of translating the structure and function of landscapes is being able to synthesise aerial photography with a direct survey of the sites on the ground. Cosgrove argues that this method removes the co-dependency that the aerial image has with the map and instead coordinates the identification of landscape types within real space,⁸⁷ while Carter argues that ground truthing is about knowing. This is one aspect of the study and representation where there are limitations; the sample size of the quadrats is too large for ground analysis or “ground truthing” (beyond what the subject already knows about the sites). As such, despite the aerial images being strengthened by ground truthing, the aerial images do offer the knowledge across long periods of time that could support future onsite research and design.

However, the aerial images do provide a representation of a chorological⁸⁸ approach to landscape change and the cultural engagement with this change across time. In this way, the analysis reveals the underlying condition of how policy settings and values are transposed onto the territory. The collection of aerial images becomes an exemplar for revealing landscape value within the territory and the social, cultural and historical implications of these values are further integrated in chapter six. The potential lies in the synoptic overview of the territory and the opportunity for the aerial image analysis to form one component of the information that when triangulated with other sources helps determine and synthesise the territory as a whole.⁸⁹

86. There is an approximation here because some of the image datasets are not available at certain time periods, particularly for the quadrats located at the furthest extent from the CBD; some of these sites were not captured in the earlier aerial imagery datasets because they were not perceived to have a relationship to the city.

87. Cosgrove and Center for American Places, *Apollo's Eye*.

88. Sauer, *The Morphology of Landscape*. Chorology is the study of landscapes and the interrelationships and associations between phenomena of landscapes.

89. Naveh and Lieberman, *Landscape Ecology*, 121. See also, Stephenson and Hepburn, *Plan for the Metropolitan Region*, 80. The land use survey (Plate 8) was derived in this way, through studying aerial photographs and conducting ground surveys to ascertain the information.

4.8 Conclusion

This chapter introduced the method of observation and classification that forms the inquiry into the peri-urban condition. These methods are used to understand the structure, function and transformation of the landscape features at each decade from the 1953 through to 2016. Conceiving the structural features as evidence of the peri-urban territory's biography and morphology enables the relationships between landscape elements, biota and culture to become prominent. As we have seen, framing the peri-urban territory as a diverse mosaic of heterogeneous values and as a medium created by and for culture provides the opportunity to acquire knowledge relating to the changing values of this landscape. Adopting the method of aerial analysis to interpret the structure (type), function (morphology) and transformation (space across time) of the peri-urban landscape of Perth ensures:

1. Sufficient data can be extrapolated from a large site.
2. A closer understanding of Perth's peri-urban territory's spatial pattern across time and how this links to ecological flows and processes and their associated social and cultural dimensions.
3. The adoption of a method that can be applied at various scales and therefore makes patterns and processes comparable with other regions.
4. The creation of new knowledge, where the classification and subsequent synthesis of the information provides for a greater understanding of peri-urban phenomena.⁹⁰

Chapter five, explains the landscape types derived from the analysis. In this regard, the seventy quadrats evaluated through the conceptual framework of edges, paths, threshold and foci outlined previously reveal a range of peri-urban types and how these types work to create meaning through the socio-ecological relationship that emerges and develops when landscapes change. I therefore argue that the pervading peri-urban types also describe the intentional discovery and making of place.

90. Antrop, *Sustainable Landscapes*, 39. Antrop explains that the concept of sustainability (in relation to landscapes) can be approached in two different ways. First, it refers to the preservation of traditional techniques in rural or pastoral landscapes and of the land qualities and natural resources needed to sustain this over time. Second, it refers to a guiding principle for future landscaping.

05 Discovering peri-urban types

5.0 Introduction

Chapter four outlined the method of analysis for the peri-urban of Perth. Descriptive and classification research methods were proposed to analyse the underlying structural and functional condition of the peri-urban territory across each decade from the 1953 to 2016. Structural elements reveal landscape types, while functional elements reveal their morphology in relation to each other. Both can enhance and detract from connections to the landscape. Furthermore, associations between structural elements and corresponding functions are indicators of the value of land uses.

Seventy, 2 kilometre x 2 kilometre square quadrats were selected for examination across the peri-urban territory (see Appendix A). For each quadrat, historic aerial imagery from the Western Australian Land Information Authority¹ was captured in ArcMap GIS at a scale of 1:10,000. Frequent sampling of imagery from each quadrat diminished the chance of anomalies occurring in the data and ensured that each quadrat had several aerial image sets that could be used to interpret its structure and function and subsequent landscape change.

Following the collection of the imagery in ArcMap, the landscape structure for each quadrat was determined by desktop analysis using a conceptual framework derived from the principles of landscape architecture. These principles provide indicators for human induced change and occupation across the landscape. Further consideration was given to the methods employed by the ecological sciences to determine measurable functional and structural conditions at the landscape scale.² Analysis of each quadrat determined the patterns and processes within the landscape and collectively developed a thickened understanding of the territory and how it informs our perception of it.³

This chapter will use an interpretative analysis of the peri-urban quadrats to further understand the structural components that constituent the peri-urban of Perth. The chapter addresses two secondary research questions of the thesis:

1. Operating under the business trading name Landgate and used hereafter.

2. Although there is further application of ecological science methodology, including statistical quantification and qualification of the data set, the parameters around this analysis would require advanced knowledge of GIS mapping systems and statistics, both skills beyond that of the researcher. This more advanced analysis would require transdisciplinary research with ecological scientists and therefore sits outside the scope of research. However, this approach does warrant and is subsequently discussed in the conclusion.

3. Bell, *Pattern, Perception, and Process*, 103.

- How do the structural components and indicators of the peri-urban of Perth influence how the territory is experienced and understood?
- What are the pervading peri-urban types evident within the peri-urban of Perth?

As discussed in chapter four, peri-urban phenomena is derived from mapping the accumulation of changing structure and function across the landscape. This is because landscape structure and function change is a process of cultural change. In accordance with the literature supporting the fundamental principles of landscape design⁴ (outlined in chapter four) and the correlation of these principles with experiential qualities,⁵ the four structural elements of edges, paths, thresholds and foci are used to determine the structural and functional formation of the peri-urban territory and are classified to reveal a range of peri-urban types. Each of these four elements is discussed theoretically and conceptually at the beginning of each of the following subsections.

5.1 Edges

Conceptualising edges

Edges can be described as forms that interlock or as spaces and transitions between spaces that are enclosed or differentiated.⁶ Edges are conceptually or physically integrative areas and provide opportunities for complex and rich connections between the form of the built environment and the spaces of the broader landscape.⁷ Physical breaks within an edge may contribute to their permeability or to their ability to spatially integrate. Edges also appear conceptually as boundaries of governance in the form of political and administrative boundaries; for example, LGAs.

Edges can manifest as a physical thickness of material—for example, built or vegetative—and can have a thickness that is both horizontal and vertical. From an ecological science perspective, the outer thickness of contained vegetative areas (patches) presents as an edge and undertakes various forms that are curvilinear or straight, each providing valuable indicators of potential energy flows across the edge.⁸ These flows are known as the “edge effect” and occur at the boundary of two or more patch habitats. The ratio between the internal patch and the length of the edge (the perimeter) is a key determining factor of high or low performance of the edge. Performance can be characterised by species numbers, species movement across the edge and wind, soil and nutrient flow. Through

4. Dee, *To Design Landscape*, 24-27; Kaplan, Kaplan and Ryan, *With People in Mind*, 9-16; Lynch, *Image of the City*; Bell, *Pattern, Perception, and Process*.

5. Dee, *Form and Fabric*; Kaplan and Kaplan, *With People in Mind*; Antrop, “Concept of Traditional Landscapes,” 105–17.

6. Dee, *Form and Fabric*, 115.

7. See Appendix A, Quadrats 1, 15, 30, 46, 51 and 54.

8. Dramstad, Olson, and Forman, *Landscape Ecology Principles*, 27.

ecological sciences literature, we know that elongated and thin patches are the worst shape for performance as they exhibit a large area to perimeter ratio.⁹

It is possible to conceive the spatial form of Perth as one large-scale, elongated patch-to-edge ratio, exacerbated by the linear vehicular corridor planning and low-density suburban development that has dominated the region since the 1970s. As discussed in chapter three, the city's continuity is a result of well-planned, persistent development of suburban areas adjacent to existing service provisions. This expansion could be further interpreted in a cultural sense through Australia's pioneering myth as it relates to the popular culture of progression and improvement since World War Two and the inalienable right to own a house in the suburbs. As Boyd predicted, development and progress are measured by the "number of acres transformed from the native state of sloppiness to the desirable state of clipped artificiality".¹⁰ The continuous suburban edge reflects the desire of home ownership in Australia, the delivery of this to be affordable, the establishment of transport networks largely to service private car ownership and the important contribution home building provides to the national economy.¹¹ Consequently, the landscape is cleared for action for something new. The continuous creation of new suburban edges echoes the eradication of the physicality of public landscape and the enclosure of a private re-made place for dwelling.

Interruptions to the suburban edge can be described as thresholds that contain cultural and social associations directly related to the growing suburban occupation of the periphery. For example, the cultural crucibles of big box retail edges and their car parking apron, prisons, airfields and extraction and waste sites are so evidently distinguishable in peripheral metropolitan landscapes. Here in the peri-urban territory of Perth, these crucibles provide for distinct interruptions and transitions to the continuity usually found along the suburban residential interface.

At a larger scale, Activity Centres, which constitute strategically located employment, retail and commercial centres within the metropolitan area,¹² are another form of cultural crucible node. Often enveloping in form, these entities present as a large-scale internalised retail mall and are important nodes within the region for employment.¹³ In the same respect, the strategic location of Industrial Centres located alongside major vehicular paths that circumnavigate the edges of the urban area, connect these nodes with the Kwinana Freight Terminal or the industrial ports of Fremantle and Kwinana in the south. These crucibles have both centripetal and centrifugal forces, attracting

9. Saunders, Hobbs, and Margules, "Biological Consequences of Ecosystem Fragmentation," 18–32.

10. Boyd, *Australian Ugliness*, 94.

11. Weller and Bolleter, *Made in Australia*.

12. Western Australian Planning Commission, *Network City*.

13. Western Australian Planning Commission, *Network City*, 6.

employment in the making and distribution of goods, as well as repelling the encroachment of urban development and other incompatible land uses that form a threat to their location.¹⁴

The push and pull of forces at play throughout the peri-urban territory is further influenced by the landscape structure. Edges have the potential to choreograph the transition and sequences from built to landscape areas.¹⁵ Further, edges can be specifically designed to provide the structure needed to move between and beyond the periphery.¹⁶ Edges are critical in creating a holistic perception and experience of the landscape as they link scales beyond and below. This is because edges, through various degrees of enclosure and openness, determine the threshold experience at individual locales as well as how these experiences unfold along a vector path network.

Edges form a vital component of facilitating movement within and beyond spaces. However, they also encourage people to dwell, facilitating an essential component of prospect and refuge theory.¹⁷ Arguably, the suburban home “at the edge” is the single most exemplary manifestation of seeking refuge. Thus, edges are needed to facilitate differentiation of intensities and these intensities facilitate sequence and movement. Therefore edges can be structured bottom-up and top-down, from the human scale to the regional scale. For the re-making of place to occur, it is the edges that construct sequences and these sequences through and within a landscape allows us to reimagine, time and time again.¹⁸ The sequence through the landscape provides an interconnection between people and their surroundings, and it is this process that is critical for cumulative memory.¹⁹ Edges are needed to frame our identity, both literally and figuratively, so as to influence our experiences and actions within the environment.

Finally, edge diversity is critical to the function of natural systems, as diversity assists the function of flow across an edge interface. Diversity of edges creates various ecotones. Ecotones are an area of transition between two different ecosystems and they occur across a gradient. A suburban built edge and rural field is an ecotone as is a rural field and plantation forest. These edge margins are also socio-cultural ecotones, displaying diverse characteristics between the socio-economic structure of suburban and rural households and their inhabitants.

Chapter one explored the implications of policy settings in the formation of the peri-urban landscape of Perth. Consistently, from the first Metropolitan Region Scheme (1963) through to *Directions 2031*

14. Western Australian Planning Commission, *Network City*, 14.

15. Marot, “Reclaiming of Sites,” 52.

16. Lynch, *Image of the City*.

17. Appleton, *Experience of Landscape*.

18. Corner, “Representation and Landscape,” 249.

19. Girot, “Four Trace Concepts”; Marot, “Reclaiming of Sites”; Thomassen, *Liminality and the Modern*.

and Beyond (2010), the edge condition of the metropolitan area is defined at the meta-level through three distinguishable landscape features: the coast, the Swan and Canning rivers and their tributaries and the Darling Scarp. The orientation of the city of Perth towards the coast, river and scarp has been positioned through the literature as supporting a distinct sense of place and offering heightened liveability for residents of the metropolitan region.²⁰ In a climate where hot, dry summers are felt for five to six months of the year, the coast provides a climatic advantage with the relief from the heat due to mitigating effect of the ocean, as well as access to the prevalent sea breeze that diminishes inland.²¹ The urbanised coastal edge and the interface with the Indian Ocean is one limit of the urban edge that is very clearly defined.

However, the consequence of these policy settings has been the continued elongation of the metropolitan region north and south of the CBD to form a near 150km development front. The *Corridor Plan* of the 1970s instigated the concentration of growth of the metropolitan region along the northern and southern circulation paths of the now Mitchell and Kwinana Freeways. More recently, the regional centres of Geraldton (400 kilometres north of Perth) and Bunbury (174 kilometres south of Perth) have become anchors beyond the metropolitan region and promote, indirectly, a continued elongation of an urbanised coastal edge.²² Both centres are earmarked as catalysts for regional growth and are possible extensions of the metropolitan region if high-speed transport paths are able to facilitate the commuting distance.²³ To the south of Perth, a continued elongation of the region is further supported by the high amounts of land zoned for urban development in the Greater Bunbury Region compared to the neighbouring Perth and Peel regions, which form the southern extent of the peri-urban territory.²⁴

Every metropolitan strategic planning policy since the first in 1963 has reinforced this pattern of growth. The linearity of the city at the metropolitan scale is emphasised by the western edge of suburban development along the coast and the eastern edge of suburban development nestled into the foothills of the scarp. In early policy settings, the elongated form of concentrated urbanisation along the coast was initially justified by green wedges in-between each corridor that enhanced the urban areas and provided relief and access to the “open country”.²⁵ As outlined in chapter one, these forms, derived from the theories of modern urban and regional planning, encouraged green wedges

20. Stephenson and Gordon, *Plan for the Metropolitan Region*; Metropolitan Region Planning Authority, *Corridor Plan*; Western Australian Department of Planning and Development, *Metroplan*; Western Australian Planning Commission, *Network City; Directions 2031 and Beyond*.

21. Stephenson and Gordon, *Plan for the Metropolitan Region*, 75.

22. Western Australian Department of Planning and Development, *Metroplan*, 5.

23. This is speculative. See Weller and Bolleter, *Made in Australia*.

24. Department of Planning and Western Australian Planning Commission, *Urban Growth Monitor*, 6.

25. Metropolitan Region Planning Authority, *Corridor Plan*, 20.

(green edges) containing rural, conservation and special uses land-use areas. The composition of the metropolitan region, through the “corridor structure”, supported the densification and growth of urban areas within long linear corridors approximately three to five kilometres wide.²⁶ Therefore, an elongated built urban edge became the distinct form of the metropolitan area, further emphasised by its adjacency to rural and recreational lands or “wedges”. Over time, these built edges have grown wider, encroaching on the open space wedges identified in the 1970s, leaving the primary coastal dune zone as the only remaining area protected from urban development. Whereas the green wedges provided contrast to the built edges of the suburbs and aimed to provide recreation and food sources for the growing city, the inevitable pressures of population increase and subsequent demands for housing has meant this policy setting continues to be eroded.²⁷ As a consequence, urban edges continued to have a diminishing effect on the landscape character of the region because there is less diversity occurring between the corridors.

Furthermore, the health of the river system remains under threat, with a decrease in rainfall and annual flows and an increase in effluents from surrounding urbanisation creating the largest impact.²⁸ Clearing of vegetation edges for agriculture and urbanisation demonstrates significant landscape change through a decline in fringing vegetation.²⁹ However, river systems and their fringing vegetation edges create legible networks through the landscape and enable a sequence of movement through the landscape from the scale of the site through to landscape and regional. Waterways are critical for sustainability and to mitigate and adapt to climate change. A decrease in river health and fringing vegetation edges results in a decrease in the experiential legibility of the landscape and its ability to respond to more rapid changes in local climate.

At the foothills of the Darling Scarp, the rivers give way to alluvial soils; these fertile soils are a rarity along the well-worn ancient Bassendean Sands that dominate the majority of the coastal plain. In the eastern extent of the metropolitan region, the curvilinear form of the rivers becomes interspersed with rural fields and agricultural plots located tangential to the river form, on a predominantly 45 degree angle.³⁰ These long thin plots recall the city’s initial property subdivision and the egalitarian division of river frontage granted in the first survey. As the river paths move towards to Indian Ocean, the rural landholdings diminish and give rise to urbanised built edges.

26. In the *Corridor Plan* of 1970 this was described as two to three miles wide and has been converted here by the author. Metropolitan Region Planning Authority, *Corridor Plan*, 20.

27. Western Australian Department of Planning and Development, *Metroplan*, 37.

28. Western Australian Planning Commission, *Directions 2031 and Beyond*, 31. By 2010, 880 hectares of land were cleared annually for urbanisation.

29. Western Australian Planning Commission, *Network City*. 99. 52% of rivers and 66% of creeks have lost half of their native foreshore vegetation.

30. See Appendix A, Quadrats 4, 7, 12 and 24.

In contrast, the sudden increase in topography from the coastal plain eastwards up into the foothills some 300 metres above sea level and the change in geology from worn coastal sands to granite outcrops of the Darling Scarp forms the third, meta-edge form structuring the urban metropolitan region. In addition, this difference, as well as the establishment of the first National Park and the location of significant water catchment areas for the developing city, meant that the eastern edge of the city plays a vital role in providing recreational opportunities through these elevated areas.³¹ Further, this meta-edge provided by the Darling Scarp provides an opportunity for refuge and retreat and for reflection of the overall prospect of the elongated urban development front that extends north and south across the SCP. The Darling Scarp is the only place from which the context and extent of the metropolitan region can be surveyed.

Collectively, the meta-edge of the Perth metropolitan region, comprising the coast, the SCP and the Darling Scarp, form the major structuring components of the region. A potential fourth meta-edge element emerged in the form of an urban-growth boundary, first discussed in the early 1990s as an opportunity to ensure natural bushland and rural fringe land remain to envelop the city.³² However, after extensive community consultation undertaken during the development of the *Network City* plan in 2004, this idea was abandoned because of a continued concern regarding amenity and biodiversity values within the region.³³

However, a common feature drawn out of these discussions was the scalability of reform required, from the meta-scale of the region to the individual lots, to ensure amenity and biodiversity values were retained. Generally, urban containment was discussed in relation to the role Residential Planning Codes (RPC) would have in affecting housing and lots sizes to support a consolidated urban development model.³⁴ This consolidation was considered in accordance with several scales of buffers that determined how the built interface of the urban edge functions within the neighbourhood scale of development.³⁵ However, the RPC remain inward focusing, with little to no regard for the interface between the external edge of new suburban developments and the surrounding landscape character of rural or recreational zones. This lacuna exists despite the first metropolitan regional plan having conveyed the need for parklands and for connected corridors across the coastal plain.³⁶ In this respect, the structural form of the built edge and landscape interface at the neighbourhood

31. Metropolitan Region Planning Authority, *Corridor Plan*, 6.

32. Western Australian Department of Planning and Development, *Metroplan*, 29.

33. It remains as an appendix in the document. See, Western Australian Planning Commission, *Network City*, 20, 113 and 64.

34. Western Australian Planning Commission, *Network City*, 30.

35. Western Australian Planning Commission, *Liveable Neighbourhoods*, 28.

36. Stephenson and Gordon, *Plan for the Metropolitan Region*, 76.

scale lacks emphasis with the vegetation edge, both internally within POS and externally within larger patches of endemic vegetation.³⁷

Edge types

The following sections identify the landscape structural edge types deduced from the descriptive and classification analysis of the seventy quadrats within the peri-urban territory of Perth. Edges are created through the process of landscape change (see figure 5.1 to 5.4). This change is brought about through either the building up of new edges or the creation of edges through the absence and loss of a thickness of material within any given area.

Edge + Field

Vegetation edges are created by the clearing of endemic vegetation. The clearing produces patches of remnant endemic vegetation and creates new edge conditions through the externalisation of these patches to the adjacent cleared field. These edges are defined by native vegetation complexes and at the landscape scale they represent a composite pattern of endemic remnant ecological patches.

Edge + Path (road)

Edges are created by default when a path is established within the landscape. Paths facilitate linear movement and road paths are most evident in the peri-urban territory. The creation of a road path forms a cleared path through the landscape; in most cases, through existing endemic vegetation. This results in two edge conditions being created on either side of the road. Vehicular paths can also create subsequent topographic edges caused by the displacement of large amounts of soil, as is the case for the major freeways and highways. Often these edges are reinforced with built sound walls, which in turn form physical edge barriers. Over time, edges along paths have remained as vegetation edges or, as a result of further clearing of the vegetation for built works, they have become hard urban edges. These hard urban edges include suburban dwellings and clusters of commercial or retail-built form.

Vector paths are linear paths that have magnitude and direction. For example, they may comprise of vehicular movement into, out of or through the physical built edge (of the city's periphery) in the form of freeways and railway lines. In turn, these paths divide edges and in doing so, create two non-traversable edges on either side of their path. In this case, edges become a consequence of these

new path networks.

Edge + Path (water)

The Swan and Canning River systems and their tributaries form the two major water paths within the Perth metropolitan region. These water paths support the development of vegetation edges along their banks. The vegetation edges follow the curvilinear form of the water path system and are one of the most distinct, mostly continuous natural forms across the peri-urban territory.³⁸

Edge + Recreation

One of the fundamental principles of the Gordon Stephenson Plan that continues to underpin the development of Perth and its edges is the desire for liveability and recreation. People connect to the outdoor lifestyle that the Perth climate provides and the opportunities given by the narrow, urbanised coastal plain connecting its inhabitants to the ocean. In this respect, liveability presents an intensity of land use along the edge of the coast as it reflects this way of life and the necessity to not impinge upon these values.³⁹

In the same respect, with increasing development, recreation space becomes more pressing and is apparent in the neighbouring form of edges along conservation corridors, such as the recreation corridor from Bibra Lake to Thompson Lake in Perth's southwest armature or the edges of the river paths across the SCP.⁴⁰ Therefore, the structure of the recreation edges within the peri-urban territory is linked to liveability and their formation seeks to integrate built suburban edges with natural qualities available across the metropolitan area.

Edge + Agriculture

Initially, the metropolitan plan for the region sought to ensure that the expansion of the city's edges did not impede upon the production of vegetables and fruits within the region. This is despite many of the sandy soils within close proximity to the urban area having been of low productivity, requiring heavy fertilisation and use of water.⁴¹ Areas to the south of Fremantle were reserved for the Spearwood market gardening areas, as were areas in the north at Wanneroo.⁴² In the eastern sector, "orchards,

38. See Appendix A, Quadrats 13, 16, 17, 18, 22 and 52.

39. Stephenson and Gordon, *Plan for the Metropolitan Region*, 87; Western Australian Department of Planning and Development, *Metrolan*, 8.

40. Metropolitan Region Planning Authority, *Corridor Plan*, 50.

41. Stephenson and Gordon, *Plan for the Metropolitan Region*, 3. See also Metropolitan Region Planning Authority, *Corridor Plan*, 11–12.

42. Metropolitan Region Planning Authority, *Corridor Plan*, 202.

small market gardens and similar activities were encouraged to sit alongside consolidated and infilled residential settlements.”⁴³ In this respect, agricultural areas became edge types signifying the extent of urban development and forming a transition edge from the suburban housing to agricultural landholdings.⁴⁴ As such, they are, in the first instance, some of the first indicators of a peri-urban edge type even today where they appear as remnants within the urban fabric, superseded by suburban edges created by the large development up-lift of urban-deferred land.⁴⁵

As a result of the demand for housing and artificial market speculation, many rural landholdings located in the outer area of the metropolitan region have redeveloped as their own entities. For example, Kwinana-Rockingham, Armadale and Midland-Guildford have undergone substantial re-zonings.⁴⁶ This is despite the Metropolitan Region Planning Authority having adopted changes to its policy as early as the 1970s that restricted the fragmentation and subdivision of rural land into five and ten acre lots only to cases where economically workable agricultural units could be created.⁴⁷ Furthermore, the connection to an open countryside is fulfilled through the neighbouring situation of private rural landholdings to suburban areas, whether they display real rural attributes or just a rural vision.

Edge + Vegetation

The variation of endemic vegetation types and complexes creates differentiation within the landscape. This might be more subtle between changes in endemic vegetation complexes or more abrupt through the neighbouring association of endemic vegetation and state forest plantation forests prevalent in the north and north-east of the peri-urban territory. Further differentiation is apparent at the edge of vegetated areas and intensive agricultural plots. In many cases, vegetation edges external to the quadrats do not appear to connect into or with the internal or external POS or conservation reserves. Increases in vegetation indifference is frequent because of increased clearing. Increased clearing creates new edge conditions and partitions areas into vegetation patches throughout the peri-urban territory.

From an ecological science perspective, edges signify health and change. The relationship between the edge and its interior (patch) and the rate of edge change will have varying effects on species

43. Metropolitan Region Planning Authority, *Corridor Plan*, 43.

44. See Appendix A, Quadrat 19.

45. See Appendix A, Quadrat 11.

46. Metropolitan Region Planning Authority, *Corridor Plan*, 10.

47. Metropolitan Region Planning Authority, *Corridor Plan*, 11.

numbers and energy flows across the edge.⁴⁸

Edge + Vegetation (re-established)

Rural residential lots provide an opportunity for vegetation edges to be re-established. Twenty of the seventy quadrats presented with significant regrowth surrounding rural residential dwellings. The re-establishment of vegetation was also apparent along fence boundaries across larger rural landholdings.⁴⁹ Through the period 1965–1995, the orthophoto datasets deduced that suburban development supported significant canopy growth of street trees. At this time, this presented as a green, interconnected network from the developed suburban areas out into the neighbouring peri-urban landscape. Since 1995, there has been significant depletion or absence of street trees in many of the more recent urbanised quadrats.⁵⁰

Edge + Vegetation (wetland)

There are several series of connected geomorphic wetlands located in a north-south orientation within the swales of the large parallel dune systems that signify the topographic and geological formation of the SCP. These wetland bodies are reinforced within the landscape by swathes of fringing vegetation. The geomorphic wetlands are seasonally inundated; the degree of inundation influences the thickness of the vegetation that encloses it.

Wetland vegetation varies between enclosed, textured and organised vegetation to diminishing degrees of open, irregular and diverse vegetation depending on degree of inundation. However, there is evidence of diminishing inundation due to decreasing rainfall, associated rural agricultural activities and surrounding urbanisation affecting sub-surface water levels.⁵¹ Subsequently, visual disruption occurs due to diminishing fringing vegetation. Loss and irregular forms of fringing vegetation alongside diminishing water levels represents a significant loss of place because, as identified in chapters three and four, water bodies are one of the basic landscape elements that make an area identifiable and unique.⁵²

48. This is outside the scope of this thesis; however, it is an important structural and functional component worthy of further consideration and investigation.

49. See Appendix A, Quadrats 31 and 29.

50. See Appendix A, Quadrats 19, 21, 28, 33, 40, 42 and 58.

51. See Appendix A, Quadrats 37 and 38.

52. Western Australian Planning Commission, *Visual Landscape Planning*, 19. This manual provides guidance for evaluation, assessment, siting and design. See also Appendix A, Quadrats 2, 3 and 7.

Edge + Built (rural agriculture)

One of the distinguishing characteristics of peri-urban areas where a substantial proportion of intensive agricultural activity occurs is the long elongated built edges of rural sheds. Over time, these built edges have increased in number and are co-located, creating a sequence of large built edges en masse.⁵³ Technological innovation and efficiencies in yield production have assisted in the creation of these edges by supporting the internalisation of agricultural plots and fields into large greenhouses. The built edges not only become new, but distinguishable as significant built form in areas where there was previously little.

At the peri-urban interface, the presence of a suburban edge as built mass delineates, by default, an area of negative space or void in the form of adjacent rural lands. Within these voids, edges formed by rural agricultural production are made evident by long linear rural sheds. However, the visual scenography of the rural is unaccompanied by the tactile patina and patterning one might expect from an intensive agricultural working landscape.⁵⁴ Unworked rural fields become remnant voids framed by the neighbouring suburb.⁵⁵ The dichotomy of mass and void reinforces ideas of existence and absence, made place and empty landscape—landscape waiting “to be constructed”. Furthermore, the absence of complexity and thus value attributes their future to sites for speculative development.⁵⁶

Edge + Built (suburban)

Increases in suburban densities in new greenfield suburbs have allowed for a decrease in road construction, power, sewerage and water provision costs, further enabling suburban edges to expand outwards.⁵⁷ However, greenfield development remains expensive because new communities must also provide public utilities, transport and social services. As the requirement for new suburban development continues to increase, the overall “real” cost of providing infrastructure to support the outward suburban development increases proportionally to the distance this development is from existing service networks.⁵⁸ In this regard, every iteration of the metropolitan plan for Perth has strategically “staged” urban development to prevent future expansion that reflects sprawl—low-density car-dependent housing. This is because sprawl neither enhances the urban environment nor preserves the essential character of readily accessible non-urban areas.⁵⁹

53. See Appendix A, Quadrats 19, 56 and 22.

54. See Frampton, “Towards a Critical Regionalism,” 28. For a discussion on the “visual versus the tactile”.

55. See Appendix A, Quadrats 66, 69 and 70.

56. See Appendix A, Quadrat 38 and 58.

57. See Appendix A, Quadrat 38 and 58.

58. Dodson and Sipe, “Unsettling Suburbia.”

59. Metropolitan Region Planning Authority, *Corridor Plan*, 8.

The suburban edge has developed rapidly. In the early 1990s, 80% of urban development occurred in greenfield areas.⁶⁰ Although there have been improvements made towards the policy targets of 47% infill and 53% greenfield,⁶¹ in 2012, only 32% infill was achieved. In 2016 this number grew to 41%⁶² and for the first time in the history of metropolitan planning in Perth, there was a higher proportion of infill projects that yielded fifty dwellings or more per lot.⁶³

A key structural characteristic of the beginning of the peri-urban territory is the built edge formed by suburban dwellings of the outermost new suburbs of the metropolis. This edge is also known as the peri-urban interface⁶⁴ and indicates the change between suburban and rural land-use zones. Typically, these suburban edges turn their back on the broader rural landscape, internalising the suburban experience and further disengaging with the characteristics of the peri-urban landscape.⁶⁵ Consequently, the suburban edge is one of the most repeated and identifiable structural characteristics of all Australian's peri-urban territories.

Further, the internalisation of the suburb is replicated at the scale of the lot. Increasing building-to-lot ratios, the loss of meaningful backyard space and potential edges formed by vegetation on the lots amplifies this condition. At the interface between lot and street, vegetation edges are negated and the vehicular path forms the area of transition. Vegetation is initially cleared except for remnant patches that remain, in part, as new POS. Streets may be replanted with vegetation; however, most of the quadrat data displays very little improvement in vegetation edges alongside the suburban built edge. Amalgamation of suburban edges across the periphery of the city presents as a continuous external edge despite discontinuities along this interface.

Since the mid-1990s, built edges have been preceded by topographic forms of levelled and terraced sand in the form of benching. Extensive cut and fill has been used to increase the performance of each suburban lot through its ability to simplify building and infrastructure costs, thus continuing to promote the ideal that suburban greenfield development is "affordable".⁶⁶ However, the severe manipulation of topography at scale of the lot and the compounding terracing across a suburban street and subdivision creates artificial terrain and implicates broader ecological problems relating

60. Western Australian Department of Planning and Development, *Metroplan*, 35.

61. Western Australian Planning Commission, *Directions 2031 and Beyond*.

62. Lindsay, *UDIA Response to the Productivity Commission*.

63. Lindsay, *UDIA Response to the Productivity Commission*, 4. Further, this met the ambitions of the Western Australian Department of Planning and Development, *Metroplan*, 9. The more consolidated form of the city is something that is not only desirable but also possible with the increase in densities, opportunities for suburban renewal and consolidation of housing within the corridors.

64. McGregor, Simon, and Thompson, "Peri-Urban Interface," 3–4.

65. For examples of the current condition see Appendix A, Quadrats 40, 55, 58 and 69.

66. Bolleter, *Scavenging the Suburbs*.

to surface water flows and the ongoing clear-felling of remnant vegetation, except in small gestures where they form part of new POS.

Increasing suburban edge densities are a common feature as a reaction against planned “sprawl” and the requirement for more efficient land use to provide lifestyle benefits through better provision of services and facilities.⁶⁷ Typical greenfield structure plans link liveability to the arrangement of built form through a mix of uses within an urban village setting that has been laid out in an attempt to (re)create a local identity and sense of place.⁶⁸ Accordingly, the internalisation of the built edge is reinforced, whereby the connections to surrounding landscapes that have the potential to not only connect greenfield development to other land-use zones at its edges but also to integrate and extend these human scale spaces to landscape and regional scales is lost. Further to this, the edge required to facilitate the movement of native fauna between landscape patches is disabled.

Over the course of metropolitan planning, new residential densities have increased from an historic ten dwellings per hectare to fifteen.⁶⁹ However consolidation has resulted in diminishing lot sizes, at the same time housing footprint-to-lot ratios have grown, becoming the largest in the world.⁷⁰ Thus, the structure of the suburban edge has also evolved from the linear, gridded, continuous built form found in earlier developed areas,⁷¹ to the curvilinear conurbations that follow topography, to the more recent (in the past twenty years) highly structured terraced lot layouts that support increased density and perceived housing affordability for each allotment.⁷²

At the local neighbourhood scale, edges are reinforced by a complete re-engineering of topographic conditions through topographic manipulation of cut and fill to a flat datum, known as benching.⁷³ Benching is the process of levelling an entire building lot to absorb topographic variations. The morphology of land-use planning and urban design practices that promote benchmarking do so irrespective of landscape and local site conditions.⁷⁴ The result is the presence of physical walls delineating each lot, replicating the diminishing connection between localised edges and the broader landscape and the accumulation of this effect at a range of scales (i.e. from the lot and street through

67. Western Australian Planning Commission, *State Planning Policy 3.1*.

68. Western Australian Planning Commission, *Network City*, 3.

69. Department of Planning and Western Australian Planning Commission, *Urban Growth Monitor*, 33.

70. . Australian Bureau of Statistics, *8752.0: Building Activity, Australia*. From 100 sqm in the 1950s to a steady increase of 240 sqm in 2016 [accessed 26 April 2018].

71. Stephenson and Gordon, *Plan for the Metropolitan Region*, 111.

72. Western Australian Planning Commission, *Network City*, 105. For example, increasingly suburban edges at the peri-urban interface are developed at 15 dwellings per hectare to reduce infrastructure costs.

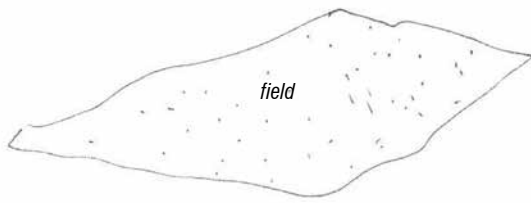
73. Bronson, *How to Kill a Golden State*, 35. The process of benchmarking originates from the development of suburban areas into the mountainous regions of California in the 1950s. Referred to as “mountain cropping”, the process allowed for suburban development to develop in areas regardless of their topographic variation. Frampton also describes this construction technique as a *tabula rasa* approach in creating absolute placelessness. See Frampton, “Towards a Critical Regionalism,” 26.

74. Banham, *Los Angeles*, 121.

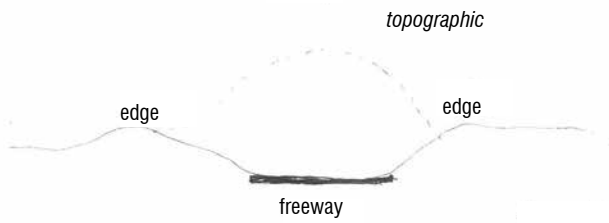
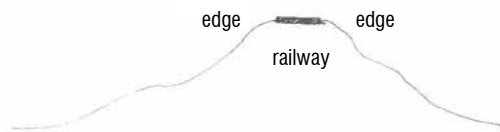
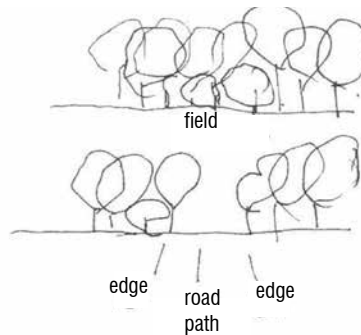
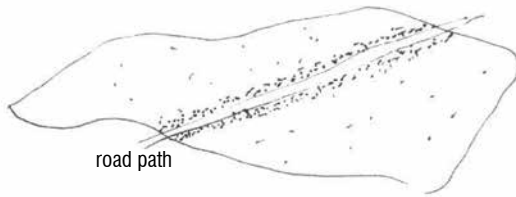
to the suburb and rural land-use zones at the periphery). This is compounded by the edges of new suburban developments, where the structural planning will typically turn its back on the area into which urbanisation is advancing. Typically, the edges of suburbs on the periphery are inward facing, focused towards internal vehicular path networks and POS rather than the expansive landscape beyond. Suburban edges are, in effect, the frame that enacts the great Australian suburban dream⁷⁵ by positioning the rural and landscape beyond as scenic background. Positioning the rural as scenic background, is an idyllic recall of an Arcadian pastoral setting from elsewhere that persists in the representation of landscape.⁷⁶

75. Streeton, *Ideas for Australian Cities*.

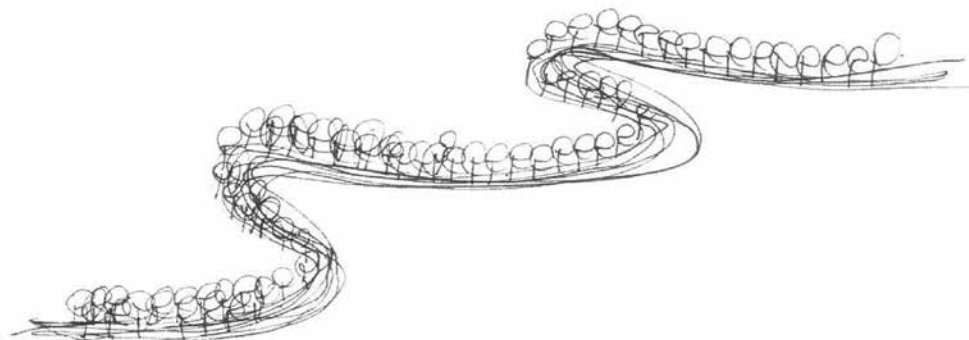
76. For example, consider the some of the first landscape paintings by Claude Lorrain that depicted the wild rural landscape surrounding the city as influenced by the Greek poets Virgil and Ovid.



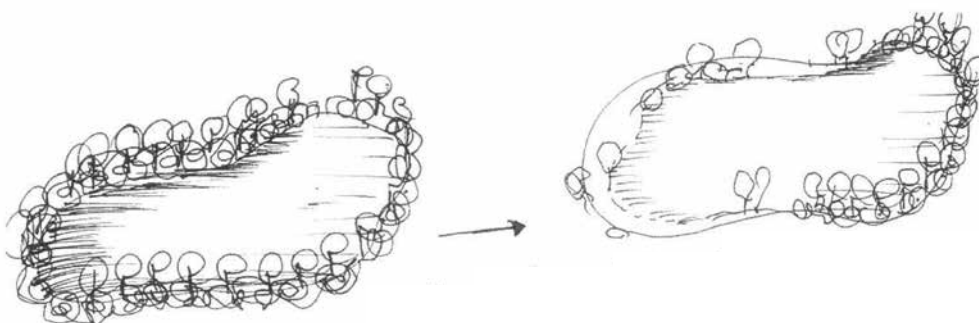
Edge + Field



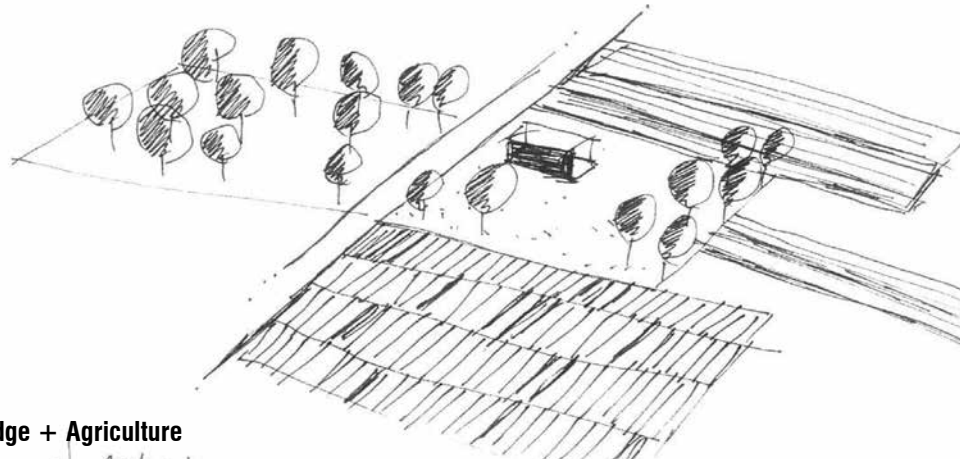
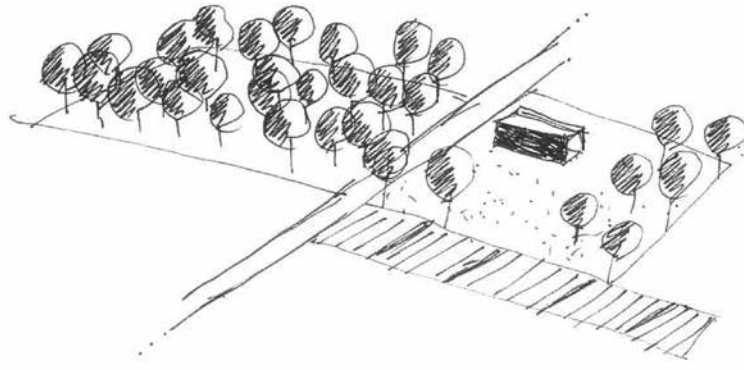
Edge + Path (road)



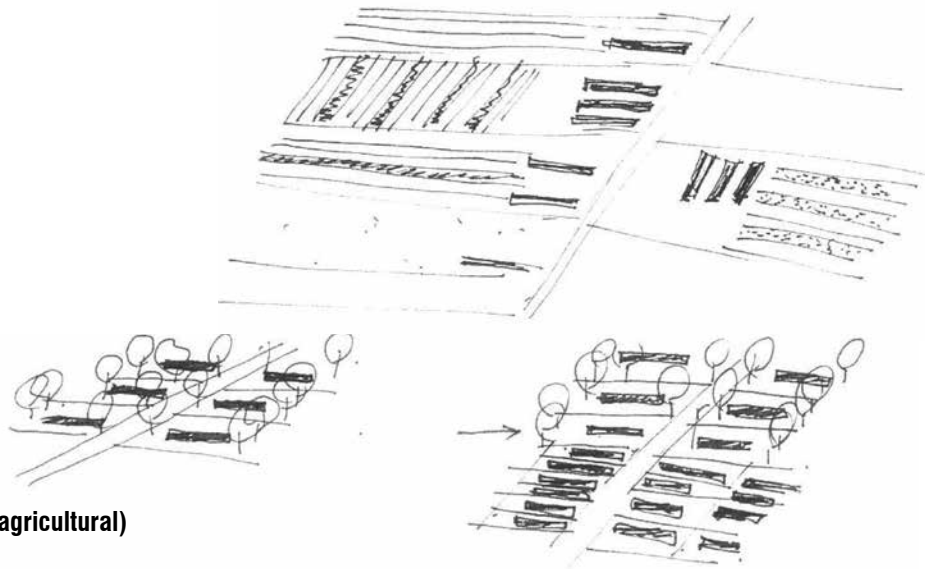
Edge + Path (water)



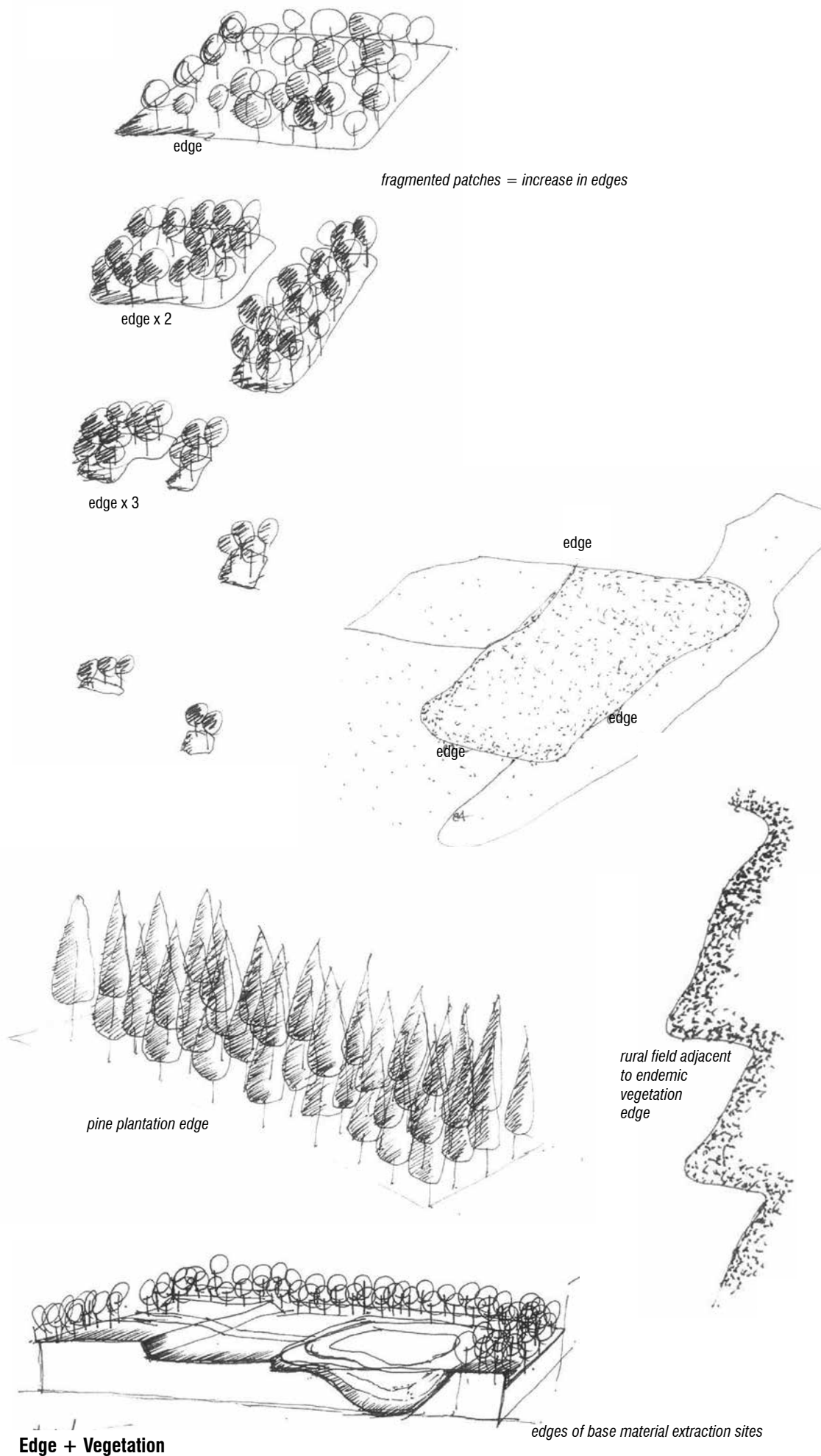
Edge + Vegetation (wetland)

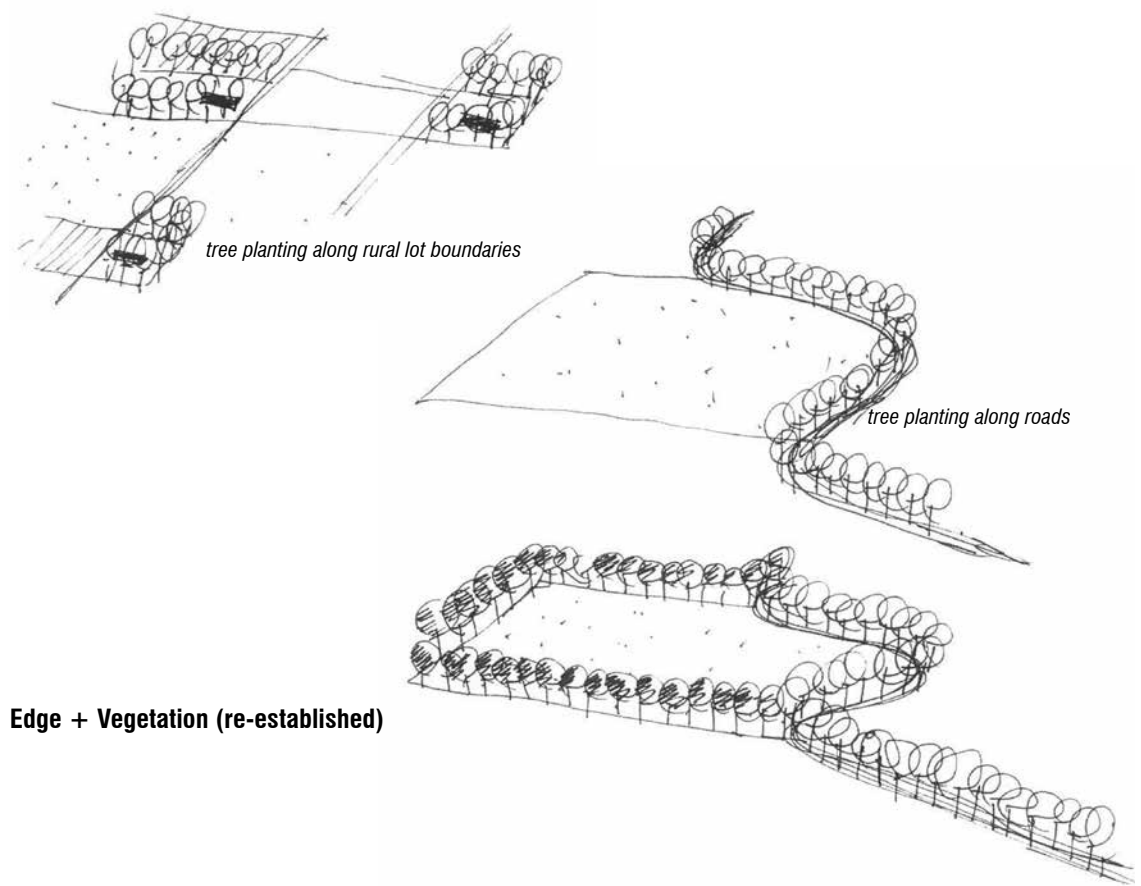


Edge + Agriculture

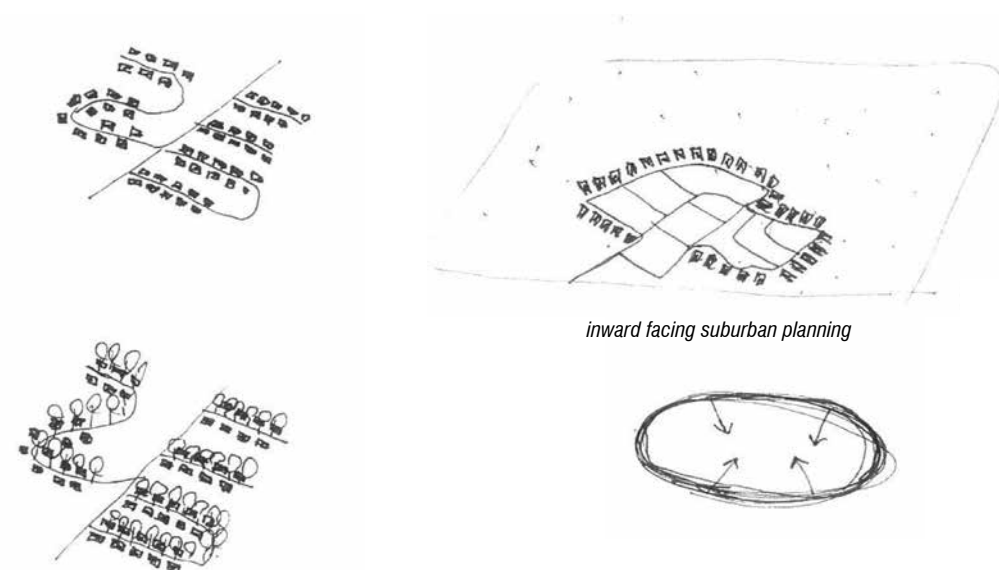


Edge + Built (rural agricultural)

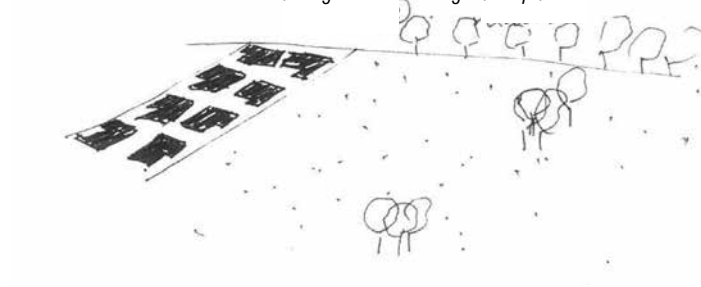




Edge + Vegetation (re-established)



suburban edge + field + vegetation patches



Edge + Built (suburban)

Figure 5.4

Peri-urban edge types (*vegetation, built*)

(Author, 2017. line drawing)

5.2 Paths

Conceptualising paths

Paths are a principal structural element that mediate and facilitate the experience of the landscape.⁷⁷

Paths are linear landscape spaces that create networks for circulation by pedestrians, vehicles or ecological systems. Bell describes paths as communication patterns, representative of a system of networks of movement of people across the landscape in various layers of complexity.⁷⁸ The pattern of path networks over time demonstrates human habitation and settlement of the landscape and reflects a range of dominant networks that represent spatial and temporal characteristics of how people move through the landscape (see figures 5.5 to 5.8). Path and node are two conditions of a movement network.

Within the peri-urban landscape, the complexity of these networks is heightened by the tension between the intensity and frequency of pedestrian, vehicular and infrastructural movement patterns between the local and landscape scale at varying speeds.⁷⁹ Paths facilitate arrival and departure within spaces. In this regard, paths facilitate sequence and the intentional design of these sequences allows for this experience to be enhanced.

Paths are typically linear; however, river systems and suburban road patterns can be exemplars of curvilinear networks within the landscape.⁸⁰ Paths are various widths, depending on their intended use. Paths are also multi-scalar as they facilitate the moving of people in from the local to the regional scale.

At the meta-scale of the city, the Swan and Canning rivers are the first defining paths of the original settlement. These paths facilitated the movement of earlier colonisers from the upper reaches of the productive agricultural lands at Guildford, to the colony settlement at the current location of the CBD. The end of this path network, the port city of Fremantle, is an essential node of economy, trade and occupation on this major structuring route.

Similarly, as the city expanded, the path networks produced by the corridor planning of the metropolitan region promoted the expansion of the city at its edges. The northern armature of Wanneroo Road and Mitchell Freeway and the southern armature of the Kwinana Freeway and Albany

77. Dee, *Form and Fabric*, 81.

78. Bell, *Pattern, Perception, and Process*, 303.

79. See Appendix A, Quadrats 4, 5, 7, 10, 11, 43, 49 and 70. Also Dweyer and Childs, "Movement of People Across the Landscape," 153.

80. See Appendix A, Quadrats 21, 32 and 57.

Highway plot the extent of peri-urban development. At their termination are the most recent suburban development nodes.⁸¹ In turn, these are followed by nodes of alternative transport in the form of railway stations punctuating this corridor route.

In contrast, the first major arterial road and railway systems controlled access, guided development and formed clear identifiable paths within the landscape.⁸² These paths became the main communications framework for the city and moved people through the landscape, creating a range of experiences along the path network.⁸³ The first plan for the city highlighted these major road networks as scenic drives to accompany the beautiful river paths of the Swan and Canning rivers⁸⁴ and an inland railway network at the base of the foothills.⁸⁵ However, they too were influenced by the geological conditions on the plain, with development expanding into areas of “good” land alongside major path networks and tentative path networks “exploring” the not so good land either side of this corridor.⁸⁶ The formation of these early road paths were elongated arterial paths, north and south from the CBD running parallel to the coast and complemented by east-west feeder paths in the northern parts of the metropolitan area.⁸⁷ However, for secondary road paths, parallel roads traversed up and down the dune systems intersected at regular intervals with crossroads at right angles, creating a monotonous urban layout in the flatter areas.⁸⁸ Despite the topography of the terrain, the alignment of roads and the subdivision of blocks occurred in a rectangular pattern independent of a sensibility to the natural form of the landscapes and recalling the pattern of original land grants across the SCP.⁸⁹

This elongated, linear pattern known as corridor planning was formally adopted and utilised to provide the most economic transport system for the region.⁹⁰ In this instance, the private motor vehicle had and continues to have an enormous impact on the creation of city form, landscape structure change and urbanisation patterns.⁹¹ As road paths become sealed, the landscape condition moves from peripheral into peri-urban as it is one of the first indicators of urbanisation.⁹² As an apron ready to be

81. See the 2016 series of, Appendix A, Quadrats 53, 30, 31, 26 and 70.

82. Stephenson and Gordon, *Plan for the Metropolitan Region*, 12.

83. Stephenson and Gordon, *Plan for the Metropolitan Region*, 2; Metropolitan Region Planning Authority, *Corridor Plan*, 6.

84. Stephenson and Gordon, *Plan for the Metropolitan Region*, 99.

85. Metropolitan Region Planning Authority, *Corridor Plan*, 14.

86. Stephenson and Gordon, *Plan for the Metropolitan Region*, 82, 102; Metropolitan Region Planning Authority, *Corridor Plan*, 15. These conditions are seen to apply to the Cannington-Kenwick area alongside the major road path Albany Highway. See also development of Quadrat 40 in the north at Yanchep.

87. See Appendix A, Quadrat 1.

88. Stephenson and Gordon, *Plan for the Metropolitan Region*, 111. See Appendix A, Quadrats 15 and 1.

89. See Appendix A, Quadrats 15 and 1.

90. Metropolitan Region Planning Authority, *Corridor Plan*, 6. The first Perth Regional Transport Study (1970) was produced under the direction of Dr Robert S. Nielsen. The findings of this plan were adopted by the Metropolitan Region Planning Authority and supported all future urban expansion along the urban corridors.

91. Metropolitan Region Planning Authority, *Corridor Plan*, 12. In 1970, the ratio of 1 vehicle to every 2.4 people was one of the highest in the any metropolitan area in the world. Today this figure shows that 57% households have access to two or more cars and over 64% of people travel to work by car. See Australian Bureau of Statistics, *2016 Census QuickStats*.

92. See Appendix A, Quadrats 20 and 21.

appropriated, urban expansion then follows the development of these paths and corridors.

Path types

The following section identifies the landscape structural path types deduced from the analysis of the seventy quadrats within the peri-urban territory of Perth. Paths, as linear conduits for movement across the landscape, form primary indicators in the direction and location of land-use change at the periphery of the city. This is because road, infrastructure and ghost paths are evidence of the clearing of land for new movement networks. In the case of vegetation corridors, these paths represent the connections between isolated patches of vegetation, brought about by landscape change.

Path + Node

Paths form networks and within these networks there are transition areas, known as nodes. Nodes are places to wait, rest, reflect or change direction within the landscape, representing a temporary or permanent moment along a path network. Nodes are an essential component of supporting people's experience within the landscape as they assist in orientation and reflection upon an individual's journey.⁹³ Specifically within the peri-urban territory, nodes are critical in assisting people to transition through the landscape.⁹⁴

The location of nodes is limited by the direction and magnitude of the path network they are attached to; however, they can assist a sequence of movements across a range of scales, thus they relate to other nodes within the landscape. Nodes are interspersed and may be at regular or irregular locations along a path network. At the landscape scale, industrial, commercial and retail nodes become evident through their connection to major road paths. Furthermore, they are evidence of transactions connected to national and global economies. Some nodes deliver experiences related to leisure or offer moments for transcendence.⁹⁵

At the local scale, nodes are represented foremost by the private dwelling. These nodes internalise experience from the landscape at the scale of the lot.⁹⁶ Private dwellings are typically connected to primary road paths and depending on the corresponding period of planning, reinforce the internalisation of the private dwelling node in the form of cul-de-sacs.⁹⁷ In some cases, lots and paths

93. Lynch, *Image of the City*.

94. Pérez-Campaña and Valenzuela-Montes, "Nodes of a Peri-Urban," 406–29.

95. For example, a drive-through cinema that has, in its most recent evolution, become a house of God. See Appendix A, Quadrat 41.

96. See Appendix A, Quadrats 17 (1974) and 23 (2016).

97. See Appendix A, Quadrats 14 (1985).

appear to connect to the broader landscape; however, over time, these connections only form seams within new suburban development areas.⁹⁸

Another common feature of nodes at the local scale are POS.⁹⁹ POS are areas identified as providing experiences related to “sport, recreation or nature”.¹⁰⁰ POS are typically located towards the centre of suburban developments to reinforce the requirements for all dwellings to be within 300 metres of a POS space of any size with access to District POS nodes within a 2 kilometre catchment distance.¹⁰¹ They exist as newly designed and implemented spaces as well as leftover spaces, identifiable by patches of endemic vegetation¹⁰² or reclaimed geomorphic wetlands.¹⁰³

Path and node are two conditions of any movement network. A path is a distinct quantity that has direction as well as magnitude, specifically as a determinant of the position of a point in space (the eye of the beholder) relative to another. Nodes are areas to wait, rest and reflect and occur at numerous points along a path network where there is a change in direction, intersection, opening or closure against a path. Within the peri-urban, nodes are multiscale and consist of descriptors such as road interchanges, the private dwelling, agricultural collection points, river and road interfaces, POS networks alongside or at termination points of a path, dams and wetlands.

Path + Recreation

The most apparent path networks connected to recreation within the peri-urban territory are those with carved out paths in endemic vegetation for recreational golf courses and sporting grounds.¹⁰⁴ The carving out of this space creates new threshold experiences within the endemic banksia woodland and, over time, supports the development of suburban residential at its boundaries.¹⁰⁵

Many of these recreational paths appear as verdant green paths, are undoubtedly water intensive and although they are included in the POS network for the city, they are typically private or limited to a few. Paths of recreational leisure are epitomised by many golf course estates hinging on the peri-urban interface of Perth as it develops.¹⁰⁶ These paths typically carve out space from within endemic

98. For example, the southeast interface of the suburban development in Appendix 1, Quadrat 28 (1985–2016).

99. See Appendix A, Quadrats 12, 50 and 69.

100. Western Australian Planning Commission, *Liveable Neighbourhoods*, 90.

101. Western Australian Planning Commission, *Liveable Neighbourhoods*, 20. It should be noted that 2 km is also the length of each quadrat.

102. See Appendix A, Quadrat 33.

103. See Appendix A, Quadrat 37.

104. Stephenson and Gordon, *Plan for the Metropolitan Region*, 91. The reason for this is perhaps historical as the first metropolitan plan allocated 4 acres per 1,000 people for golf.

105. See Appendix A, Quadrats 17, 42 and 13.

106. See Appendix A, Quadrats 8, 21, 23, 50 and 68.

vegetation patches.¹⁰⁷ The green fairways create thick, scalloped paths within the landscape.¹⁰⁸

In several cases these paths are reinforced with the private dwelling node of golf course estate housing.¹⁰⁹ Other unique path forms evident to support a leisure lifestyle include BMX and go-kart tracks.¹¹⁰

Active recreational sports playing fields are derived in the same way. The carving out of this space from endemic vegetation amplifies the threshold experience at the transition from canopy to open field and at this point, emphasises the sky plane. Landscape descriptors of this type also include parklands and POS, particularly in new residential developments where banksia woodland has been cleared.¹¹¹

Recreational paths are carved out of the landscape. It follows that recreational paths form a sequence of cleared paths creating the structural appearance of continuous POS areas.¹¹² As the quadrats in the new suburbs demonstrate, these POS areas are used to support road paths that anchor the development of new suburbs at the peri-urban edge.

Path + Goat tracks

Goat tracks are informal human-made pathways created by the repetitive wearing of paths that reflect frequent movement patterns through the landscape. They reveal the regular movement of people across the landscape between nodes; places to rest, wait and stop. Often, private residences signify these nodes; however, other features such as recreational sites,¹¹³ topographic features,¹¹⁴ water bodies,¹¹⁵ energy infrastructure paths¹¹⁶ or a shortened path between two points also act as structural signifiers within the territory.¹¹⁷

Goat tracks are evident where vegetation or residential density exists; for example, in dense endemic vegetation areas, a high degree of irregular goat tracks is evident.¹¹⁸ In this case, they represent people exploring the local vegetation and topography of the region. Over time, this intensity decreases. Quadrats containing dense endemic vegetation have a high degree of irregular tracks; however, this decreases over time as the vegetation is thinned and surrounding areas cleared, leaving

107. See Appendix A, Quadrat 21.

108. See Appendix A, Quadrats 8 (1965), 21 (1995), and 68 (1995).

109. See Appendix A, Quadrats 23 (1985), 50 (1965), and 59 (1995).

110. See Appendix A, Quadrat 31.

111. See Appendix A, Quadrat 17.

112. See Appendix A, Quadrats 18, 50 and 68.

113. See Appendix A, Quadrat 23.

114. See Appendix A, Quadrats 8, 15 and 22.

115. See Appendix A, Quadrats 16, 17, 39 and 41.

116. See Appendix A, Quadrat 33.

117. See Appendix A, Quadrats 14, 39 and 68.

118. See Appendix A, Quadrat 19.

patches of vegetation.¹¹⁹ Signs of goat tracks reappear within these vegetation patches as the density of suburban development increases in the surrounding landscape.¹²⁰ These patches once again become explorative areas within the landscape as they provide contrast and intrigue to the highly regulated environment of the suburb. These path networks also connect to various cultural crucibles in the landscape.¹²¹ Further, the rapid increase in goat tracks results from the sudden increase in population density surrounding these now vegetation patches or islands at the edge of the city.

Paths + Agriculture

The repetitive linearity of rural landholdings in an east-west direction is evident by the pattern of road and fence lines and their contrast to the curvilinear river path that moves across the coastal plain.¹²² This pattern is reinforced when linear road paths are sealed, rural land is cleared and property fence lines become a determining structure of pattern across the landscape.¹²³

Agricultural production creates paths through the landscape; for example, the intensive agricultural areas of the peri-urban territory include cultivated flower, vegetable, fruit and turf production.¹²⁴ Each of these types are arranged in linear land parcels to support efficiency of growth and harvest. Larger rural land plots include agricultural production related to cereal and non-cereal broadacre crops for use as hay and silage, cereals for grain and lupins for grain or seed.¹²⁵ In intensive agricultural areas associated with fruit production, the organised, gridded pattern of tree plots creates paths through the linear voids within the in-between spaces.¹²⁶ This grid pattern is also prevalent in the state forest timber plantations situated at the periphery.¹²⁷

Paths created by intensive agricultural industries are a signifier of change within the peri-urban territory. Typically, these areas were located within the geological areas of the Herdsman and Cottesloe soil associations and in the earliest metropolitan plan they were clearly protected from subdivision and their development.¹²⁸ These paths include the ephemeral linear paths created by differing agricultural production types as well as for vehicles to work this landscape type. This is evident through the linear branching of road paths, linear segmentation of rural lots and the

119. See Appendix A, Quadrat 26.

120. See Appendix A, 2016 series, Quadrats 39, 41 and 57.

121. For example, the goat tracks in Quadrat 68 intensify through the endemic vegetation towards the prison fence.

122. See Appendix A, Quadrats 24, 19, 41, 43 and 51.

123. See Appendix A, Quadrat 24.

124. Australian Bureau of Statistics, *7121.0: Agricultural Commodities, Australia, 2017–18*. See Appendix A, Quadrats 37 and 15 (1953–2005).

125. Australian Bureau of Statistics, *7121.0: Agricultural Commodities, Australia, 2017–18*.

126. See Appendix A, Quadrats 9 and 11.

127. See Appendix A, Quadrat 55.

128. Stephenson and Gordon, *Plan for the Metropolitan Region*, 203.

formation of linear built edges in the form of rural sheds and intensive agricultural greenhouses.¹²⁹ In accordance with this change, the increase in paths brought about by agricultural production creates contrast and complexity within the peri-urban.¹³⁰

Paths + Water

The major river paths of the SCP are a distinctive contrast to the agricultural and rural areas across the territory. The river paths are a regular and consistent path through the landscape and provide stability at the intersections and transition areas between suburban and rural landholdings at the peri-urban interface.¹³¹

The river systems are essential structuring elements in the form of water paths traversing across the SCP—from the Darling Scarp to the urbanised coast. The edges of these water paths provide variances of enclosed and open vegetation. Several of the river systems floodplains are low-lying and are poorly drained. These areas have been traditionally seen as limiting for urbanisation; however, over time they have been filled to support other land uses such as the Perth Airport and several industrial estates.¹³² More recently, large areas in the southeast of the metropolitan area have undergone significant infill for urbanisation.¹³³

Water paths can be reinforced through significant vegetation and canopy growth along these path networks.¹³⁴ In this case, vegetation edges, in their association with water paths, can support increased legibility of the local and broader landscape region. Without vegetation edges, water paths become diminished at the landscape scale. This is further amplified by the encroachment of suburban development as this increases built edges. Typically, these built edges remain unconnected to the landscape characteristics of the region.

Water paths can also be artificially created. In these cases, water paths represent the extraction and movement of water to support human settlement. Channelled water paths are prevalent in areas where agricultural production occurs.¹³⁵ Further, these water paths are often connected to geomorphic

129. See Appendix A, Quadrat 39 (2005).

130. See Appendix A, Quadrat 19.

131. See Appendix A, Quadrats 4, 11, 12, 24, 25, 31, 44, 47, 58 and 61.

132. Stephenson and Gordon, *Plan for the Metropolitan Region*, 202.

133. Department of Housing and Works, *Keralup Masterplan*. For example, the extensive 25 million cubic metres of sand fill required (or 20% of the total future amount for a metropolitan population of 3.5 million) to support the 4,000 ha East Keralup Development south of Rockingham that proposed to house 90,000 people. This development was abandoned in 2015 due to extensive reviews of the environmental consequences on these fragile lowland areas. See also, Mercer, "Ecological Fears Kill Satellite City."

134. See Appendix A, Quadrat 23.

135. See Appendix A, Quadrat 52.

wetlands as the primary water source.¹³⁶ These linear water paths disappear as suburban density increases, and their connecting nodes (dams or geomorphic wetlands) often disappear or are reinterpreted into aesthetic lakes as part of new POS.¹³⁷

In many areas, the landscape topography and presence or absence of water reveals its deep geological history. Here, paths are represented by bands of geomorphic wetland and sub-surface water patterns.¹³⁸ The undulating coastal dune systems and flat plains are a result of the prevailing south-westerly winds over thousands of years.¹³⁹

Paths + Vegetation corridors

From an ecological perspective, paths can be corridors of vegetation. Corridors are critical for connecting patches of vegetation to one another, to facilitate species movement across the fragmented peri-urban territory.¹⁴⁰ Vegetation paths have various thicknesses. As well as facilitating movement of species, vegetation paths can form edges between cleared areas or fields.¹⁴¹ Similarly, vegetation paths become more distinct with increasing urban density due to the contrast and differentiation of their structure within the landscape.¹⁴²

Paths + Void (basic raw materials)

Irregular road paths across sandy soils are plotted throughout the peri-urban territory.¹⁴³ These paths show the connection between larger vehicles and basic raw material (BRM) sites. BRM sites contain the raw materials such as lime, sand, limestone, clay, gravel and rock aggregate that are used in public and private construction, including residential, commercial, roads and railway production.¹⁴⁴ Their structural presence within the peri-urban is tied to continuing urbanisation.

Paths + Equine facilities

Elliptical paths created by the equine industry are another structural signifier within the peri-urban territory. They represent a predominant rural land use of peri-urban territories in Australia, and persist

136. See Appendix A, Quadrats 32, 33, 2, 13, 17, 38 and 52.

137. See Appendix A, Quadrats 2 and 32.

138. See Appendix A, Quadrats 53, 3 and 18. Many of these features are evident in the 1974 ortho-photo dataset as the winter of this year saw unseasonal amounts of rain and flooding. Many of the images show areas inundated with water that otherwise would not be apparent across the landscape.

139. See Appendix A, Quadrats 70, 23, 40 and 53. Typically those within 5 km of the coast.

140. Forman and Godron, *Landscape Ecology*.

141. See Appendix A, Quadrats 32 (1965), 59 (2005) and 62.

142. See Appendix A, Quadrats 31, 48 and 60.

143. See Appendix A, Quadrats 16, 27, 43, 55 and 67.

144. Government of Western Australia Department of Premier and Cabinet, *Perth and Peel Green Growth Plan*, 5.

as spaces within the landscape even in areas where there has been rapid landscape change.¹⁴⁵ Occasionally, these spaces transform into recreation lands to support encroaching urbanisation.¹⁴⁶ Their persistence as a landscape space is attributed to the value of the equine industry in the rural zone of the city.¹⁴⁷

Paths + Road

The development of road paths displays the importance of movement within the peri-urban territory and their first presence is usually as unsealed rural road paths. Their subsequent change to sealed roads displays a changing hierarchy of movement and remains as a persistent indicator within the peri-urban.¹⁴⁸ Major sealed road paths running north-south throughout the peri-urban provide contrast to the river path and the pervading alignment and pattern of rural settlement.¹⁴⁹ As a contrast to the east-west axis contained by the foothills on one side and the ocean on the other, these north-south routes create interest and intrigue and project forth the field of view to the endless horizon that awaits. Attached to these major road paths are suburban conurbations. Depending on the time of their formation, they can be linear grid road networks (1950–1990) or curvilinear self-enclosing paths networks.¹⁵⁰ In both cases, the road networks of the edge suburbs exhibit a range of morphology types that in turn emphasise preference and values of land-use planning. In all cases, the movement of suburbs out into rural and endemic vegetative land in an all-encompassing process of consumption.

Road paths are instrumental, not only in supporting urbanisation but also in providing access to recreation and POS networks. Wanneroo Road is a major primary (now secondary) road extending north out of the city that supported the gradual urbanisation of the swales and associated wetlands between the major parallel sand dunes that define the SCP.¹⁵¹ Wanneroo Road also provided a key connection between the residents of the metropolitan area and the recreation opportunities of an early twentieth-century pleasure garden at Yanchep National Park.¹⁵² More recently, there was a proposal for the Mitchell Freeway extension to intersect with the western boundary of Yanchep National Park and excise 52 hectares of its land, further imparting urbanisation pressures onto this recreation and

145. See Appendix A, Quadrats 5, 10, 12, 27, 42 and 56.

146. As is the case for Appendix A, Quadrat 31 (1974–1985).

147. City of Swan, *Economic Profile*, 29. The City of Swan has 1,000 horses, 700 of which are at stud.

148. Bell, *Pattern, Perception, and Process*, 303.

149. See Appendix A, Quadrats 36, 47, 51 and 52.

150. See Appendix A, Quadrats 38, 48, 57, 59, 61, 64 and 69. Typically these are suburban paths developed from the 1980s onwards.

151. See Appendix A, Quadrats 21, 22, 23, 39 and 54.

152. Department of Environment and Conservation, *Yanchep and Neerabup Management Plan*, 43.

Paths + Railway

Railway paths were built to connect existing points of activity. Industrial areas came to be hinged from railway and road paths and were located at peripheral sites of the city in order to limit the impact of traffic, noise and potential contaminates on residential areas. One of the first railway lines was from Fremantle to Guildford, connecting the Port of Fremantle with the alluvial agricultural areas of the Guildford settlement. Subsequent development of the Midland line to the town of Geraldton, some 400 kilometres north of the metropolitan region, forged the beginnings of a substantial rail network.¹⁵⁴ This railway line formed a key freight interchange that brought rich resources for export from the Wheatbelt and mining explorations throughout the state. While the Fremantle to Midland railway path axis became a major emphasis for the city's industrialised growth, it also formed a limiting barrier¹⁵⁵ that reinforced the natural path barrier of the Swan River, which concentrated the early development of the city north of the river.¹⁵⁶

Path + Void (ghost paths)

The clearing of endemic vegetation creates temporary paths in the form of voids. These voids or ghost paths are a result of clearing and cultivating the ground plane for suburban development.¹⁵⁷ The ghost paths space enables new road paths to be constructed, structuring a new sequence of path and nodes in the form of private dwellings.

Path + Infrastructure (energy)

Infrastructure networks form distinctive paths on the ground and on the wall plane within the peri-urban territory. At the local scale, overhead power lines are another path network typically located parallel to a road path. At a larger scale, energy networks are formidable structures that dominate the relatively flat SCP.¹⁵⁸ These elevated linear spaces also act to repel functions in the immediate area underneath the path network. However, there is evidence of new functions, in the form of POS procuring the ground plane underneath.¹⁵⁹ In this regard, their presence often signifies a transition

153. Department of Environment and Conservation, *Yanchep and Neerabup Management Plan*, 3.

154. Metropolitan Region Planning Commission, *Corridor Plan*, 15.

155. Stephenson and Gordon, *Plan for the Metropolitan Region*, 9, 202.

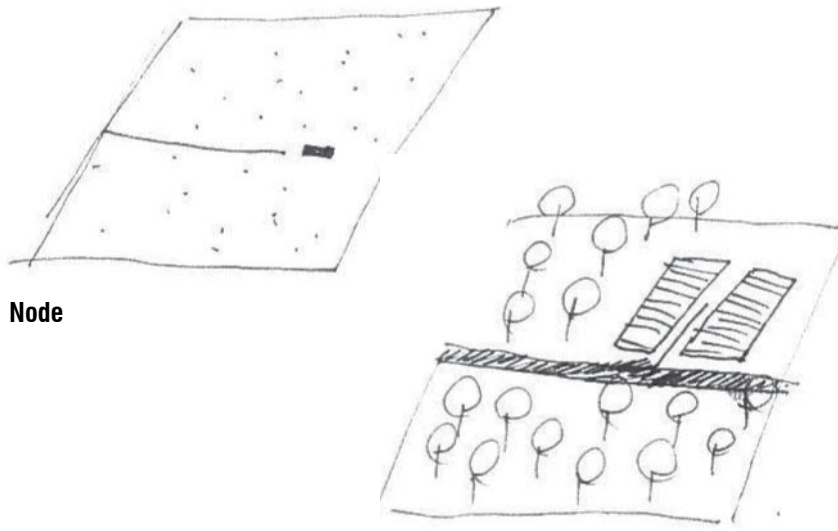
156. Stephenson and Gordon, *Plan for the Metropolitan Region*, 9.

157. See Appendix A, Quadrats 32 (1974–1985), 59 (2005) and 62 (1974).

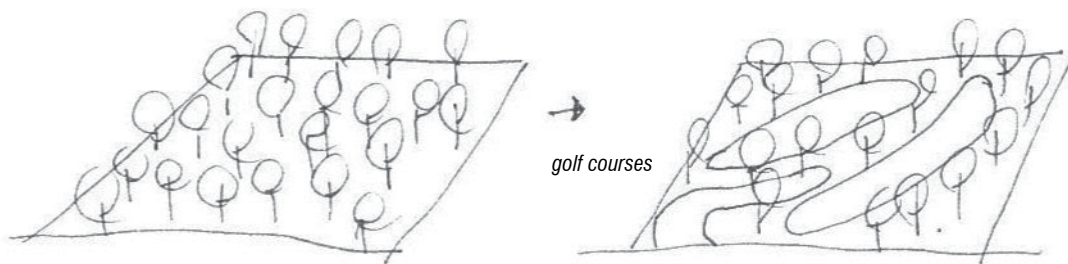
158. See Appendix A, Quadrats 33, 34 and 41.

159. For example, the aesthetic wetland and POS that develops in Appendix A, Quadrat 32 (1995).

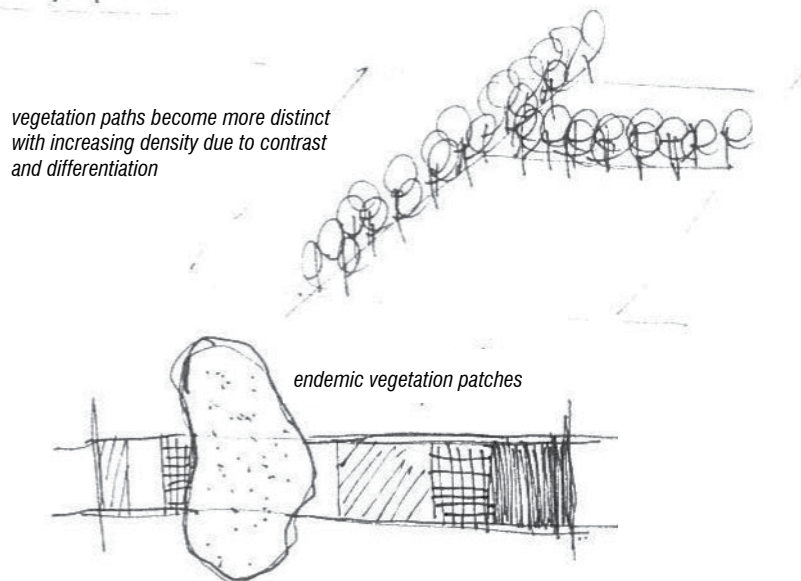
Path + Node



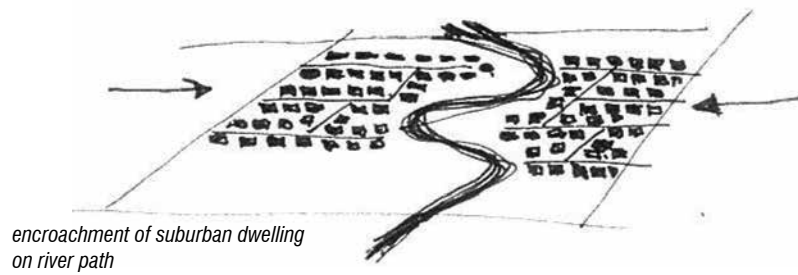
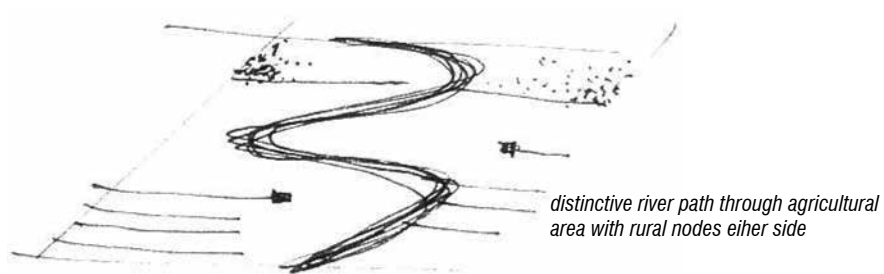
Path + Recreation



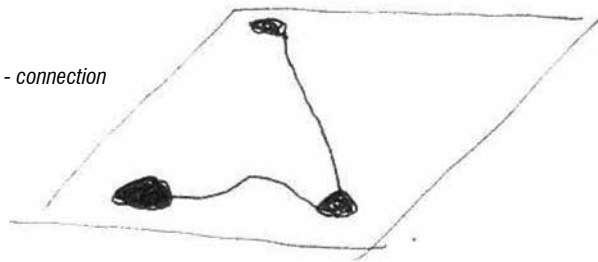
vegetation paths become more distinct
with increasing density due to contrast
and differentiation



Path + Vegetation



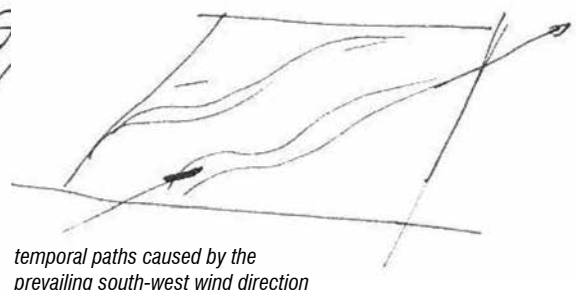
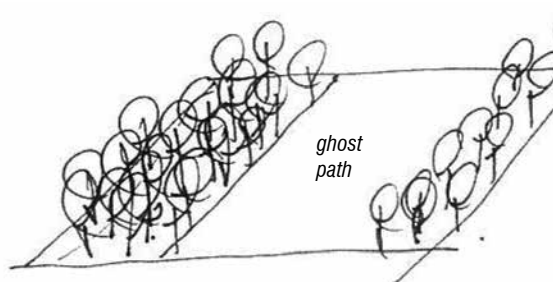
artificial water paths - connection between dams



Path + Water



Path + Goat Tracks

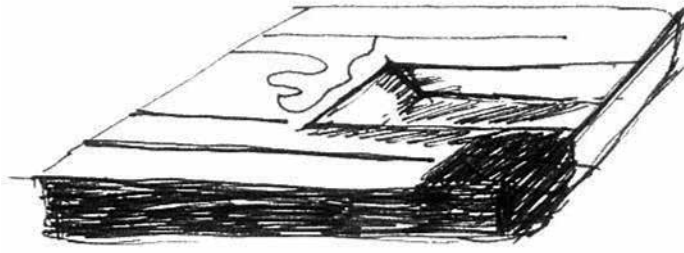


Path + Void

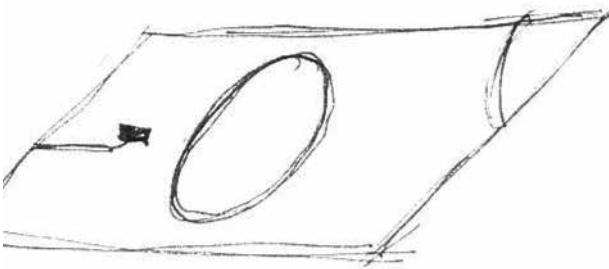
Figure 5.6

Peri-urban path types (water, goat tracks, void)

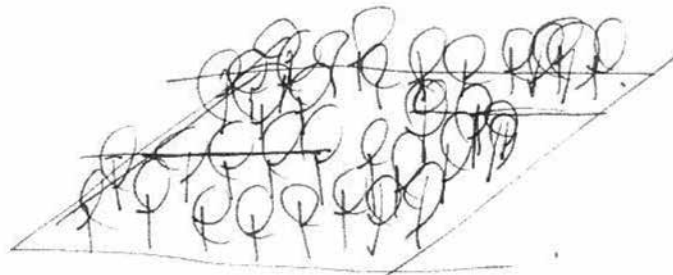
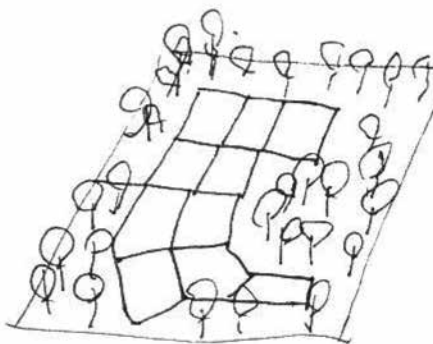
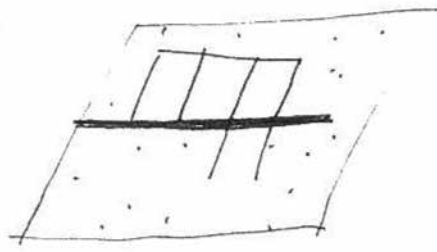
(Author, 2017. line drawing)



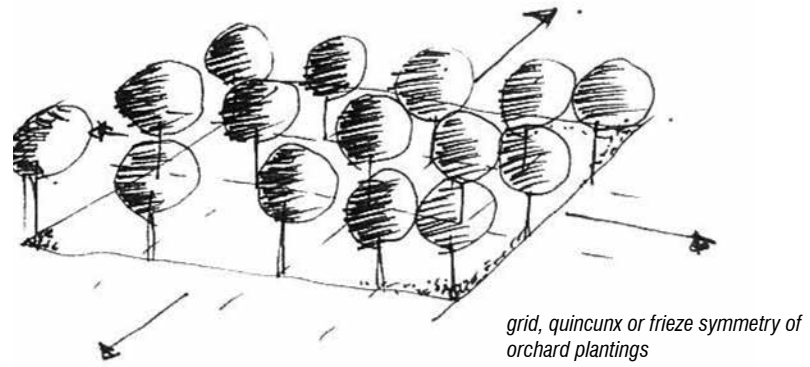
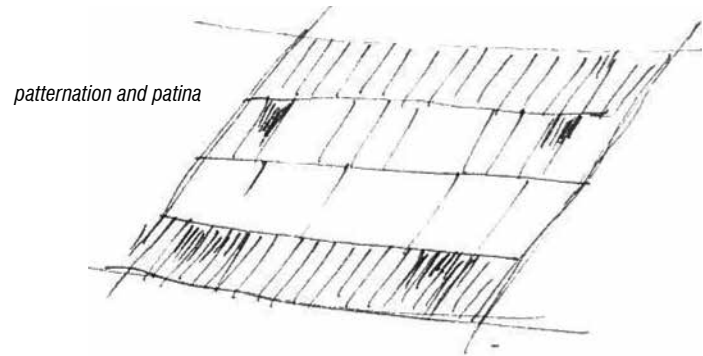
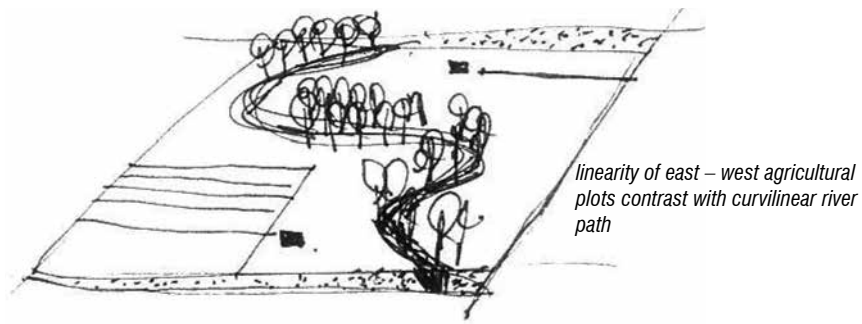
Path + Void (basic raw materials)



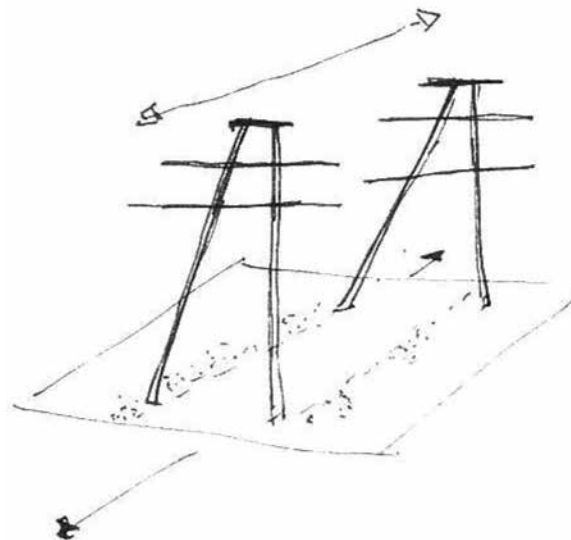
Path + Equine facilities



Path + Road



Path + Agriculture



Path + Infrastructure (energy)

Figure 5.8

Peri-urban path types (agriculture, infrastructure)
(Author, 2017. line drawing)

area between urban and rural land uses within the peri-urban territory and because of their scale and proportion within the surrounding landscape, they help to create legibility.

5.3 Thresholds

Conceptualising thresholds

Thresholds are integrated spaces within the landscape that facilitate transitions and knit spaces together (see figures 5.9 to 5.12). These transitions can be subtle or complex and are typically evident at larger scales of the immediate and local. Thresholds are centred spaces rather than edges, becoming physical points at which you move through the landscape. They can also be spaces within the landscape that lock together one place and another and, in this regard, can possess qualities of the landscape one has left and of the landscape one is arriving into.¹⁶⁰ Because of this, remnant landscapes, those remaining after large-scale landscape change has occurred around them, are thresholds of distinct landscapes in space and across time.

Thresholds increase with urbanisation due to an increase in contrast between cleared, urbanised, endemic and remnant landscapes.¹⁶¹ The process of clearing endemic vegetation creates shifting threshold experiences where both the presence and absence inadvertently provides the threshold experience.

Thresholds are as much about the relationship between adjacent landscapes as they are about the space into which one moves into, through and within. Similarly, although the thresholds are experienced at the immediate or local scale, across time they form a sequence of space and occupation within and beyond the peri-urban territory to the regional scale. Accordingly, thresholds are critical spaces that assist in a re-reading of the urban to rural, or wilderness transect employed by city-wide planning to date.¹⁶²

Importantly, thresholds have the potential to be dynamic interfaces. For example, the 1974 aerial image data set for the quadrat analysis demonstrates the effects of the higher than average rainfall on vegetation and water threshold spaces throughout the peri-urban territory. So too do other climate variations, in the form of drought stress on water and vegetation associations, as well as large-scale changes brought about by bushfires within natural areas on the city's periphery are further evidence of threshold change. In turn, this provides potential to "design in" threshold spaces that can act as

160. Dee, *Form and Fabric*, 169–71.

161. See Appendix A, Quadrats 4, 15, 24, 28, 31, 33, 44 and 60.

162. Western Australian Planning Commission, *Liveable Neighbourhoods*.

spaces that absorb landscape change amplified by human induced climate change.

Threshold types

The following sections identify the landscape structural threshold types deduced from the analysis of the seventy quadrats within the peri-urban territory of Perth. Thresholds offer the “cushioning” required to exude the stress of landscape change brought about by the advancement of suburban residential edges out into rural or natural landscapes. Conversely, they provide opportunities for this mechanism to be inverted, whereby the rural and natural landscapes once again puncture and penetrate inwards towards the city proper.

Threshold + Road

The clearing of endemic vegetation creates temporary paths in the form of voids. These voids or ghost paths are a result of clearing and cultivating the ground plane for suburban development.¹⁶³ The ghost paths space enables new road paths to be constructed, structuring a new sequence of path and nodes. The most significant of these are the localised threshold of road to private dwelling.

In their period of transition, they create moments of between and within the endemic vegetation. In many areas, this vegetation is banksia woodland or scrubland, which exhibits interspersed canopies. Therefore, the transition space also become connected to the sky plane and it is here that the sky connects the individual beyond the immediate surroundings to the broader landscape of the region.

Threshold + Infrastructure

The built form of large energy infrastructures creates opportunistic breaks between suburban areas.¹⁶⁴ Large energy infrastructure networks are typically located at the edges of suburban areas and therefore can be read as a threshold space that locates the peri-urban interface,¹⁶⁵ or, as the city has continued to urbanise outwards, they become evidence of the remnant peri-urban interface that has now been succeeded.¹⁶⁶

Energy infrastructure is a common feature of the peri-urban territory and the transitional space located below their networks could have potential to enable a more distinct transitional experience through peri-urban areas.

163. See Appendix A, Quadrats 32 (1974–1985), 59 (2005) and 62 (1974).

164. See Appendix A, Quadrat 32.

165. See Appendix A, Quadrat 34.

166. See Appendix A, Quadrat 46.

Threshold + Topography

With only subtle undulations, the SCP offers only small variances in topography. Parklands were initially located along the coastal limestone ridges as they were expensive for building and they provide a significant threshold (break) in the continuity of urban development.¹⁶⁷ Similarly, POS amenity in the first metropolitan plan was located across areas of more difficult contours. However, since the 1970s, many low-lying areas were earmarked for POS within new suburban developments because they were able to be used as drainage swales for the suburb. Moreover, areas of raised topography could support the development of new thresholds as there are few opportunities to gain prospect across the peri-urban territory.

An inverse topographic threshold is found in the peri-urban territory where sites of BRM are hollowed out, appearing as scars within the landscape.¹⁶⁸ Once again, these spaces have the potential to be re-made into threshold experiences for surrounding urban development. Before extraction, the rural lands to which they belong form a holding threshold space, as they contain the lime and sand supplies required for future urban development.¹⁶⁹

Threshold + Rural

Rural landscapes continue to be a structural type that is utilised to counter the city proper and transition the city from the urban or suburban edge outwards into the territory. The first metropolitan plan for Perth identified rural areas as being opposite to urban areas.¹⁷⁰ Consequently, large areas adjacent to the city proper were reserved for agriculture and further enforced the differential relationship between the city and its surrounds.¹⁷¹ Subsequently, rural agricultural lands are thresholds and transition spaces for the broader territory whereby they interface with urban areas.¹⁷² Over time, these thresholds have diminished as the pressure on the agricultural land for urbanisation has increased. The reduction in appearance of these areas has however created smaller, intensified thresholds spaces of this landscape type. This is evident by the cut flower industry and intensive agricultural production areas as remnant fields within the northern suburbs of Perth.¹⁷³

167. Stephenson and Gordon, *Plan for the Metropolitan Region*, 76.

168. See Appendix A, Quadrats 16, 27, 34, 35, 43 and 51.

169. Stephenson and Gordon, *Plan for the Metropolitan Region*, 76–77. Described as “open space belts”.

170. Stephenson and Gordon, *Plan for the Metropolitan Region*, 230.

171. Kobelke, *Swan Valley Planning Review*, 15–16. In the inner ring of the analysed quadrats, most agricultural landscape types held off the threat of urbanisation until the mid-2000s. Today, most of these areas have fallen to suburbanisation. The area that has resisted this is the Swan Valley, identified in the *Corridor Plan* as valuable rural land because the vineyards are an important rural and cultural asset for Perth.

172. See Appendix A, Quadrats 15, 16, 19 and 34.

173. See Appendix A, Quadrats 19, 20 and 56.

In several instances, the threshold of rural agricultural lands is magnified when co-located with biophysical properties. The most common form of this are the rich soils at the edges of the wetlands along the SCP, which in and of themselves act as transition spaces at the landscape scale. Their edges supported intensive agricultural uses¹⁷⁴ and the use of these sensitive wetland environments landscapes for production predicated their more rapid transition to suburban developments.¹⁷⁵

The second major biophysical determinate of rural lands is the sub-surface waterlogged areas in the south and southeast metropolitan area known as the Palusplain. As waterlogged areas, these were undesirable for urban development.¹⁷⁶ They were cleared and drained in the 1800s through to the mid-1900s to support agricultural development. However, the high levels of additional phosphorus have had a detrimental impact on the waterways of the Peel-Harvey Estuary.¹⁷⁷ These areas remain as large lots supporting the major industry of beef cattle production and often appear in a degraded state. In this regard, these large lots and open agricultural lands enforce a threshold transition space that is landscape, sky and horizon, adjacent to urban edges in the southern part of the metropolitan area.¹⁷⁸ In the winter months when rainfall is frequent, these areas present inundated waterlogged areas, forming another temporal threshold experience.¹⁷⁹

Another “non-urban” structural form that the rural zone supports is large-scale forestry. These spaces form thresholds at the landscape scale. Firstly, the contrast of state-owned pine plantations within the peri-urban territory create markedly different threshold experiences compared to the banksia woodland of the coastal plain due the regulated grid and height of the *Pinus radiata* and *Pinus pinaster*.¹⁸⁰ They also become structuring elements for the transition from urban to agricultural and then forestry in the northern suburbs of Perth, along a transect that commences at Wanneroo Road and extends west to the Gnangara Pine Plantation.¹⁸¹

The rural threshold constitutes dynamic structural spaces, with varying intensities of agricultural production and rural land uses evident across the peri-urban territory. Collectively, their structural form remains an important threshold space for transitions and experiences within and between urban areas and the peri-urban territory.

174. Metropolitan Region Planning Authority, *Corridor Plan*, 14.

175. Metropolitan Region Planning Authority, *Corridor Plan*, 14. See Appendix A, Quadrat 15 and 52.

176. Stephenson and Gordon, *Plan for the Metropolitan Region*, 77–79.

177. Safstrom, “Agriculture Futures.”

178. See Appendix A, Quadrats 35 and 28.

179. Safstrom, “Agriculture Futures,” 10.

180. See, Forest Products Commission, <https://www.fpc.wa.gov.au/node/851> and <https://www.fpc.wa.gov.au/node/906> respectively. Accessed September 17, 2018.

181. Metropolitan Region Planning Authority, *Corridor Plan*, 43. First identified as a transition space and evident in Appendix A, Quadrats 20, 22, 38, 39 and 55.

Threshold + Built (institutions)

There are several built form of institutional or cultural threshold spaces within the peri-urban territory at the landscape scale. Three prevalent types are evident in the quadrat analysis: prisons, buildings of faith and big box retail.

First, the prison emerges as an enclosed space that interlocks the interior fenced environment to the broader landscape. Seen to be incompatible with urban areas, prisons are traditionally located at the periphery and are subsequently enveloped as development increases outwards.¹⁸² Their threshold space is twofold, located on the inner and the outer of the security fence and the need to repel the approaching development front is enforced by agricultural fields or a thickness of remnant endemic vegetation acting as a buffer with new transitional spaces at their edges. In the case of Casuarina Prison in the southern Perth suburb of Casuarina, there is a distinguishable connection between this threshold space and the informal goat track paths expanding from the neighbouring urban area to the security fence.¹⁸³

Second, the peri-urban territory becomes a host for new buildings of faith. In part, this is because of the growing cultural diversification of Perth and affiliations with a broadening religious base as well as increasing urbanisation at the periphery looking for these types of community facilities nearby.¹⁸⁴ Indeed, some buildings of faith are relegated to the peri-urban because of a broader societal move against specific religions;¹⁸⁵ for example, both the Cambodia Buddhist temple and the Sikh Gurdwara temples are co-located within a kilometre of each other within the northern peri-urban area of Bennett Springs. Both are an example of a built form that is seen to be incongruent with the form (and religious affiliations) of more established urban areas.¹⁸⁶ In a similar distance from the city's centre, located in an adjacent quadrat at a site that was previously a drive-in movie theatre, a Christian church has reclaimed this space.¹⁸⁷ These buildings become distinguishable because of their built form and because they are co-located throughout the peri-urban territory. These buildings establish literal and symbolic threshold spaces between communities and the immediate and surrounding landscape setting of the peri-urban.¹⁸⁸

182. See Appendix A, Quadrats 14, 24, 50 and 68.

183. See Appendix A, Quadrat 68.

184. Australian Bureau of Statistics, *2024.0: Census of Population*. Perth has the third largest multiculturally diverse population in Australia behind Melbourne and Sydney and with this comes a broadening of religious affiliations.

185. One such example is consistent with the rise of anti-Muslim rhetoric and the inferred connections to terrorism at the national and international level first initiated by the attacks on the World Trade Centres in New York in 2011. The Sikh temple in Bennett Springs is one such example, see Appendix 1, Quadrat 3. See also *The West Australian*, "Vandals Attack Sikh Temple."

186. See Appendix A, Quadrat 3.

187. See The Potters House Christian Fellowship Church, Beechboro, located within Quadrat 41.

188. This is reaffirmed by Shah, Dwyer, and Gilbert, "Landscapes of Diasporic Religious Belonging," 77–94.

Third, big box retail and commercial centres emerge as a secular style of built form at the edges of cities and form a significant contrast to the two institutional types previously identified.¹⁸⁹ First described by Joel Garreau as “Edge Cities”,¹⁹⁰ they represent larger, incumbent built retail and commercial forms where landscape of the peri-urban offers little to no land-use conflict. In this regard, their representation across the periphery is a repetitive and novel economic condition prevalent within the peri-urban territory. These amalgamated areas form large built thresholds between suburban, rural and infrastructural types, specifically for those experiencing the peri-urban territory with their own private vehicle.

Threshold + Built (suburban)

The transition inwards or outwards through a suburban edge, along a road path or at the peri-urban interface exhibits threshold qualities. The condition of a road meeting the suburban edge is a definable point where the transition of experience between the scale of the neighbourhood or site and the scale of the landscape occur.¹⁹¹

So too are the thresholds that exist between residential complexes of varying densities, proportions and ages;¹⁹² for example suburban to commercial precincts,¹⁹³ industrial estates¹⁹⁴ or community facilities across the heterogenous territory of the peri-urban.¹⁹⁵

This process is again reiterated at the scale of the lot. Private gardens were once categorised as private open space in the first plan for Perth, and were upheld as desirable because “land is abundant and of comparatively low agricultural value, the almost universal desire for a garden can be satisfied”.¹⁹⁶ This value underpinned the development of large lots and supported an immediate threshold experience between the built and cultivated landscape of the garden.¹⁹⁷ With increasing urbanisation and the demand for larger houses, lots have become smaller. Consequently, there remains little to no space for an external garden and the localised threshold condition has been lost.¹⁹⁸ The garden as a threshold has all but disappeared from new suburban developments within

189. See Appendix A, Quadrats 10, 13, 18 and 41.

190. See Garreau, *Edge City*. Garreau used the term “edge city” to describe retail and commercial precincts at the periphery of cities with more than 600,000 sq feet of retail space.

191. See Appendix A, Quadrats 11, 40, 50 and 57.

192. Metropolitan Region Planning Authority, *Corridor Plan*, 2. This is consistent with the ambitions of the plan: “urban growth can be developed in units having an individual identity.” See, Appendix A, Quadrat 15.

193. See Appendix A, Quadrat 2.

194. See Appendix A, Quadrat 4.

195. See Appendix A, Quadrat 14. The Fiona Stanley Hospital precinct adjacent to major road infrastructure and suburban housing.

196. Stephenson and Gordon, *Plan for the Metropolitan Region*, 90.

197. The quarter-acre block also contributed to food production for households.

198. Wright, “Perth Homes Get Bigger.” Perth house sizes are the biggest in the country averaging 327.2 sqm on an average lot size of 382 sqm.

the peri-urban territory. Instead, there is a reliance on neighbourhood POS because the next threshold experience is from the scale of the lot to the neighbourhood.¹⁹⁹

This change in morphology of thresholds at the suburban neighbourhood scale is repeated at the landscape scale through the erosion of the green wedges located between the corridor armatures of development.²⁰⁰ Traditionally kept to mediate urban development and in doing so, create thresholds for transition across the landscape at the landscape and regional scale, the pressures of increasing urbanisation to be located near existing infrastructure has spurred their conversion to developed land. This is despite the *Corridor Plan* vision: “to allow urban growth to occur on the non-urban plain between the corridor arms would seriously weaken the present urban structure on which the future must be built”.²⁰¹

Threshold + Water

Wetlands form a transitional space within the landscape and across the peri-urban territory of Perth. A chain of geomorphic wetlands, running north to south, are recognised as forming part of the regional open space system.²⁰² The forested areas of the scarp act as catchments feeding into the two main rivers of the city, the Swan and the Canning.

The Swan and Canning rivers are important large structuring thresholds because they connect landscape types together.²⁰³ Flowing from the upper catchment areas, the threshold spaces around these water sources begin in national parks, the large conservation areas in the Darling Range. As the rivers open onto the SCP, the threshold experience is counteracted with alternating rural, agricultural and suburban landscapes.²⁰⁴ As the river flows closer to the city’s core, the density of urbanisation increases.²⁰⁵ However, the quadrats also show that the landscape types adjacent to their edges do not follow the typical sectors expected from the urban transect of wild to urban.²⁰⁶ This is because the structural land types adjacent to the river are determined by their amenity and landscape character.

Despite water structuring at the scale of the region, landscape, local (neighbourhood) and site (lot), it follows that wetlands should form an important transition space and “indisputable land use for

199. See Appendix A, Quadrats 19, 29, 33, 40, 52, 54, 58 and 59.

200. In accordance with the planning direction of the *Corridor Plan*.

201. Metropolitan Region Planning Authority, *Corridor Plan*, 16.

202. Metropolitan Region Planning Authority, *Corridor Plan*, 12.

203. See Appendix A, Quadrats 11, 12, 44 and 47.

204. Following this sequence through Appendix A, Quadrats 44, 25, 24 and 4, and their intersections with the Swan River.

205. As seen between variations in thresholds and intensity of Quadrats 11 and 12, situated along the Canning River.

206. In accordance with the principles of the “new urbanism transect” of Duany, and Plater-Zyberk & Co, *Lexicon of New Urbanism*, 9-10; and the Western Australian Planning Commission, *Liveable Neighbourhoods* policy that replicates these principles in new suburban development.

development”.²⁰⁷ However, as early as the 1970s, many wetland areas were drained because they formed a barrier to urban development and because of the need to support urban growth.²⁰⁸

Threshold + Recreation

Recreation spaces and the sequence of recreation spaces create immediate local structural elements, as well as a network of threshold experiences across the peri-urban territory. In this respect, they form contrasting spaces to the city’s built urban form. In creating these networks, recreation thresholds also provide one of the few structural landscape types that form a continuum “chain” of threshold experiences across the peri-urban interface from inside and outside the city proper.²⁰⁹

While major urban parks along this “chain” are few, the precedent for city and park exists in the form of Kings Park. Kings Park, directly west of the CBD, was the first large park for the city.²¹⁰ The connections westward between Kings Park and the state government owned Endowment Lands (the suburbs of coastal City Beach and inland Floreat) referenced the traditions of the garden suburb.²¹¹ As concluded in chapter one, this form of modern urban and regional planning enshrined recreation thresholds as a necessary transitional space between the city and its suburbs.²¹² Consequently, several decades later, the *Corridor Plan* sought to reserve more open space for the growing city in the form of green wedges between the development armatures that radiated north, south, northeast and southeast from the CBD.²¹³ These wedges were designed as meta-threshold spaces and consisted predominantly of infertile soils. However, because these areas contained limited agricultural activities, their threshold status instead came to be occupied by diverse landscape types (repellent to suburban housing) representative of the peri-urban landscape, including airports,²¹⁴ forestry,²¹⁵ commercial and industrial precincts,²¹⁶ government institutions and recreation activities.²¹⁷

In accordance with economic stability, formalised recreation spaces in the form of playfields were

207. Stephenson and Gordon, *Plan for the Metropolitan Region*, 83.

208. Metropolitan Region Planning Authority, *Corridor Plan*, 47.

209. See Appendix A, Quadrats 12, 17, 37 and 65. See also Metropolitan Region Planning Authority, *Corridor Plan*, 42. For example the sequence of wetlands in the northern section of Perth are a recreational centrepiece and an important ecological system for migratory coastal birds.

210. Stephenson and Gordon, *Plan for the Metropolitan Region*, 83.

211. Freestone, “Exporting the Garden City,” 72-73.

212. The Garden City principles, theory and practice were first introduced by Ebenezer Howard and Raymond Unwin in Letchworth (1903) and Welwyn (1920) in the UK at the turn of the twentieth century and realised in Hope and Klem’s 1925 master plan for the Perth Endowment Lands. See, Freestone, “Exporting the Garden City,” 73.

213. Metropolitan Region Planning Authority, *Corridor Plan*, 10. The Metropolitan Redevelopment Planning Authority increased a proportion of its income to buy more land so it could reserve this as open space.

214. See Appendix A, Quadrat 7.

215. See Appendix A, Quadrat 55.

216. See Appendix A, Quadrat 37.

217. Metropolitan Region Planning Authority, *Corridor Plan*, 16.

considered as part of the early POS requirements for the city.²¹⁸ These thresholds spaces were organised at a range of scales from the local to the district to the regional, based on the amount of people in an urban area and the need for open space.²¹⁹

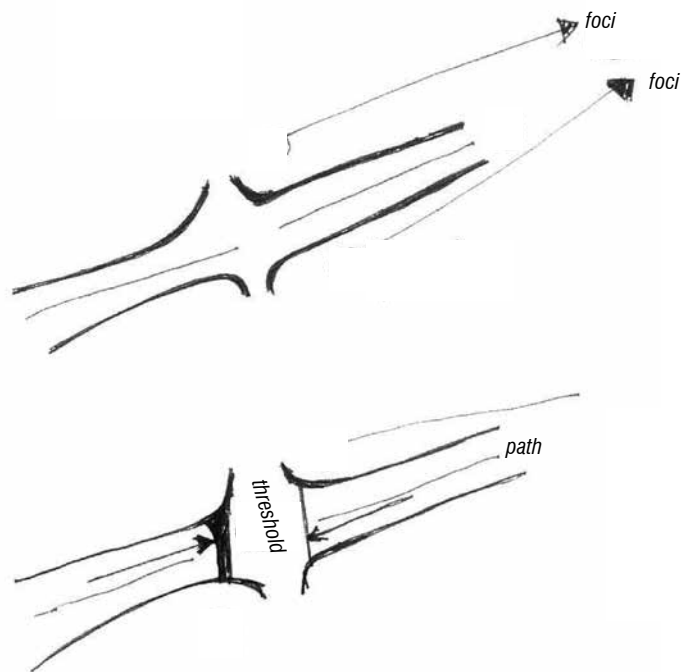
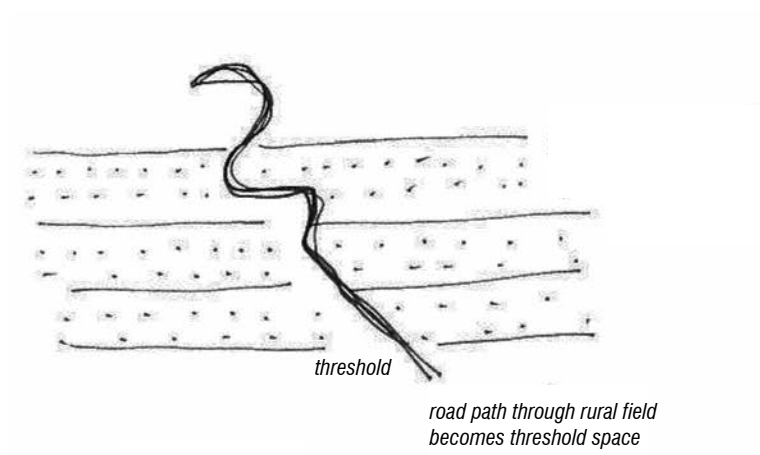
Not just conceived at the macro scale of the city, the thresholds of private open space and gardens were a key component of the early suburbs of the city.²²⁰ Together with active POS networks, the recreation thresholds (and ecological networks) created a circulation network at the local and landscape scale and delivered upon the requisite 10 per cent POS allocation from the 1955 plan. This is enshrined in planning doctrine to this day, despite the condition been very different.²²¹

218. Stephenson and Gordon, *Plan for the Metropolitan Region*, 4.

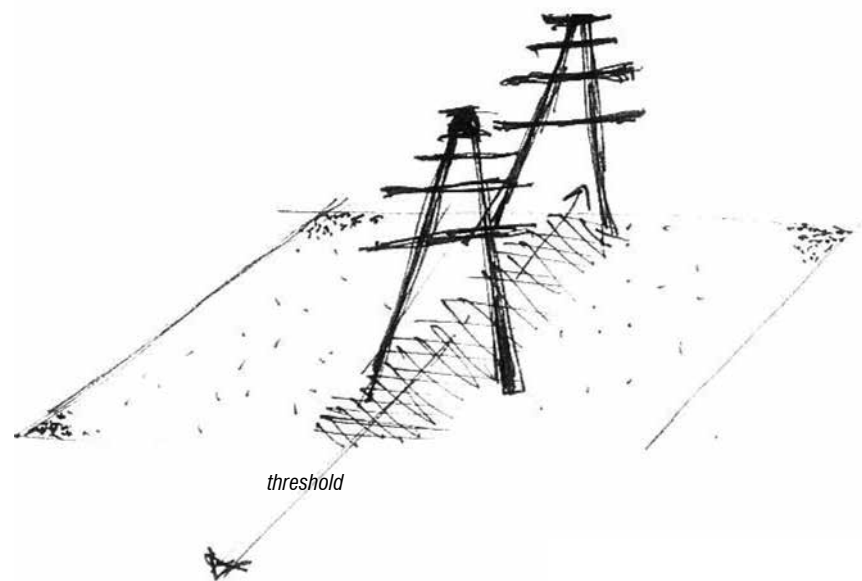
219. Stephenson and Gordon, *Plan for the Metropolitan Region*, 11. For example, this plan indicates “local open space (children playgrounds, small public gardens, schools and playfields) to have 3.0–4.7 acres per 1,000 people. District open space (large parks, large public playing fields and organised sports) to have 5.5 acres per 1,000 people and Regional space to encapsulate the meta-landscape characteristics of the city in the form of ocean, beaches, river, foreshores.”

220. Stephenson and Gordon, *Plan for the Metropolitan Region*, 90.

221. Metropolitan Region Planning Authority, *Corridor Plan*, 39. See also, Grose, “Perth’s Stephenson-Hepburn Plan,” 20.

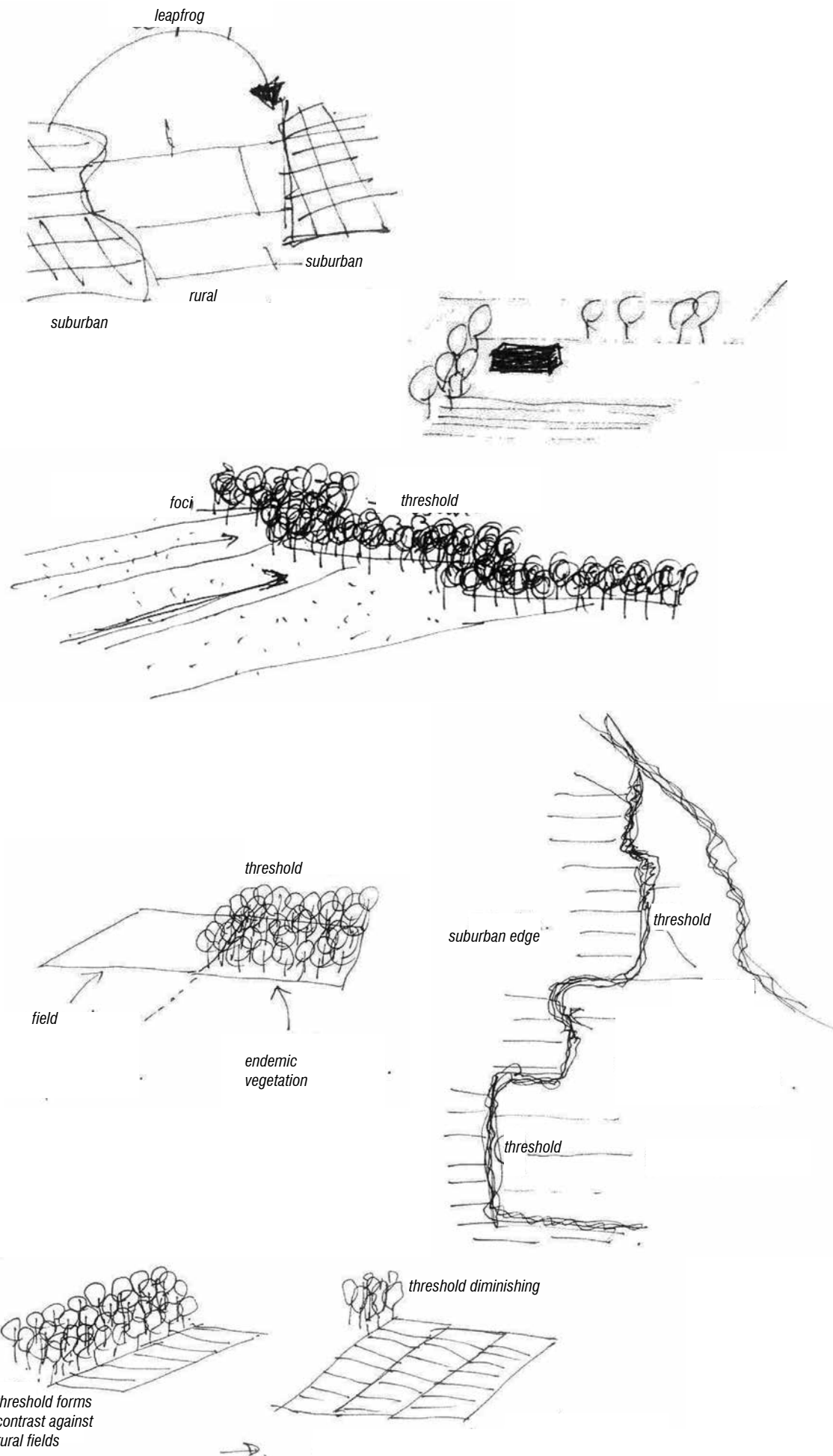


Threshold + Road

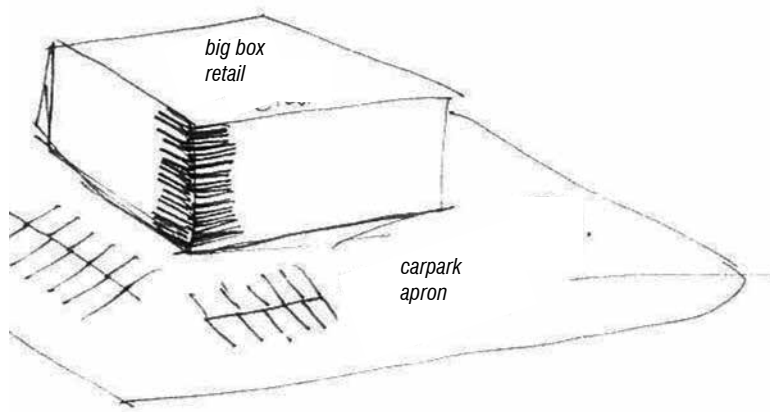


Threshold + Infrastructure

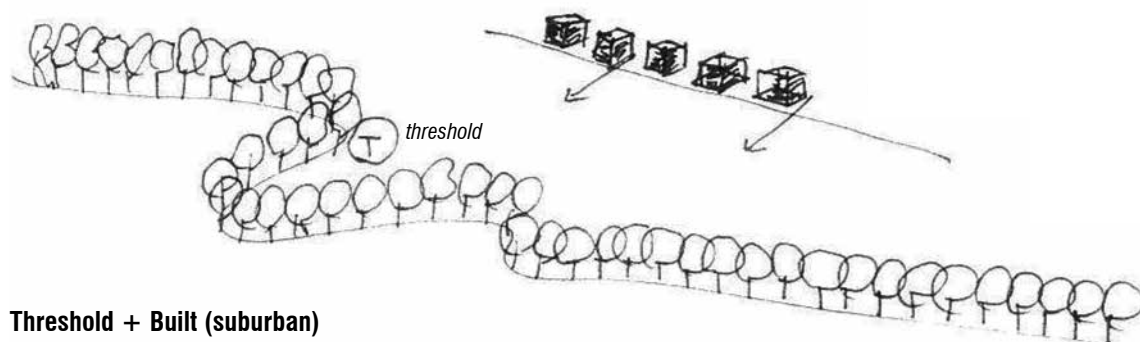
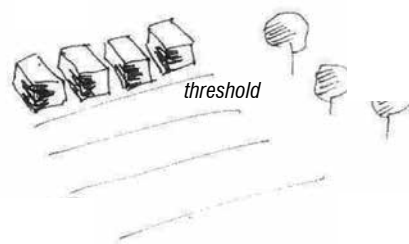
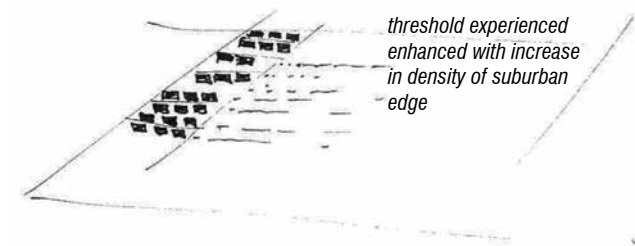
Figure 5.9 **Peri-urban threshold types (road, infrastructure)**
(Author, 2017. line drawing)



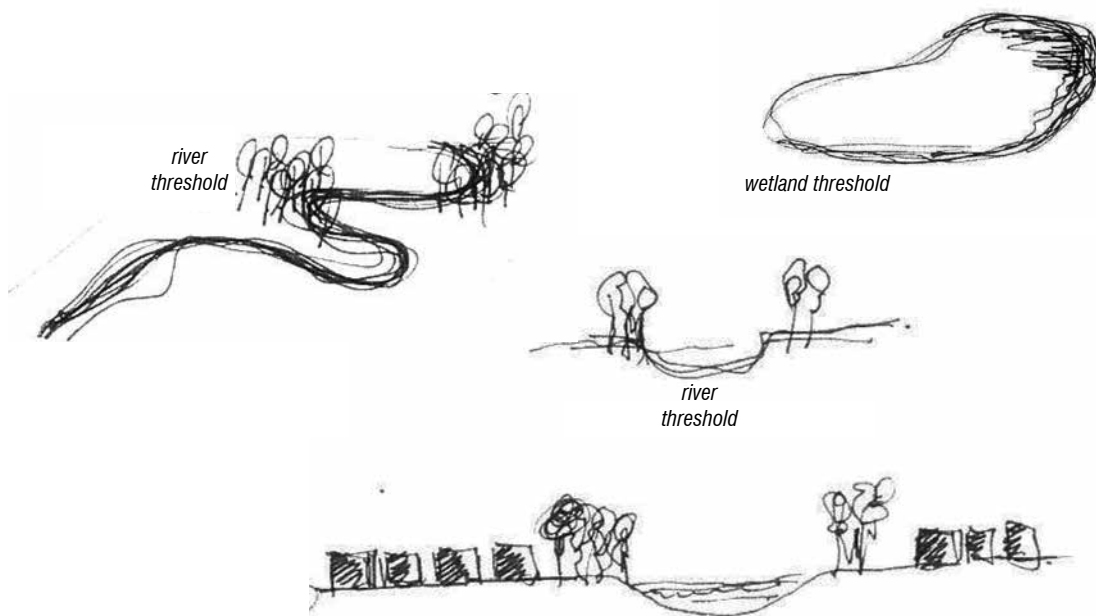
Threshold + Rural



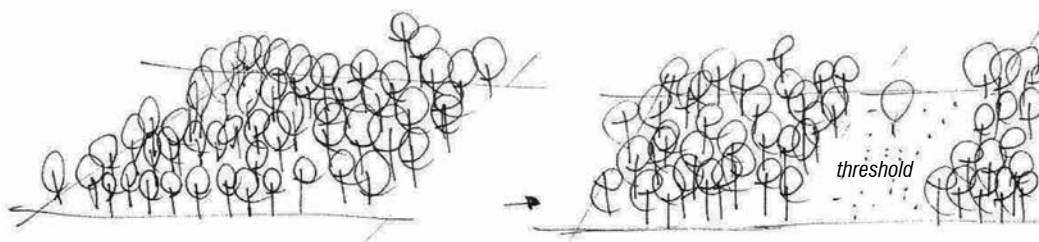
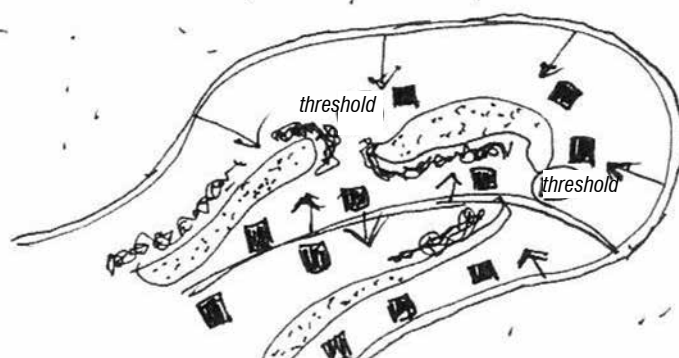
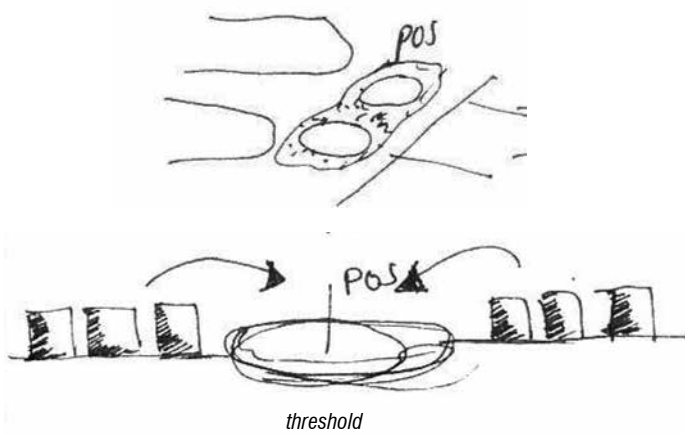
Threshold + Built (institutions)



Threshold + Built (suburban)



Threshold + Water



Threshold + Recreation

5.4 Foci

Conceptualising foci

Foci are forms or places within the landscape that draw people to them, either physically or visually. Their dominance arises with respect to, or contrast to, the surrounding landscape. Foci are important as they support a continuum of movement and sequence through the landscape. They form interchanges along path networks to assist people in orientating themselves within the landscape (see figures 5.13 and 5.14). They may be a gathering place and, in this respect, adopt some of the functions of nodes, as areas to wait, rest and contemplate. Foci may be centred or emphasise edges, depending on the landscape material of water, vegetation, topography or built form.²²²

From a structural landscape perspective, foci can be singular built objects within the landscape, or landscape elements that are positioned to stand out, through a sequence of movement or events. Given this, the relatively flat landscape of the SCP emphasises two foci, the sky and the horizon. Operating at a scale beyond the quadrat sample, the sky and horizon are significant. In the orthophotos (dating from the 1950s to the 1980s) within Appendix A, the focus is upon the intersection of land and sky at the horizon. As the city begins to urbanise more rapidly, the focus of the horizon is internalised and the reorientation of foci is to the built objects within these spaces.²²³

Foci can also arise from the clearing and absence of space around a landscape feature. Natural topographic variations are heavily predominant in the eastern area of the peri-urban territory adjacent to the Darling Scarp.²²⁴ Clearing of raised topographic features creates focal points, albeit temporary.²²⁵ Clusters of remnant bushland²²⁶ within cleared areas of the territory form focal points and over time they evolve into internal threshold spaces within the urban area. Similarly, BRM extraction sites and the harvesting of state pine plantations form dynamic focal points within the peri-urban.

Land-use planning compartmentalises similar land uses. The co-location and agglomeration of buildings related to similar land uses can form an area of focus. This is particularly noticeable in commercial and industrial “parks”,²²⁷ as well as the “sea of roofs” that appears in newly formed

222. Dee, *Form and Fabric*, 145–48.

223. See Appendix A, Quadrats 21, 26, 32, 49 and 69.

224. See Appendix A, Quadrats 8 and 44.

225. The quarries scattered along the Darling Scarp are examples of this. For example, the Darlington quarry.

226. Typically known as “Bush Forever” sites.

227. See Appendix A, Quadrat 41.

suburban clusters set adjacent to or within rural land-use areas.²²⁸

In planned and designed landscapes, foci are intentionally used to support the sequence of movement through a space. In the peri-urban territory, there is little evidence of planned and designed foci, instead those that do appear arise from a continuum of landscape change and shaping of the landscape that externalises and internalises the foci condition.

Focal types

The following sections identify the landscape structural focal types deduced from the analysis of the seventy quadrats within the peri-urban territory of Perth.

Foci + Horizon

Foci are evident across a range of compounding scales. However, when the horizon is a focus, it presents as scenic background towards which suburban development advances. Accordingly, the minimal topographic variation across the peri-urban territory aids the advancement and occupation of this space as a setting for the city. Low-density suburban housing advance outwards and the paths leading to these spaces emphasise the horizon; however, once contained within the suburb, the focus is internalised. Turning its back to the broader landscape, the horizon, which has been instrumental in structuring the city forward, is diminished.

Rarely does the peri-urban interface intersect with the coastal area to the west; however, when it does at the city's most northern and southern extents, the horizontal plane of water of the Indian Ocean and the horizon becomes a synergised and dominant landscape feature.

The horizon emphasises the sky plane and thus facilitates and emphasises the shift from the scale of the landscape to that of the region. The horizon is the mediating device that is emphasised by road paths, which promote the experience of the peri-urban territory at speed.²²⁹ In this respect, local foci are lost because of the rate of experience brought about by increasing vehicular travel. The rate of transition from local to the landscape scale is facilitated by nodes that support a place to wait, rest and reflect as well as the continuity of landscape character as you move through the peri-urban.

228. See Appendix A, Quadrats 39, 53 and 59.

229. Appleyard, Lynch, and Myer, *The View From the Road*.

Foci + Topography

The three major ancestral dune systems of the SCP reveal the geomorphology of the metropolitan area. The undulating topography of the Quindalup, Spearwood and Bassendean dune systems²³⁰ channel the water into the major river systems of the Swan and Canning rivers or into the geomorphic wetland areas located in the swales between them. Accordingly, the meta-topography of the region is understood through the dune systems and their water filled depressions. The chain of wetlands between the Quindalup and Spearwood dunes contain the largest chain of wetlands in the north and south of the city. However, the continuing urbanisation and cultivation of these wetland areas results in a loss of understanding and knowledge of the subtle topographic and geomorphological nuances across the metropolitan area.²³¹

Subsequently, this subtle reading of topography has been eroded within the peri-urban territory. Conversely, the Darling Range, which forms the eastern extent of the metropolitan area, becomes an important focus. It forms a narrow strip of parkland between 200 and 300 metres in altitude and consolidates the suburban centres of Darlington, Kalamunda, Roleystone and Mundaring.²³² In this regard, the hills became an area of ecological protection²³³ and a focal backdrop for living and recreation of the urban settlement on the plain.²³⁴

Foci + Water

The river and geomorphic wetlands of the SCP form moments of localised foci within the peri-urban territory as well as reinforcing the geomorphology of the city at the meta-scale.

Foci of water are important in displaying the processes of landscape change and interconnectedness of landscape systems. As a structuring element for peri-urban development, the Swan and Canning rivers provide strong continuity to the alignment of property ownership along the riverfront and the perpendicular layout of roads that terminate at the river.²³⁵ Furthermore, the allocation of POS alongside the rivers provide continuity of water foci from the immediate foreground to the background, local landscape to the regional.²³⁶

Wetlands appear to be a pervading and consistent focus type across the peri-urban; however, over

230. Parallel to the coast from west to east.

231. See Appendix A, Quadrats 17, 38 and 52.

232. Stephenson and Gordon, *Plan for the Metropolitan Region*, 76.

233. As related to endemic vegetation and securing water sources across drinking water dam areas.

234. Metropolitan Region Planning Authority, *Corridor Plan*, 15.

235. See Appendix A, Quadrats 3, 12, 25, 44 and 61.

236. See Appendix A, Quadrat 12. Also, Department of Conservation and Land Management, *Canning River Regional Park*.

time, these have been filled or have shrunk to support the foundations for suburban development or to meet the targets for POS quotas.²³⁷ However, some wetland foci have been retained and have been internalised in urban areas to inform a new aesthetic as urban lakes.²³⁸

From an ecological sense, water foci are critical in supporting biodiversity as many ecosystems are dependent upon the wetlands and their biodiversity is affected by longitudinal changes brought about by a drying climate.²³⁹ Their boundaries and edges represent a rich and fragile transition between terrestrial and aquatic environments.²⁴⁰

Collectively, water foci represent tangible blue infrastructures for biodiversity as well as liveability of the urban area in the way they support POS and experiences adjacent to them.

Foci + Infrastructure

Several infrastructure types appear as foci within the peri-urban territory. These include energy, communications, water networks and the junctions of road and rail networks where they appear as transit nodes.

These foci are markers that identify previously held limits of the city's advancement; for example, the high-voltage overhead transmission power lines create a linear vertical boundary in the third dimension. Typically, their location is on the outer side of the urban edge interface. However, as the city expands, they become contained within and form vertical threads through and between urban areas.²⁴¹ In addition, some of the spaces underneath these foci have been transformed into POS or grassland habitats because of their incompatibility with residential areas.²⁴²

Water towers represent built and landscape focal forms and spaces. Located on high points, these foci reinforce topographical changes within the landscape and in doing so, build the legibility of the peri-urban territory. Being elevated, they also connect the sequence of movement within their surrounds to the sky and the horizon.²⁴³

Intersections of major vehicular road paths create flyovers and where these occur, they are

237. See Appendix A, Quadrats 3, 7, 13, 15, 18, 28, 32, 33, 37, 42, 47, 65, 66 and 69.

238. See Appendix A, Quadrats 2, 10, 37 and 50.

239. English and Keith, "Assessing Risks to Ecosystems," 413-416.

240. Cadenasso et al., "An Interdisciplinary and Synthetic Approach," 719.

241. See Appendix A, Quadrats 32, 33, 42, 46 and 57.

242. For example, Quadrats 32 and 33. There are two drivers here: firstly, visual impact and undesirable character of large transmission lines; and secondly, speculations about the impacts of health. See World Health Organization, *Electromagnetic Fields and Public Health*.

243. See Appendix A, Quadrats 6, 20 and 48.

experienced at speed through the windscreen of a vehicle.²⁴⁴ A more recent attempt to create an aesthetic experience at these flyovers is evident along the southern corridor armatures of the Kwinana Freeway. Here they are both foci and threshold experiences.

In addition, the southern and northern freeway armatures, the Kwinana Freeway and Mitchell Freeway respectively, have passenger rail lines along their median. The sequence of railway stations along these armatures are distinguishable foci that mark passenger interchange points within the territory.²⁴⁵ Accordingly, the termination of these built foci along these two major armatures indicates the commuting limits for a large proportion of the urban population.

Foci + Basic Raw Material

The structural requirements to support greenfield development includes the requirement for large amounts of BRM, namely sand, lime and clay, crushed for aggregates or sand to fill low-lying areas of land.²⁴⁶ The source sinks of these materials track the outer limits of suburban development at any given time.²⁴⁷ To this end, in a city that continues to urbanise outwards, BRM sites become requisite negative voids resulting from incremental expansion of the built suburban edge. Ironically, this urban encroachment onto BRM sites affects the viability of these sites for future urban development because these land-use types are often incompatible with residential areas.

The resulting hollowed-out sites become repellents to urban development in the same way that industrial development requires distance from residential areas. In both cases, they rely on the highly efficient movement of goods and services throughout the peri-urban territory through linear road infrastructures and or rail paths.²⁴⁸

Therefore, the primary sites of the extraction industry become localised foci and the areas of disturbance set forth the ground for future opportunities for the occupation of these spaces once BRM peak extraction has been reached.

244. See Appendix A, Quadrats 10, 33 and 52.

245. See Appendix A, Quadrat 1.

246. Metropolitan Region Planning Authority, *Corridor Plan*, 15.

247. See Appendix A, Quadrats 4, 27, 34, 35 and 43.

248. Western Australian Planning Commission, *Network City*, 37.

Foci + Built (suburban)

The peri-urban interface is marked by the adjacency of the urban built area to another land use, usually rural.²⁴⁹ Throughout the first few decades of metropolitan planning (as evident in the quadrats in Appendix A), there appears to be a stronger structural connection between the suburban and the rural landscape.²⁵⁰ In this regard, the focus of the suburb is diminished because it references outward towards the broader landscape of the peri-urban territory. However, as the population rapidly increases, there is evidence of a growing continuity of built edge. In this way, there is a diminishing focus on the peri-urban territory and instead, it becomes evident that the focus turns back onto the built edge of the suburb.²⁵¹ This connection is further exacerbated by the collective sea of suburban roofs that becomes a focus, reflecting the sky and the sun and reiterating the advancement of the suburbs across the coastal plain. Furthermore, in some of the newest suburban developments in the city's north, there is a deliberate attempt to conceal the horizon and landscape features behind artificially created landscapes.²⁵²

The accumulated sequence of connected foci at the landscape scale experienced through vehicular movement along primary, secondary and tertiary roads to the entrance of a suburb, then to the garage door of the lot, quickly shifts this focus. Here, the experience of the immediate suburban landscape forms an imaginative and figurative focus of what life could be (and is)—it become internalised, and therefore forms the relationship and orientation of the people between the inside and the outside of the suburb at the edge along the peri-urban interface.

To this point, this internalisation of foci promotes further fragmentation and alienation from the surrounding peri-urban territory. This is compounded by a high proportion of new development that has been suburban greenfield development,²⁵³ driven by a growing demand to deliver housing affordability.²⁵⁴ Consequently, the cheapest way to do this is to further erode local landscape topography, vegetation, soil and waterflows (the natural foci of the peri-urban) to deliver and capitalise on demand. Here, landscape does not matter, the shift of foci from the horizon to suburban roofs and dwellings is a significant marker of the loss of landscape and place. However, the potential that exists

249. See Appendix A, Quadrats 28, 29, 42, 56 and 69.

250. As evident in the Quadrats located within the inner areas. See Appendix A, Quadrats 3 (1985), 7 (1965), 10 (1964) and 15 (1974).

251. See Appendix A, Quadrats 10, 12, 15, 18, 21, 37 and 49.

252. See Appendix A, Quadrat 53.

253. Western Australian Planning Commission, *Directions 2031 and Beyond*, 4; Western Australian Planning Commission, *Perth and Peel@3.5million*, 20–21. It was not until 2004 when the *Network City* metropolitan plan built on ideas of urban consolidation to restrict urban fringe development. Before this, development on the edge of the city accounted for more than three-quarters of all new development. More recent metropolitan planning policies still indicate greenfield development of 53%.

254. Thomas and Hall, "Housing Affordability in Australia." Where housing affordability is defined by the relationship between expenditure on housing (prices, mortgage payments or rents) and household incomes. In 2016, this figure for Perth was \$520,000.

here is how the structural qualities of landscape foci can be reorientated and integrated into the built interface of the territory and how this might encourage social benefits and emergent possibilities of the multiple places of the territory.

Foci + Built (rural)

The built conditions of the rural and agricultural landscape form notable focal points within the quadrats. Rural sheds situated within the working rural scene²⁵⁵ bring the peri-urban territory into being and translate ideas pertaining to the cultivation of the landscape for food production for a bigger domestic market.²⁵⁶

The intensity of the rural foci changes over time. The rural sheds and associated rural agricultural industries form a unique patterned focus across the quadrats with a high proportion of these continuing to maintain some form of peri-urban rural built character.²⁵⁷ These built forms become cultural markers of landscape change and the heterogenous occupation of people and their connection to place within the peri-urban territory.

A noticeable change in the scale of the built rural sheds comes through the internalisation of agricultural production. Innovations in agricultural production; for example, hydroponics, have given way to “field” plots of agricultural production contained within large linear greenhouses that are able to produce higher yields in more controlled climates.²⁵⁸

Foci + Built (industry)

The formation of large-scale industrial areas was facilitated by the expansion of the primary road and rail corridors of the metropolitan region in the 1970s.²⁵⁹ Their location within peri-urban territory was twofold. They were planned firstly, to support an increase in workforce participation from reasonably skilled labour sources²⁶⁰ and secondly, to minimise noise, smell and heavy traffic in inner city areas.²⁶¹ Furthermore, their location on the periphery of residential development also occurred because the land was cheaper for the larger lot sizes required and good access and communication

255. See Appendix A, Quadrats 5, 7, 15, 21, 22, 25, 39, 54 and 58.

256. Stephenson and Gordon, *Plan for the Metropolitan Region*, 33. In 1955, rural sheds of piggeries were co-located with markets so the food supplies to fatten the stock were easily accessible.

257. See Appendix A, Quadrats 22, 25, 31, 39 and 60.

258. See Appendix A, Quadrats 20, 25, 44 and 56.

259. Metropolitan Region Planning Authority, *Corridor Plan*, 41. For example, Kwinana and Welshpool industrial areas correspond directly with the expansion of the freight rail network.

260. These ideas derive from the Garden City ideal as discussed in chapter one.

261. Stephenson and Gordon, *Plan for the Metropolitan Region*, 57.

could be achieved.²⁶²

Their amalgamation within the peri-urban territory is emphasised through the sudden transition to large-scale built fabric and accordingly it draws the focus of the peri-urban territory inwards towards this space.²⁶³ Furthermore, because of their large-scale, industrial areas create a focus at their borders in their intersection with residential or natural landscape areas within the territory.

Foci + Institutions

Several types of built form become custodians to cultural patterns and processes within the peri-urban territory. These built forms are significant focal points and include buildings for religious purposes, prisons, big box retail and sporting precincts.

Religious buildings typically represent the religions of cultural minority groups, and in this regard are seen to be disparate with suburban areas of the already built up city.²⁶⁴ Pushed to the periphery, they become a destination and a sanctuary for an array of cultural groups and their practices. Consequently, there is evidence that this also causes the amalgamation of different religious buildings. In the north-east of the peri-urban, several large religious buildings are evident within 2 kilometres of each other.²⁶⁵ Marshall Road, in the suburb of Beechboro, forms the path along which these buildings become nodes, housing various religious experiences.²⁶⁶ Typically, their scale, proportion and unique design ensures they form foci within the surrounding landscape.

Prisons are unique in their form and position within the peri-urban.²⁶⁷ Prisons are typically located at the periphery (at some point in time), their forms representing a focal point of exile from the city. Of course, as the city continues to expand outwards, the city seeks to reclaim these spaces as neighbouring built forms. These processes are what Massey argues to be representative of the production of space of a western democracy.²⁶⁸

The peri-urban territory is also home to the foci of large-scale retail outlets of homewares and home

262. Stephenson and Gordon, *Plan for the Metropolitan Region*, 10.

263. See Appendix A, Quadrats 28, 37, 41 and 67.

264. Further to this they are often the target of anti-religious and anti-racial vandalism attacks. See *The West Australian*, "Vandals Attack Sikh Temple."

265. See Appendix A, Quadrat 3, which includes various religions including the Hindu (Shree Swaminarayan Temple (Mandir), Perth), Sikh (Sikh Gurdawara, Perth) and Buddhism (Cambodian Temple).

266. Located 1.5 km to the west outside of the frame for Quadrat 3 but also located along Marshall road, an old drive through cinema has been converted into The Potter's House Christian Centre.

267. See Appendix A, Quadrats 24 and 68.

268. Massey, *Space, Place and Gender*, 149. Massey explains in her argument of place that it is: "about what one might call the power geometry of it all; the power geometry of time—space compression. This point concerns not merely the issue of who moves and who doesn't it is also about power in relation to the flows and movement."

trades.²⁶⁹ Large big box retail are motherships of the peri-urban and the suburban dream. They represent the aspirations of the suburban population and the individualising of private nodes of the residential home. They are built foci and a land-use pattern that has come to be recognised as a cultural marker of the city's periphery and consumer lifestyle.

Furthermore, various modes of recreation that incorporate combined sporting facilities, specifically those that support smaller membership and spectator numbers, are enabled by the lower land costs and available space that the peri-urban territory offers.²⁷⁰ Their requirements for built structures and large car parking aprons are easily afforded on the edge of the city.²⁷¹

Foci + Vegetation

Structural changes to the endemic vegetation of the peri-urban territory situates the landscape as a projected focal background to the dominant form of the built suburbs and city. Here, where vegetation is situated as background, there continues to be an inability to cultivate and structure a metropolitan aesthetic from the ecologies of the SCP.

As a result, vegetation foci occurs in two ways. First, as a series of aggregated focal points formed by clumps of vegetation in fields surrounded by cleared patches of endemic vegetation. These foci draw attention to the mid and foreground of the peri-urban territory. Additionally, they become critical sinks for living biota as they form islands between disconnected fragments of vegetation.

Second, the clearing of vegetation becomes a focal point within the landscape and in doing so, challenges the notion of living in the suburbs among unspoilt nature.²⁷² In fact, the tabula rasa approach of modernist planning procedures, which begins with the clear-felling of endemic vegetation, clears the stage for progress.²⁷³ The displacement and temporality of endemic vegetation clumps forms unique areas of contrast in focus between the indifferent land uses within the peri-urban as they succumb to the suburban spread.

Finally, vegetation associated with intensive agricultural uses becomes a distinct focus as suburbs encroach upon these traditional peri-urban land types. Their structure within the peri-urban territory initially marks the outward limit of suburban development. Over time, they become urbanised and

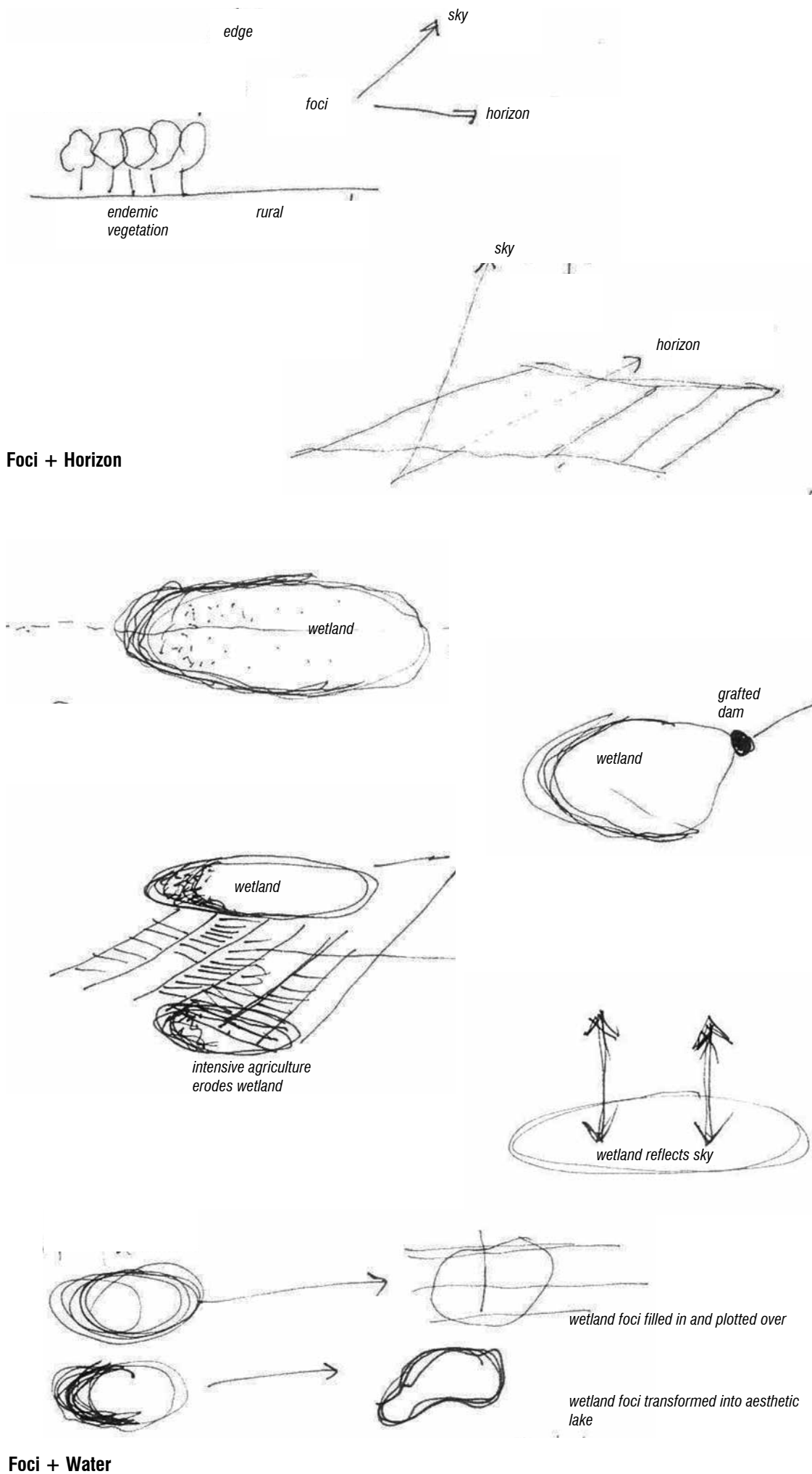
269. For example, leading retailers of IKEA and Bunnings Warehouses. See Appendix A, Quadrat 64.

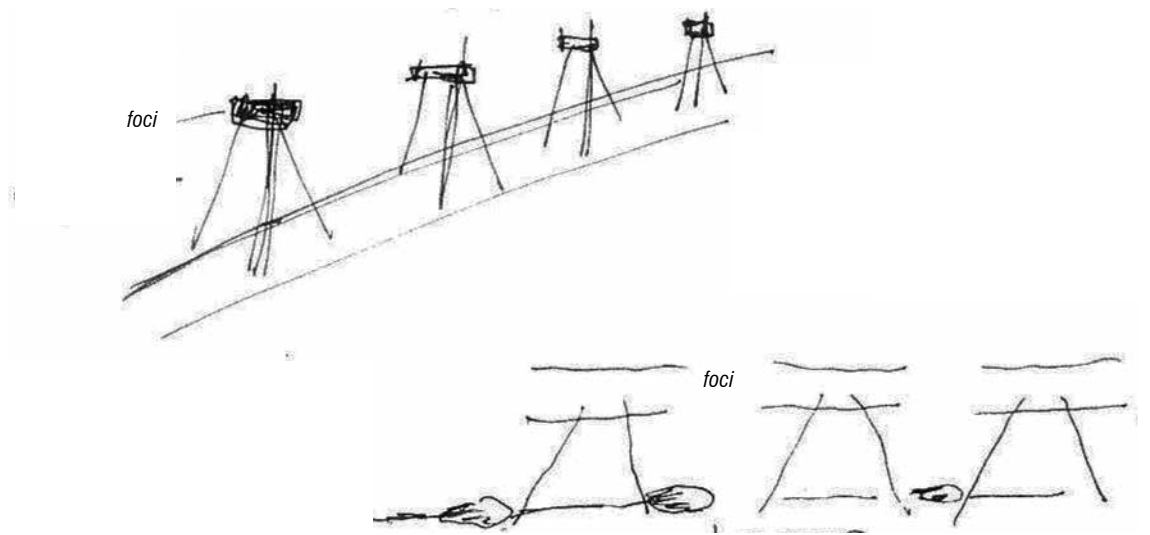
270. See Appendix A, Quadrat 5, Perth's Velodrome and Quadrat 47, Champion Lakes Regatta Centre. Several other recreation precincts consisting of playing fields, club houses and car parks can be found as nodes attached to Reid Highway, the main freeway that circumnavigates the city in the north, east and southeast.

271. Appendix A, Quadrat 5 and 47.

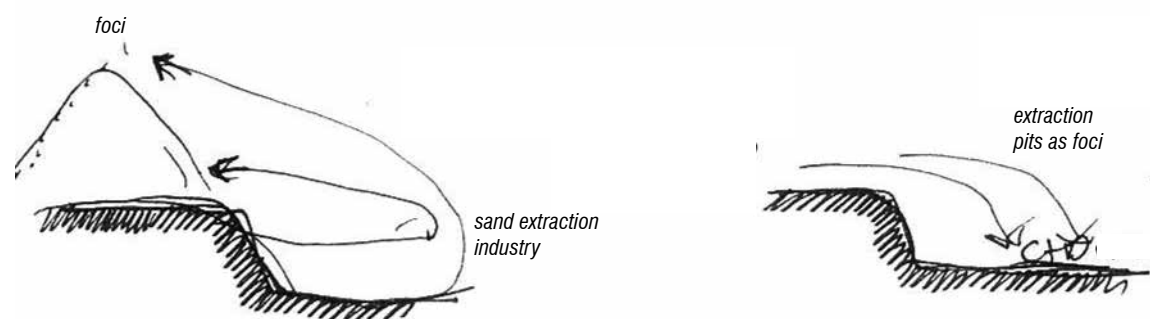
272. As discussed in chapter three.

273. Stephenson and Gordon, *Plan for the Metropolitan Region*, 78. For example, the vegetation of the Bassendean Association has been lost to ensure "close and continuous development that is necessary to provide essential services."

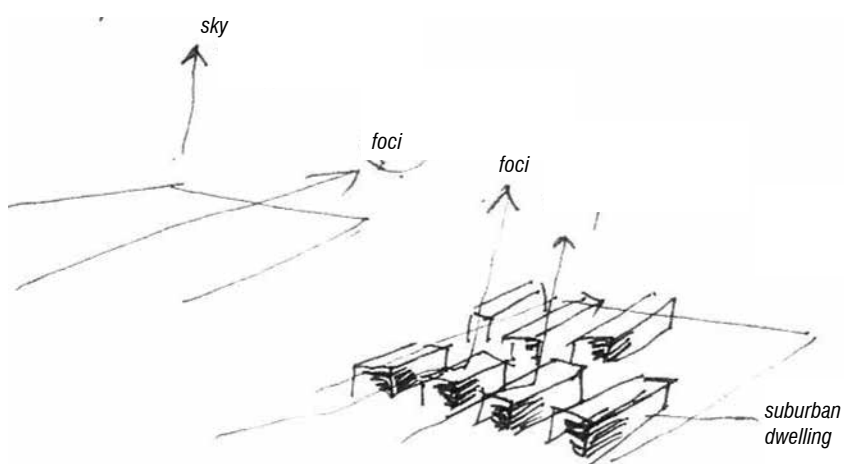




Foci + Infrastructure



Foci + Basic Raw Material



Foci + Built (suburban)

Figure 5.14 Peri-urban foci types (*infrastructure, basic raw material, built*)
(Author, 2017. line drawing)

enclosed, acting as remnant lots and a centralised focal point.²⁷⁴

Foci + Public Open Spaces

POS have been emphasised as a critical component of the city in supporting the wellbeing of its residents.²⁷⁵ They have been developed in close and continuous development with the suburban expansion to provide essential services to a growing city.²⁷⁶

The scale of POS from the broad landscape scale to the internalised spaces of the neighbourhood and lot create varying focal moments. The increase of building footprint-to-lot ratios means the imperative of the local foci as opportunities to facilitate the experience of people in the broader landscape is diminished.²⁷⁷

The focus, however, is not the illustrative scenery but the broader meta-landscape characteristic of the foothills, horizon and wetlands that are so particular to this place and the peri-urban territory more generally. The internalisation of the suburb, beginning at the entry statement and moving in to the artifice of the POS at its heart,²⁷⁸ is reinforced through a cultural framework of street names that represent landscape character that has been lost.

5.5 Reflection: classifying peri-urban types

This chapter continued to develop the third stage of inquiry that operationalises the discovery of the peri-urban territory. In accordance with this discovery, the strategic metropolitan plans of Perth have provided a high-level spatial framework and have attempted to enforce two primary goals:

1. Where the development should be located and what land uses and transport are required to support development.
2. What is needed to be protected to retain high-quality natural environments and resources.²⁷⁹

These goals are focused on facilitating continued urban growth within the metropolitan region and provide assurance, protection and prioritisation of future urbanised land while inferring connections between people and the landscape. While this was evident at the meta-scale of the region, the

274. See Appendix A, Quadrat 19. This area of the peri-urban located within one of the first peri-urban areas continues to be engulfed by suburban development. The intensive agricultural areas are unique foci within this quadrat.

275. Stephenson and Gordon, *Plan for the Metropolitan Region*, 201.

276. Stephenson and Gordon, *Plan for the Metropolitan Region*, 78.

277. Wright, "Perth Homes Get Bigger."

278. See Appendix A, Quadrats 3, 29, 50, 55 and 59. Quadrat 65 shows a new suburban development that challenges this and begins to connect its internal POS to wetland systems north and south of the development.

279. Western Australian Planning Commission, *Directions 2031 and Beyond*, 1.

descriptive and classification analysis in chapter four found that “landscape” more often than not defaulted to the narrative of scenery, by providing a backdrop to urban development.²⁸⁰ This is despite the natural environments of the SCP (as determined in accordance with regulations of land-use planning) being preservation landscapes centred on the primary natural systems that have defined metropolitan region planning since 1955. Through the classification of types identified in this chapter, those that hold the highest value are the beaches and coastal landscapes, the Swan and Canning rivers, the Darling Escarpment, wetland habitats and remnant bushland parks. Furthermore, the value (as articulated in the statutory plans for the city) placed on landscapes that provide water resources and a sense of place and on food producing rural lands close to the city continue to be removed or negotiated or become remnants in the shadow of urban development.²⁸¹

Peri-urban thickness

The typologies illustrated within reinforce the landscape structural components that are necessary for the imageability of the peri-urban territory to be expanded. Similarly, the opportunity for the intentional design and construction of the tangible spaces of landscape (paths, nodes, thresholds and foci) becomes apparent, not only to assist movement through the peri-urban territory but also to gently choreograph people’s relationship and their making of memory to and within this place.

To this effect, these types illuminate the need to build and create landscapes that are equal and consummate to the monumentality of suburbanisation and its industrial, infrastructural, waste, water and food systems that enable the city to continue to expand. These spaces need to be made of the physical matter of the landscape, one in which we reside and from which we build memory.

Peri-urban potential

While many of the natural areas having undergone direct conflict with urbanisation during this time,²⁸² of the 70 quadrats surveyed, 54 (77%) display evidence of containing one valued landscape indicator. In addition, across the final 2016 dataset of the 70 quadrats, only 15 (21.4%) could be classified as entirely urban (see table 3). Instead, areas where the peri-urban condition is evident tend to continue to exhibit peri-urban structural types by evolving without tending towards full urbanisation. That is, not all peri-urban lands become urban over time. Therefore, because highly valued landscapes become a clear indicator of value, they form a critical component of determining

280. This is discussed in more detail in chapter three.

281. Western Australian Planning Commission, *Directions 2031 and Beyond*, 5.

282. Western Australian Planning Commission, *Directions 2031 and Beyond*, 2.

Table 3. Classification of quadrats in accordance with MRS zones

Quadrat	1953	1965	1974	1985	1995	2005	2016
1 outside city proper	periphery	peri-urban	peri-urban	urban	urban	urban	
2 outside city proper	periphery	periphery	peri-urban	peri-urban	urban	urban	
3 rural	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
4 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	urban	
5 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
6	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
7 periphery	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
8	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
9	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
10 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban remnant	peri-urban remnant	peri-urban remnant	
11 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	urban	urban	
12 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	urban	urban	
13 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban remnant	urban	
14 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban remnant	urban	
15 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban remnant	urban	
16 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
17 periphery	periphery	periphery	peri-urban	peri-urban	peri-urban	peri-urban remnant	
18 periphery	periphery	periphery	periphery	peri-urban	peri-urban	peri-urban	
19 periphery	periphery	peri-urban	peri-urban	peri-urban	peri-urban remnant	urban	
20	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
21	periphery	periphery	peri-urban	peri-urban	peri-urban	peri-urban	
22	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
23	outside city proper		outside city proper	peri-urban	peri-urban	peri-urban	
24 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
25 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
26 peri-urban	peri-urban	urban	urban	urban	urban	urban	
27 rural	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
28 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	urban	
29 rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
30	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
31	rural	rural	rural	rural	rural	peri-urban	
32 rural	rural	peri-urban	peri-urban	urban	urban	urban	
33 rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	urban	
34 rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
35 rural	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
36	rural	rural	rural	rural	rural	peri-urban	
37 rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
38	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
39	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
40	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
41 outside city proper	rural	peri-urban	peri-urban	peri-urban	peri-urban	urban	
42 outside city proper	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
43	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
44 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
45	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
46 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
47 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
48 peri-urban	peri-urban	peri-urban	urban	urban	urban	urban	
49 rural	rural		peri-urban	peri-urban	peri-urban	peri-urban	
50 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	urban	
51 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
52 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
53	peri-urban		peri-urban	peri-urban	peri-urban	peri-urban	
54	peri-urban		peri-urban	peri-urban	peri-urban	peri-urban	
55	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
56	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
57 outside city proper	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
58 outside city proper	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
59	rural	rural	rural	peri-urban	peri-urban	peri-urban	
60	peri-urban	peri-urban	rural	rural	peri-urban	peri-urban	
61 rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
62	rural	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
63	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
64 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
65 outside city proper	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
66 rural	rural	rural	peri-urban	peri-urban	peri-urban	peri-urban	
67 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
68 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
69 peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	
70	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	peri-urban	

	rural
	periphery
	peri-urban
	urban
	peri-urban remnant

potential within the peri-urban territory. Accordingly, these landscapes not only support urbanisation and protect and retain high-quality natural environments and resources but also support and enhance human wellbeing. They also provide opportunities for cues and sequences (by design) to assist movement through the peri-urban territory and improve its imageability. In this regard, choreographing people's relationships and their making of memory to and within this place creates an important literacy of the territory that is crucial to facilitate longer-term engagement and booster areas for climate change resilience in the Anthropocene.

In this respect, city growth must be seen to not only facilitate more urbanisation but also enhance and contribute to positive human connections with the city landscape. The connections that support wellbeing are perceived by people as "situation-dependent", reflecting local geography, culture and ecological circumstances.²⁸³ The potential for this to occur within the peri-urban territory is linked to its changing structure and function and as the thesis argues, it is underpinned by three components: understanding the territory, exploring its potential and foregrounding the role of landscape architecture in its (re)making. Can the connection of people to the immediate, local and broader landscape can be emphasised and designed? Yes, it appears the potential of landscape to assert itself as the medium to cultivate imagination, purpose and reflection within the dynamic landscape of the peri-urban territory is possible and necessary.

5.6 Conclusion

This chapter discussed the classification of structural and functional change of the peri-urban territory of Perth between 1953 and 2016. This was derived from a qualitative interpretive and classification methodology of seventy, 2 kilometre x 2 kilometre square quadrats located across the peri-urban territory. The abductive analysis revealed unexpected conditions of the peri-urban and used the researchers cultivated knowledge to support the analysis.

A conceptual framework derived from the principles of the formation of space from the disciplinary perspective of landscape architecture were applied and explained through policy implication enforced at the metropolitan scale. Through this framework, a series of peri-urban types connected to the spatial structure of paths, nodes, thresholds and foci were identified. I established that these types explain a multitude of dynamic and potential conditions characteristic of the peri-urban territory of Perth.

283. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being*, 3.

Furthermore, the types reinforced the pervading narratives of the peri-urban discussed in chapter three and secured a methodological approach for assessment and interrogation of the spaces contained within this territory. Moreover, the typologies illustrated how landscape change is representative of cultural values assigned to this territory. The following chapter will provide further explanation of the types and their relationship and connection to landscape values.

06 Valuing peri-urban types

6.1 Introduction

In chapter five, peri-urban types were identified by their structural and functional characteristics and classified into types. Through the disciplinary lens of landscape architecture, they were explained in relation to theoretical, socio-cultural and ecological perspectives. The types reaffirmed the creation of a peri-urban territory as a product of human interaction within the landscape according to the planned outward urban growth and changing relationship of rural lands to the city. While the quadrats illustrated a diminishing differentiation (heterogeneity) of the landscape structure, peri-urban components remained a distinct characteristic of the territory. Conversely, the landscape meta narratives of the metropolitan area (described in chapter three) outlined in the statutory plans for the city were often displaced at the landscape scale.

The diminishing differentiation and specification of the peri-urban as a result of until recently unabated outward urban growth has impacted the performance of ecological and socio-cultural parameters that are richly entrenched within the peri-urban territory. Indeed, a desire to create a liveable metropolis has occurred largely at the expense of these significant SCP ecologies. These social and environmental parameters are critical to liveability because landscape forms and thus landscape beliefs, experiences, knowledge and preferences are all fundamental to inscribing and communicating a culture's relationship with the peri-urban landscape.¹

This chapter will explore how the structural components of the peri-urban territory contribute to its value. The Oxford Dictionary identifies value in three ways: intrinsic/comparative worth, individual preference/opinion and collective morality.² Subsequently, landscape value is first discussed in the context of cultural landscapes as a universal principle for determining the meaning and importance of landscapes for people. Landscape value is then considered from the disciplinary perspective of landscape architecture, and then the continuing duality of nature and culture that informs paradigms within the peri-urban. These paradigms are used as a framework to determine the value of the peri-urban types deduced from the structural and functional analysis of the peri-urban territory in chapter five. Additionally, the values are critically examined through commentaries on Perth's peri-urban territory and through landscape architectural practice more generally.³ Accordingly, the

1. See Meinig, *Interpretation of Ordinary Landscapes*; Brinckerhoff Jackson, *Discovering the Vernacular*; Hoskins, *Making of the English Landscape*; Cosgrove, *Social Formation and Symbolic Landscape*.

2. Oxford Dictionary (online) <https://www.oed.com/>

3. A review of the past ten years of projects (2006–2016) within *Landscape Architecture Australia* (until recently, Australia's only landscape architectural journal), identified in Appendix B, have been used to evaluate the profession's engagement within the peri-urban territory.

peri-urban types become not only representative of the territory but also reveal the opportunities for future engagement of people, their experiences and knowledge within it. In this regard, the aim of this chapter is to understand a range of landscape values specific to the peri-urban that can support the meaningful enactment of ecological and cultural relations within the territory. In doing this, the potential for a relationship between the processes driving peri-urban transformation and the profession of landscape architecture, whose primary role is in the formation of culture–nature relations through design, is established.⁴

6.2 The cultural landscape

The work of American geographer Carl Sauer is where the term “cultural landscape” originates. For Sauer, humans were instrumental in the transformation of the natural landscape, “the cultural landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result.”⁵ Sauer argued that the cultural landscape is formed by a summation of observing “individual scenes” that are guided by the pattern and structural quality of the landscape itself. He explains that the observation is “distinctly anthropocentric” because it is driven by personal interest in the landscape. For Sauer, value comes from those parts of the physical qualities of the landscape that are of use to us, through either their habitat value, present or potential.⁶

In 1992, the United Nations Education and Scientific and Cultural Organization (UNESCO) adopted a framework for evaluation where natural and cultural landscapes combine to represent the diversification and manifestations and common heritage of humankind with their environment.⁷

UNESCO defines those landscapes, of differing regions of the world that represent long-term relationships with people and their natural environment, as cultural landscapes. Accordingly, cultural landscapes are seen to contain significant value:

Cultural landscapes are cultural properties and represent the “combined works of nature and of man” designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic

4. See Meyer, “Expanded Field of Landscape,” who connects the formation of landscape with the processes that generate it.

5. Sauer, *Morphology of Landscape*, 343; Cosgrove and Daniels, *Iconography of Landscape*; Olwig, *Landscape, Nature*.

6. Sauer, *Morphology of Landscape*, 43–47.

7. United Nations Education, Scientific, and Cultural Organization (UNESCO), *Convention Concerning the Protection of the World Cultural and Natural Heritage*.

and cultural forces, both external and internal.⁸

The cultural landscape definition subsequently became the first international legal framework to recognise and protect cultural landscapes. Of the three categories that define cultural landscapes, peri-urban landscapes, as a territory produced by the association of urban and rural influences, falls into the second category of “organically evolved landscapes”, which is defined as:

a continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time, it exhibits significant material evidence of its evolution over time.⁹

Similarly, situating peri-urban territories as cultural landscapes (because of their continuing associative contribution to society and the natural world), aligns with UN Sustainable Development Goal 11,¹⁰ of which the first indicator identifies:

Urban–rural linkages support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.¹¹

Furthermore, the International Federation of Landscape Architects (IFLA) code of ethics defines the standards expected of landscape architects to society and the environment of which cultural and historical context and the ecosystem is to be recognised and protected.¹² Importantly, understanding peri-urban territories as cultural landscapes in their own right supports the evaluation of value arising as a social construction by different cultures.¹³ Accordingly, as this thesis argues, value is something that can be influenced through the choreography of people’s engagement with the landscape.¹⁴ In this respect, the profession of landscape architecture has an obligation to carry out their responsibilities to peri-urban (rural–urban) landscapes because when they are perceived as cultural landscapes, they form a substantial component of what is valued by humans.

8. UNESCO, *Guidelines on the Inscription*, 85–95. Accessed December 13, 2018 <https://whc.unesco.org/archive/opguide08-en.pdf#annex3>.

9. UNESCO, *Guidelines on the Inscription*, 84.

10. United Nations, *Transforming our World*, 14.

11. United Nations, *Transforming our World*, 21–22. See Sustainable Development Goal 11.a: Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.

12. See, International Federation of Landscape Architects, “IFLA Code of Ethics.”

13. Ingold, “Introduction to Culture,” 329–49.

14. For example, the presence of imported plant species of the southern Mediterranean becomes representative of geographical migration patterns within Perth’s peri-urban.

6.3 Determining landscape value

The significance of cultural landscape value has been pursued largely in a European context through the European Landscape Convention, whose purpose is to identify and define the substantive nature of landscape in planning.¹⁵ Here, landscape continues to be evaluated as a critical component of peoples cultural, environmental, social and ecological lives and surrounds. The European Landscape Convention defined landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”.¹⁶ In the same regard, the Convention describes landscape “quality” as an objective achieved through the formulation of landscape by the public and its agencies to achieve collective aspirations of the landscape features and their surroundings.¹⁷

The Convention set forth the incorporation of values into policies that affect the professional practice of landscape within landscape planning and landscape architecture in Europe, and consequently influenced professional bodies worldwide to adopt similar frameworks to support and promote the importance of landscape values in practice.¹⁸ Subsequent influences from the US Forestry Service¹⁹ inform practices primarily concerned with the inventory and analysis of landscape aesthetics related to National Forest lands. In an Australian context, the establishment of landscape values is less consistent; however, necessary. For the city of Perth, this is arguably even more paramount because of the unique landscapes that underpin one of a few biodiversity hotspots in the world.²⁰

As early as 1994, the West Australian State Department of Biodiversity, Conservation and Attractions²¹ adopted an approach to describing landscape character and inventories of natural landscape character types that form a frame of reference and associated values for Perth.²² However, character types had already been determined as early as the first incarnation of the metropolitan plan in 1955. Here, the lowest landscape value was attributed to residential areas located upon land that had previously been determined to be land of poor quality.²³ Conversely, evidence of highly valued

15. Brunetta and Voghera, “Evaluating Landscape for Shared Values,” 71–87.

16. Council of Europe, *European Landscape Convention*. See also, Council of Europe and European Centre for Nature Conservation, “Pan-European Biological and Landscape Diversity Strategy.”

17. Council of Europe and European Centre for Nature Conservation, *Pan-European Biological and Landscape Diversity Strategy*, 2.

18. Green Business Certification Inc. (GBCI), *The Sustainable SITES Initiative*, accessed May 2, 2017 <http://www.sustainablesites.org/>. SITES is the first comprehensive rating system for the design, construction and maintenance of sustainable landscapes. The rating system provides a wide-ranging set of guidelines needed to measure the performance and the value of sustainable landscapes. Further to this, the rapid development of Landscape Character Assessments within the UK to substantiate the value of regional and rural landscapes. See, Landscape Institute, *Guidance for Landscape*.

19. United States Department of Agriculture and Forest Service, *Landscape Aesthetics*.

20. Myers et al., “Biodiversity Hotspots for Conservation,” 853–58; Myers, “Biodiversity Hotspots Revisited,” 916–17.

21. This is the current name for the Department. Previous names represented in the literature include the Department of Conservation and Land Management, Department of Parks and Wildlife and the Department of Environment and Conservation.

22. Stuart-Street et al., *Reading the Remote*.

23. Stephenson and Gordon, *Plan for the Metropolitan Region*, 87.

landscape character units was described in the following types:

1. Areas to be reserved and left as natural bushland.
2. Areas to be reserved and utilised for forestry purposes.
3. Areas to be used and developed as landscape parks.
4. Areas to be used or leased for recreational centres, camping or picnic grounds.²⁴

However, as the city grew, these highly valued landscape character types were negotiated. The seminal work of landscape architect and ecologist George Seddon²⁵ explains this. Seddon describes the metropolitan conurbation of Perth as living on the “plain”; however, not as a self-contained unit, because it is not a naturally productive area. The city, he argues, has always relied on minerals and resources from further afield and thus is “profoundly affected by decisions about the area that lie outside its boundaries”.²⁶ In this respect, Seddon argues for a negotiation of values, for robust decision making to ensure the land use, design and management is consistent with the values of the natural landscape systems that lie there and beyond:

The concrete mixer and the bulldozer can make landscapes as well as mar them, and the emphasis in conservation, especially in urban areas, should be on intelligent land *use* and on environmental design as well as on preservation, although there is also much that should be preserved. The first step in design is recognition, the ability to see what there is. Only then can we ask whether a given structure is appropriate to its setting, or whether a proposed land use is appropriate in a given environment.²⁷

More recently, landscape value has been differentiated to include qualities that are intangible (aesthetic, recreational and tourism) and tangible (agricultural products, biodiversity or other quantifiable economic benefits).²⁸ Tangible qualities have been expanded through an ecosystem services framework to describe the constituent elements of ecological systems that support provisioning, regulating, supporting and cultural services.²⁹ When the ecological elements of landscape are determined through the application of an ecosystem services framework, it helps to identify the complexities and interdependence of a range of ecological systems and their subsequent values.³⁰ However, it is important to emphasise that value is not absolute. Value can be an intrinsic

24. Stephenson and Gordon, *Plan for the Metropolitan Region*, 98.

25. Seddon, *Sense of Place*.

26. Seddon, *Sense of Place*, 4.

27. Seddon, *Sense of Place*, xv.

28. Ives and Kendal, “Values and Attitudes,” 80.

29. Costanza et al., “Value of the World’s Ecosystem,” 253–60.

30. Costanza et al., “Value of the World’s Ecosystem,” 253–60; Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*.

objective conceptualisation of an object or, from an environmental psychology perspective, assigned through the principles and priorities related to the valued object. Alternatively, values can be underlying, representing the general life guiding principles.³¹ Determining value in this way can be more difficult to ascertain from the landscape itself and often requires a deeper understanding of the collective human values held within it.

In fact, learning to read the landscape, to understand it, is the first component in associating value.³² This is because the assignment of values is a process drawn from the landscape in which values act as a nexus for understanding and intervening in the relations of society and environment;³³ for example, this is consistent with the values that people assign to green space.³⁴ Of all the services that green space provides, cultural services are the least represented.³⁵ As Ives argues, cultural services are an expression of the values people assign to the landscape and these values emerge from the realm of how people relate to the landscape.³⁶ Likewise, Brinckerhoff Jackson concludes that:

landscape is not scenery, it is not a political unity, it is really no more than a collection, a system of man-made spaces on the surface of the earth. Whatever its shape or size it is never simply a natural space, a feature of the natural environment; it is always artificial, always synthetic, always subject to sudden or unpredictable change. We create them and need them because every landscape is the place where we establish our own human organization of space and time. It is where the slow, natural processes of growth and maturity and decay are deliberately set aside, and history is substituted.³⁷

This conception of landscape as constructed by humans is confirmed further by Butler who describes values as “cultural constructs of time and place and integrated through social and cultural filters”.³⁸ Stephenson also argues that values can only be determined and identified by those who are part of the cultural context in attempting to understand the landscape.³⁹ Therefore, values not only represent what is valued (tangible/intangible) but also what is preferred—people’s response to the physical features of the landscape both natural and constructed.⁴⁰ Moreover, how values are assigned—by

31. Kaplan and Kaplan, *Humanscape*; Kaplan, “Aesthetics, Affect, and Cognition,” 3–32; Ives and Kendal, “Role of Social Values,” 67–72.

32. See Stigloe, *What is Landscape?*; Brinckerhoff Jackson, “The Word Itself”; Whiston Spirn, *Language of Landscape*.

33. Johnston and Gregory, *Dictionary of Human Geography*, 797.

34. Hunter and Luck, “Defining and Measuring,” 1139–63; Jorgensen and Gobster, “Shades of Green,” 338–63.

35. Ives et al., “Capturing Residents’ Values,” 32–43.

36. Plieninger et al., “Assessing, Mapping, and Quantifying,” 118–29.

37. Brinckerhoff Jackson, “The Word Itself,” 156.

38. Butler, “Dynamics of Integrating Landscape,” 241.

39. Cosgrove, *Social Formation*. Also, Stephenson, “Values in Space and Time.”

40. Tveit, Ode, and Fry, “Key Concepts in a Framework,” 229–55.

whom and for whom—is critical to understanding a specific landscape.⁴¹ Accordingly, assigned values imply a tension between outsider-based values and the subjectivity of the insiders who directly experience the landscape.⁴² From the author’s lived experience of Perth, as both an objective outsider and subjective insider, it is apparent that the association of values is determined by the lived experience and incidental experiences of a place.

This tension draws us back to the disciplinary basis of landscape architecture and Marc Treib’s mantra *must landscapes mean?*⁴³ To ‘mean’ implies value has been ascribed. Treib postulates that the landscape cannot imbue meaning into a place, because this comes from the two-way experiencing of the place itself and is developed by the transitory psychological state and pleasure derived from those experiencing it. Treib concludes that meaning and significance can only be acquired over time in connection to a place. Nevertheless, design offers the opportunity to not only respond to specific places but also to concentrate the qualities and conditions of a place to create “evocative, meaningful, and sustainable landscapes.”⁴⁴ In this respect, landscape architects “shape the face of the Earth and also help to shape the face of the future”.⁴⁵

6.4 Relational value

The physical environment is constantly evolving and so too is the dynamic relationship that humans have with the environment. The emergence of research in the social sciences towards relational value, and its subsequent influence on sustainability science value and thus landscape research,⁴⁶ reflects more broadly the social cohesion and responsibility towards the natural environment.⁴⁷

Schwartz argues that there are several aspects to consider for a continuum of relational types of values.⁴⁸ He deduces that different groups of people might define diverging values and uses for the same landscape⁴⁹ and that when landscape appreciation is shared by large or small groups of people, such landscapes might take on a more significant or multiple place.⁵⁰ Similarly, Gobster outlines what happens when multiple meanings and values are held for the same landscape, and argues that managing the various and conflicting values and preferences within landscapes could reveal the

41. See Lebel et al., “Governance and the Capacity,” 1–2. This point of “who decides, for whom and where” follows social and ecological systems research and describes the changing dynamics of power, agency and governance.

42. Butler, “Dynamics of Integrating Landscape,” 240. Butler draws upon the categories of value holders examined by Relph in Relph, *Place and Placelessness*.

43. Treib, “Must Landscapes Mean?,” 46–62.

44. Motloch, *Introduction to Landscape Design*, 1.

45. Waterman, *Fundamentals of Landscape Architecture*, 8.

46. Stenseke, “Connecting ‘Relational Values,’” 82–88.

47. Pascual et al., “Valuing Nature’s Contributions to People,” 11.

48. See Schwartz, “Are There Universal Aspects,” 24. These are part of ten universal values.

49. Meinig, “The Beholding Eye,” 33–48.

50. Tuan, *Topophilia*.

potential of a common set of core ideas and differences.⁵¹ Likewise, Zube reinforces how patterns of land use mediate between humans interacting with the landscape as static receiver, active participant and agents of impact on the landscape.⁵² Figure 6.1 explores these nested, relational dimensions of landscape value and preferences, and the multiscale notion that these relationships occur at any one given time.

In Figure 6.1, the transaction between perceiver and landscape (group or individual) is situated among the medium of landscape. The medium of landscape, and the interactions within it, create experiences and subsequent knowledge, which ultimately affects how it continues to be shaped.⁵³ It illustrates that landscape *is* culture—to exist it requires appreciation and interpretation.⁵⁴ In the context of a transaction between the perceiver and the artefact, this is where significance and subsequent collective norms are formed.⁵⁵ In turn, these norms, along with values derived from the nested relationship of experience and knowledge, informs how the landscape is designed, managed and constructed. Just as Brinckerhoff Jackson emphasised, the (purposeful) creation of space is a necessity of including human presence within the landscape:

A space on the surface of the earth; intuitively we know this it is a space with a degree of permanence, with its own distinct character, either topographical or cultural, and above all a space shared by a group of people.⁵⁶

Importantly then, the peri-urban landscape, a space of shifting contexts and ecological processes, stimulates the relational matrix conveyed in Figure 6.1 so as to *receive* the making of new terrains (design, construct and manage) as a necessary process required to influence human interaction and understanding of the current age.⁵⁷

Therefore, the processes and precise conditions that reflect a common attitude towards the peri-urban must meet people's needs and desires and regulate the normative understanding of a place. This understanding is more easily differentiated in urban and natural settings whereas it is amplified in settings like the peri-urban, where the land-use pattern is more diverse. Acknowledging the diverse peri-urban types that emerged from the interpretative study of the territory in chapter five, it is proposed that for value to be achieved, it must meet present and future opportunities in order to

51. Gobster, "Visions of Nature," 35–51.

52. Zube, "Perceived Land Use Patterns," 37–45.

53. Treib, "Content of Landscape Form," 19.

54. Olwig, *Landscape, Nature, and the Body Politic*.

55. Olwig, *Landscape, Nature, and the Body Politic*.

56. Brinckerhoff Jackson, "The Word Itself," 5.

57. Treib, "Content of Landscape Form," 27.

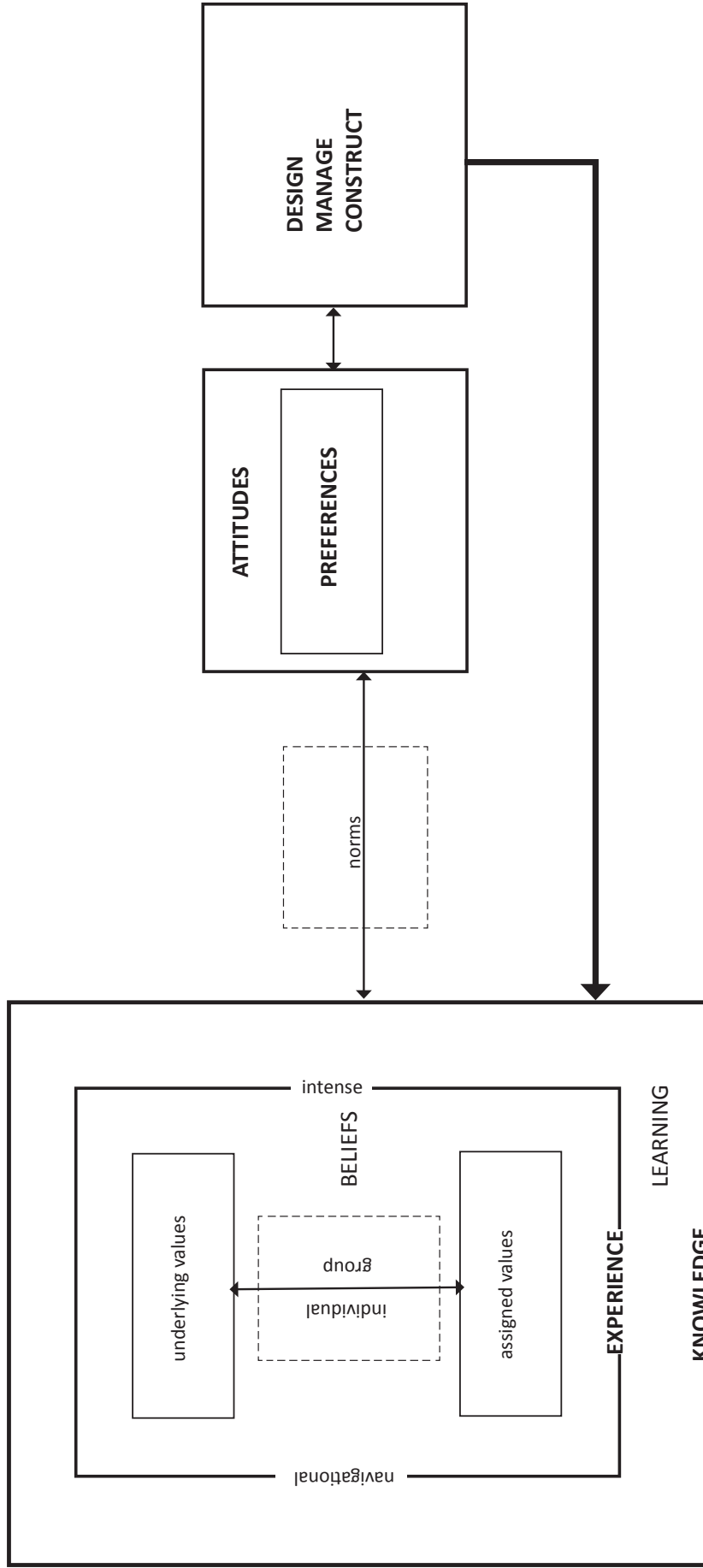


Figure 6.1 Conceptual framework of the relationship between factors contributing to attitudes of, and within, the landscape.
(After Ives and Kendal, "Values and attitudes of the urban public," 8.)

6.5 Opportunities for knowing value

Potential, as framed in the introduction to the thesis, is in accordance with the opportunities available to reconfigure the relationships within the peri-urban through the profession of landscape architecture—to create and make spaces that address human needs now and in the future. Henceforth, landscape value within the peri-urban describes those pluralistic landscape characteristics that the community considers are significant for reasons such as their “aesthetic (predominately visual), social, environmental and heritage values”⁵⁹ of past landscapes and those of the future.

Ives and Kendal argue that previous studies relating to peri-urban landscapes have focused on people living in or using these landscapes rather than the values assigned to specific peri-urban landscapes by the urban population as a whole.⁶⁰ Values, as a cultural indicator at the scale of the metropolis, include an emphasis on anthropogenic approaches to space and attitudes, based on thinking with a concern for self and for all other species and their entanglement,⁶¹ not only as a requirement but out of necessity.⁶² Chapter three framed several of these meta-values of the peri-urban landscape of Perth through the identification of landscape narratives, while chapter four illustrated these values through landscape change and chapter five identified subsequent peri-urban types.

The dynamic condition of the peri-urban provides opportunities for the retention and construction of imbued landscape types that can transcend time and space. However, when considering values, it is necessary to understand how values pertaining to landscape are adopted by planning and design professionals and how the oscillating objectivity of these outside experts alongside the subjective values of stakeholders of the landscape impact user knowledge and practice. Landscape architects currently do this in two ways, through participatory planning methods and landscape character assessment, both of which help practitioners recognise and deal with multiple dimensions of value within the landscape.⁶³ Typically, however, in the context of Perth, this occurs on individual projects that often have no relationship to one another yet use these methodologies to guide their actions. There is, therefore, an opportunity to consider how projects aggregate together at a range of scales

58. Zube, “Perceived Land Use Patterns,” 39.

59. Western Australian Planning Commission, *Visual Landscape Planning*, 171.

60. Ives and Kendal, “Values and Attitudes,” 81. For example, those displayed and evident in city-wide planning policies that uphold specific landscape systems that create the city as an identifiable place.

61. Haraway, *Staying with the Trouble*.

62. Schultz and Zelezny, “Values as Predictors,” 255–65.

63. Butler, “Dynamics of Integrating Landscape,” 239–52.

beyond that of a single site. This is because collectively held, aggregated values help formulate broader protection conservation or transformation policies that recognise the importance of landscape value to define a place.⁶⁴ For a city, to be globally competitive and distinguishable it must promote and retain the ecological and aesthetic quality of its landscapes.⁶⁵ Certainly, how values are accordingly developed, built upon and framed will almost always inform the attitudes, preferences and derived norms of individuals and society as a whole. Therefore, to consider the peri-urban as a collection of sites that inform a whole of territory approach to challenges confronting the city, provides an opportunity for potential and landscape architecture to act.

6.6 Defining landscape values in landscape architecture

Landscape architects are charged with the responsibility to “provide leadership in the planning, design and management of our natural and built landscapes for the sake of our communities and the future health of the planet”.⁶⁶ Subsequently, to undertake this task effectively landscape architects must think and act in a transdisciplinary way. In addition to design, the disciplinary backgrounds and experiences of landscape planning, landscape ecology and environmental psychology continue to be prevalent within landscape architecture paradigms. Accordingly, various theoretical constructs are required to situate peri-urban values within the discipline of landscape architecture.

Building on the work of Carl Sauer, cultural landscape studies such as those of Brinckerhoff Jackson in the US shaped the discipline by distinguishing the historic landscape as a “vernacular landscape”.⁶⁷ The fluidity of landscapes, how it is formed, changed and by whom, emphasises a “distinct way of defining and handling time and space”.⁶⁸ However, it was Ian McHarg’s seminal text *Design with Nature*⁶⁹ that demonstrated how landscape architects assigned and prioritised value-based decisions from methodologies derived from ecological sciences and applied these to the planning and design of a place.⁷⁰ McHarg argued for “intrinsic suitability”—the recognition of social values inherent in natural processes. McHarg demonstrated how the sum of natural processes and the resulting social values that emerge are necessary to determine, prior to their utilisation.⁷¹ In particular, McHarg foregrounded the temporal condition of landscape and the subsequent changes to landscapes as non-negotiable in

64. Déjeant-Pons, “European Landscape Convention,” 363–84. As has been the case with the formation of the European Landscape Convention.

65. Brunetta and Voghera, “Evaluating Landscape for Shared Values,” 82.

66. Australian Institute of Landscape Architects, *AILA Charter*.

67. See also the work of Olwig, *Meanings of Landscape*; Stigloe, *Borderland*; Hopkins, *Making of the English Landscape*.

68. Brinckerhoff Jackson, “The Word Itself,” 150. See also Stigloe, *What is Landscape?*.

69. McHarg, *Design with Nature*.

70. Ian McHarg’s methodologies of overlay analysis has been largely credited with informing the first Geographical Information Systems.

71. McHarg, *Design with Nature*, 104.

the formation of values.

Equally, environmental behaviour researchers have influenced the discipline of landscape architecture. The work of Zube, Sell and Taylor critiqued the paradigms of landscape value research and the theoretical base that lies underneath.⁷² They identified how landscape perception emerges from three sources: human interaction with the landscape and the nature of this interaction; the tangible and intangible elements and relationships in the landscape; and the expected outcomes that emerge from landscape interactions.⁷³ Outcomes, through interaction, identify the landscape as a transactional place where perceptions arise from responses to patterns that emerge from major landscape change, and varying experiences are mediated by socio-cultural contexts.⁷⁴ The transaction initiating from these perceptions relates to how people are positioned within the landscape either as agents of impact on the landscape, as static receiver within the landscape or as active participant—thinking, feeling, acting.⁷⁵ Likewise, Bell differentiates between aesthetics (for contemplation) and aesthetics that is intrinsically tied to the human experience of the landscape.⁷⁶ He argues that the latter predicts higher value because of the implications for design and management.

There have been several disciplinary perspectives that build upon landscape values. Thompson conceptually maps three positive values in landscape architecture, the aesthetic, the social and the ecological, as the parameters of a normative theory in the historical and philosophical approach to landscape architecture. In doing so, he differentiates between the aesthetic ethic of the 1960s and its transformation into an environmental ethic brought about by an increasing need to reconcile human and ecological values after a period of environmental awareness in the 1970s. This trajectory, he explains, forms an ecological approach to design that is imbedded in the design process. Further, he elicits innovations in aesthetics by the profession of landscape architecture and insists that these need to be derived from a reconciliation between the anthropocentric and non-anthropocentric ethical systems⁷⁷ that have shaped practice.⁷⁸ Similarly, Whiston Spirn eloquently evaluated the integration of ethical systems through a poetic and lyrical reading of landscape.⁷⁹ The structure of landscape, she argues, is indebted with cues and configurations created by a negotiation of anthropocentric and non-anthropocentric value systems throughout human history.

72. Zube, Sell, and Taylor, "Landscape Perception," 1–33. See also, Zube, "Perceived Land Use Patterns," 37–45.

73. Zube, Sell, and Taylor, "Landscape Perception," 6.

74. Zube, "Perceived Land Use Patterns," 44.

75. Zube, "Perceived Land Use Patterns," 37.

76. Bell, *Pattern, Perception and Process*, 64.

77. Includes those ethical systems founded on living biota other than humans as well as the value of whole ecosystems.

78. Thompson, "Environmental Ethics," 170.

79. Whiston Spirn, *Language of Landscape*.

A more recent study undertaken by Butler reiterated a framework of values similar to Thompson. By building on the previous theorisation of landscape values in participatory mapping and the negotiation of planning issues, he was able to position the tools and practice of landscape architecture within a value framework. Butler examined ten landscape character assessments from 2007 to 2012 in the UK. Consistently he found commonalities evident across five landscape types: economic, natural significant, aesthetic/scenic, recreation and cultural significant. The character assessment approach has been enlisted by planning professionals in Perth through preferred visual landscape indicators⁸⁰ and currently provides a framework for assessing landscape types across a spectrum of most or least preferred for the whole of Western Australia. However, the overall objective assessment of landscape indicators (related to people's experiences and perceptions) is also difficult and controversial.⁸¹

In the last two decades, ecological sciences have contributed to this intersection of human and natural values through the application of ecosystem services. Ecosystem services are those benefits that are provided to humans through the ecosystems of the natural world and can be categorised as provisioning (food and water), regulating (pollination, climate mitigation and erosion regulation), supporting (primary production, habitat and nutrient cycling) or cultural services (spiritual, knowledge systems, education, recreation, aesthetic and sense of place).⁸² As Forman explains, people have long depended upon local resources and the benefits of natural systems in close adjacency to urban areas.⁸³ However, as urbanisation has increased and these resources and systems correspondingly depleted, people have had to rely on more distant and potentially expensive resources to supplement the supply chain. Thus, the depletion of these resources in close adjacency to urban areas has a negative effect on their value, as "nature-dependent aesthetics, inspiration, ethics and resources for future generations erode".⁸⁴

Cultural ecosystems services are non-material benefits that emerge from the complex and dynamic interaction of people engaging with the natural world.⁸⁵ The Millennium Ecosystem Assessment (MEA) outlines ten categories that correspond to cultural ecosystem services.⁸⁶ Although the MEA does not provide an explicit definition of these categories, Gobster demonstrates how landscape

80. Western Australian Planning Commission, *Visual Landscape Planning*.

81. Tveit, Ode, and Fry, "Key Concepts in a Framework," 229–55.

82. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*, 26–28; Fisher and Turner, "Ecosystem Services," 1167–69.

83. Forman, *Urban Regions*.

84. Forman, *Urban Regions*, 4.

85. Fagerholm et al., "Community Stakeholders," 421–33.

86. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*.

values can be expressed concurrently when aligned with varying interpretations of “nature”.⁸⁷ Based on four parameters, the function, structure (appearance), use (by whom and for whom) and icons (structures that are important for identity),⁸⁸ Gobster concludes that the success of an in-depth design response using methodologies of participatory planning is defined not so much by what the landscape looks like, but how successfully the integration of different values of nature and culture is achieved. Conversely, Plieninger et al. identify additional categories within the cultural ecosystem services framework to describe services that detract from providing benefits to humans.⁸⁹

Accordingly, the origins of landscape value in landscape architecture demonstrate that values cannot be considered in isolation. Values exhibit a plurality of diverse values, with human and landscape values derived from ecological systems forming the primary medium that supports instinctive social responses and engagement within a place.⁹⁰ Landscapes are transactional and perceptions are influenced by people’s position within the landscape and their relative agency to act within it. Therefore, adopting a conceptual framework approach to understand how landscape values (from several disciplinary backgrounds) inform the disciplinary background of landscape architecture is appropriate (see table 4). In accordance with the aforementioned literature, assessing the value of the peri-urban types revealed in chapter five against a criteria for the five landscape values (economic, natural significance, aesthetic/scenic, recreation and cultural significance) can confirm or challenge these preconceived notions of value. Commonalities found within table 4 confirm that values are more than the physical representation of landscape as a spatial entity, but they emerge as dimensions of varying physical expressions of spatial modes, relationships and practices within it. The economic values focus on agricultural and natural systems such as water as well as the infrastructure networks that support the movement of goods and services, including those of primary industries, production and waste. The economic values are focused on factors that drive economic growth⁹¹ and those that support human use and enjoyment, including industries such as tourism and recreation, with the ecosystem services perspective framing those regulating services that have long-term economic benefit. This is consistent with Steger et al., who argue that “ecosystem services can also be seen to be boundary concepts that integrate diverse knowledge’s across social groups and scales”,⁹² specifically their “interpretative flexibility” when they relate to cultural services that

87. Gobster, “Visions of Nature,” 35–51.

88. Gobster, “Visions of Nature,” 40.

89. Plieninger et al., “Assessing, Mapping, and Quantifying,” 118–29.

90. McHarg, *Design with Nature*.

91. Plummer, Tonts, and Martinus, “Endogenous Growth,” 146–76.

92. Steger et al., “Ecosystem Services as Boundary Objects,” 153–60.

offer both tangible and intangible benefits across a range of social groups.⁹³ Table 4 demonstrates a conceptual framework of disciplinary specific approaches to landscape value. The table identifies that opportunities for further potential while outlining that long-term benefit comes from decision making and activities related to environmental stewardship, where responsibility and care for the environment improves and ensures that the long-term availability of the environment for humans use remains activated.⁹⁴

These opportunities are replicated when we look at natural values, both those landscapes that are naturally occurring or are perceived to be natural and specifically recall types of topographic variation and water as having significant value. Not only do these landscapes require care, their legibility promotes mystery in the sense that they prompt discovery.⁹⁵ The act of discovery is one where the qualities of the landscape (and hence value) is an emergent factor that relies not only on conserving critical habitat but supporting ongoing human interaction with the natural world. It is this interaction that promotes the aesthetic and spiritual values related to a sense of place and ultimately supports the regulation of cultural norms in relation to landscape types.

The human experience of landscape is both experiential and situational, reinforcing value concepts relating to individuals as well as society as a collective whole. Similar to natural value, those landscapes where water and topography are evident add diversity to the landscape. Combined with shared patterns of form derived from cultural function within the landscape, these landscape types are found in the peri-urban territory and are constructed to elicit aesthetic response from the landscape. Therefore, coherence across the peri-urban territory is derived from the cultural landscape and is formed by collective pattern colours and textures within the vegetation and built elements, which in turn promote a shared legibility and of appreciation for these spaces.

The cultural landscape value includes natural and built elements that reinforce individual and collective identity. In the peri-urban, the rural built and natural structures are a reoccurring peri-urban type throughout the analysis. Furthermore, these values relate intimately to the human experience of this landscape through the “perceptible realm”. As a record of past and collective cultural history, cultural landscapes display the outcome of decision making related to values. However, problematically, the dynamic temporal nature of the peri-urban disrupts the feedback loop of value exchange required

93. For further reading on the characteristics of boundary objects see Leigh Star, “This is not a Boundary Object,” 601–17.

94. Roman et al., “Stranded Capital,” 169–75. See also Leopold, *A Sand Almanac* for ideas pertaining to a land ethic within the discipline of landscape architecture.

95. The term “mystery” is used in both the sense of the unknown waiting to be discovered and also the direct coordination of the experience of landscape through anticipation as one moves through the landscape. In a design sense, mystery can be choreographed as is evidenced by some of the great designed gardens of the world, for example those of the Italian Renaissance.

Table 4. Relationships between cross-disciplinary values that inform landscape architectural practice

	Butler (2016); ¹ Western Australian Planning Commission of Planning (2007) ²	Whiston Spirm (1998); ³ Gobster (2001); Thompson (2015); Motlock (1991), Bell (1999)	Thompson (1999, 2007); ⁴ Brinckerhoff Jackson (1984)	Gobster et al. (2007); ⁵ MEA (2006) ⁶
	Landscape Planning	Landscape Architecture (Design)	Landscape Architecture (Theory)	Landscape Ecology
Economic	Subsistent and sustenance landscapes of food and water with long-term economic benefits. Coherence of industrial buildings in one area (i.e. industrial parks and buffers).	Landscapes that facilitate movement and meeting (i.e. large-scale infrastructure landscapes that support places for exchange of goods and information). ⁷ Landscapes of production and waste and the subsequent diametrically opposed values of wastelands and wilderness where values have been inverted. ⁸	Egocentric mutually agreed, classical economics and capitalism based on self-interest. Anthropocentric and homocentric for human use and enjoyment.	Provisioning services—products obtained from the ecosystems for human benefit including traditional resources of production (food, fibre and water) and biomedical properties. Regulating services that have economic benefit including climate, water regulation and pollination. Cultural services of recreation and tourism.
	Ecological and life sustaining. May be undisturbed landscapes or those that have high aesthetic or scenic benefits. Landscapes which exhibit a high degree of perceived naturalness, topographic variety, or vertical relief. Unusually expansive landforms or those of vast horizontal scale. Diversity of vegetation, age and density. Water and inundated areas. ephemeral landscape features. Distinctive remnant vegetation located along streams, roadsides and paddocks.	Natural landscapes are imbued with meaning of both human intervention and perception, and the inherent significance of waiting to be discovered. Management patterns of perceived naturalness contribute to human perception of value. ⁹	Biocentric and egocentric, ecological moral rights based on topography, hydrology, natural process and their systems.	Critical habitat. Species specific, food and habitat, limited use. Cultural services related to sense of place, aesthetic and spiritual and religious experiences derived from natural landscapes. Urban water management (water bodies that are well maintained).
Natural	Those designed for enjoyment including recreational pursuits. Diversity of pattern, colours, textures, vegetation provide aesthetic interest. Diverse building styles. Development sites designed so they strengthen the urban context in which they are located. Presence of water that borrows local shape, diversity from natural elements. Coherence of amalgamated	Landscape genre—archetypal activities that share patterns, function and form, from culture-to-culture. ¹⁰ Designed landscapes. Aesthetic experiences – enclosure and mystery. Multi-layered plant palette, passive-appreciative, dramatic landforms.	Form, space and materials. Good design is design that endures and is anthropocentric and homocentric focused. Derives both from an ecological approach and natural aesthetic.	Varying landscape types change the context of human experience both experiential and situational. These can be carefully designed and managed landscapes that elicit aesthetic responses ranging from scenic beauty to notions of care, stewardship and identity. Presence of natural rock features. Presence of trees, greenery,
Aesthetic				

Recreation	industrial areas. Incorporation of cultural and environmental features into urban design. Ephemeral features. Built development that does not impinge on dominant natural features (i.e. Darling scarp, river foreshores and coastal landscapes).	Therapeutic health benefits both physical and mental, supporting both solitude and socialising. Presence of trees, parks, and well-maintained gardens. Presence of water, (dams, lakes and inundated areas) that borrow location, shape, scale and edge configuration from natural elements.	Landscapes of play—from urban playgrounds to sports fields, large recreation areas to theme parks. ¹¹ Nature as substance and backdrop. Nature appreciation in wilderness.	Anthropocentric and homocentric for human use and enjoyment derived on intersections of ecology and humans that underpin an ecological approach.	Within landscapes of leisure, aesthetics is used to drive landscape change. Cultural services are related to recreation.	parks and gardens, street trees, canopied streets and median strip vegetation.
	Cultural	Historical areas and those that are individual in their identity. Landscapes which area orientational, educational, scientific and contain significant landscape features (trees, heritage elements, topography and remnant vegetation). Historic relics, presence of water, settlement structures that reinforce	Landscape as the place where humans have dwelled for over 60,000 years. Landscape was the first form of human text (it can be read and contains all the features of language. ¹² Landscapes are the world itself and may be metaphors of the world or affirm or negate memory of personal past, record or collective cultural past. ¹³ Values are derived from these features.	Social and historical values and behavioural responses linked to origins, development and justification of values from different areas.	Humans engage with environmental phenomena at the scale of human experience of landscape. Interaction with landscape within the “perceptible realm” provides aesthetic experiences that in turn influence humans actions and changes within the landscape and its ecosystems. Ecological motivated, – landscape is centred.	

1. Butler, “Dynamics of Integrating Landscape,” 244.
2. Western Australian Planning Commission, *Visual Landscape Planning*.
3. Whiston Spirn, *Language of Landscape*.
4. Thompson, *Ecology, Community and Delight*. Thompson argues for three positions of value within landscape architectural practice—aesthetic, social and ecological—and the potential that trivalent design would provide. That is design and practice that encompasses strong degrees of each. See also Thompson, “The Ethics of Sustainability.”
5. Gobster et al., “Shared Landscape”.
6. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*.
7. Whiston Spirn, *Language of Landscape*, 67.
8. Whiston Spirn, *Language of Landscape*, 69.
9. Bell, *Pattern, Perception and Process*, 64.
10. Whiston Spirn, *Language of Landscape*, 54.
11. Whiston Spirn, *Language of Landscape*, 63.
12. Whiston Spirn, *Language of Landscape*, 15.
13. Whiston Spirn, *Language of Landscape*, 20, 62.

to inform cultural norms. In this respect, cultural landscapes not only need to be integrated into the changing nature of the peri-urban but also, in many respects, heightened.

The intentional planning and design of recreational spaces becomes an opportunity to envelope all values exhibited listed within Table 4 because they bridge the intersection of human and ecological values of which economic value can be aligned. More so, the value of design to elicit and provoke heightened aesthetic responses has broadscale benefits including the increasing need for landscape to act as a vessel for preventative health measures.⁹⁶

While diverse, the aforementioned values have key criteria that are consistent. This criterion is what Pakizeh et al. conclude is evidence of compatible values.⁹⁷ Compatible value are the corresponding values within the landscape that are derived as a result of close ties between landscape expression and practices.⁹⁸ Therefore, it follows that persistent landscape types within the peri-urban are expressions of what is deemed compatible.

Compatible values can arise when single values are used to activate related values, attitudes and behaviours. For example, the single value of “green space” almost always has positive values; further to its aesthetic properties and its high value contribution to natural and cultural values, it appears in all five landscape value types identified (economic, natural significance, aesthetic/scenic, recreation and cultural significance).⁹⁹ Patterns of green space for human habitat include places that increase the perception of health and, more distinctly, green areas that facilitate walking.¹⁰⁰ Green space has value for those that use it as well as for those that know it is there and see the broader contribution green space makes to an urban area.¹⁰¹ This is certainly the case in how metropolitan regions are planned and perceived and how values evolve over time. For example, in the first metropolitan plan for Perth, health was framed as a provisioning service¹⁰² rather than the restorative and preventative health service that, as Hartig defines, “offers the recovering of physiological, psychological and social resources that have become diminished in efforts to meet the demands of everyday life”.¹⁰³ Accordingly, green space (natural systems of the natural world not green artifices) not only provides connections between people, natural systems and the natural world but also activates how

96. Frumkin, *Environmental Health*.

97. Pakizeh, Gebauer, and Maio, “Basic Human Values,” 464.

98. For example, the natural endemic banksia woodlands of the SCP that are now enclosed and identified as Bush Forever areas. The associated passive recreation trails beginning with gates to keep dogs and trail bikes out of the area are one such example.

99. See Ives et al., “Capturing Residents’ Values,” 32–43. This study was undertaken in a rapidly urbanising region in the Hunter Valley of NSW. See also, Beatley, *Biophilic Cities*.

100. See Ives et al., “Capturing Residents’ Values,” 32–43.

101. Swanwick, Dunnett, and Woolley, “Nature, Role and Value,” 94–106.

102. Stephenson and Gordon, *Plan for the Metropolitan Region*, 2.

103. Ward Thompson and Travlou, *Open Space: People Space*, 163–80.

one situates oneself within it.¹⁰⁴ Compatible values are therefore consistent with the role of, and opportunities for, landscape architecture. This is because value can be activated through the planning, design and management of a landscape.

Value systems drive and are derived from human–landscape interactions and these interactions are used motivationally, to select and justify actions.¹⁰⁵ Values form a criterion to choose opportunities of action and therefore constitute an important element of both individual and group identities.¹⁰⁶ In this way, landscape values are a result of common agreements, while conflicts between interrelated values primarily exist because of disagreements in the prioritisation and relative importance of values and the methods of pursuing them.¹⁰⁷ Through design, landscape architectural practice has the ability to broker agreements between values and to influence practices within the peri-urban territory.¹⁰⁸ Furthermore, the profession has a social obligation to do this as well as an ecological imperative to sustain the systems that support human life of self and community. As Thompson concludes, trivalent design, where all value is merited (aesthetic, social and ecological), is the most likely to succeed because it delivers pluralistic design value.¹⁰⁹

6.7 Defining value of peri-urban types

Peri-urban territories are created by the processes of urbanisation and their modification by human activities are made more difficult by the competing values of urban and rural administrators and the various socio-economic groups that reside and engage with this territory. A key indicator of these territories is the natural systems and processes that flow between the urban area and adjacent land types; however, the dynamic modification of this area causes the appearance of and flow of natural systems across this territory to be varied considerably. This is because increases in urbanisation, agricultural production and industry typically cause an inverse, decreasing effect on natural ecosystems, processes and flows across this territory. More explicitly, ecosystemic processes can be severely altered or lost entirely due to the process of urbanisation.

The biophysical properties of landscape and its land-use patterns inform the perception of landscape through the transactions between individuals and landscapes. These transactions are mediated

104. Coutts, *Green Infrastructure and Public Health*.

105. See, van der Stoep, Aarts, and van den Brinks, "Shifting Frames," 697–711.

106. Buchecker, Kianicka, and Junker, "Value Systems," 7–26. See also Appendix 2 which provides a comprehensive evaluation of what landscape architects in Australia determine to be valuable.

107. Pakizeh, Gebauer, and Maio, "Basic Human Values," 458.

108. See, Stephenson, "Cultural Values Model," 127–39. Stephenson argues that when the subject is active within the landscape, representation influences practice, similarly, practice informs social representation as part of a co-dependence upon each other.

109. Thompson, "Trivalent Design," 217.

by personal utility and the socio-cultural context of the individual to inform their response.¹¹⁰ In this respect, peri-urban areas can be valued in different ways because of different user groups. Subsequently, transactions and perceptions are magnified with the utility and the socio-cultural context is shared by many individuals. As Seddon explains, tension exists between competing values and is almost always negotiated:

...good communications bring suburban and industrial development in their wake, and so the only soils on the plain adapted to specialty crops, such as potatoes, citrus and other fruits, and irrigated pastures for dairying, become too expensive for the farmer, who is forced further afield into less suitable farming land where his specialty crops, needed in greater quantity, cost more to produce, and do not taste as good.¹¹¹

Unlike economic value, which may be connected to global trade networks and value chains beyond the scale of the metropolis, the cultural and social value is defined directly by the activities people undertake within the territory. This can include activities by people who reside within and outside this territory. Thus, collective transactions within the landscape not only reinforce the dominant value system of individuals residing there but also the broader collective who are influenced by this territory.¹¹² As Treib argues:

If perception is the primary vehicle for understanding we also need to consider aspects of cognition, which are equally, if not more, crucial for maintaining interest and pleasure—and for evaluating landscape merit.¹¹³

This is an important distinguishing element of the peri-urban territory. As Ives and Kendal argue, many previous studies relating to peri-urban landscapes have focused on people living in or using these landscapes rather than on values assigned to specific peri-urban landscapes by the urban population as a whole.¹¹⁴ The peri-urban types derived from the interpretative analysis in chapter five constitute landscape change brought about by “whole of city” policies and the subsequent spatial character and function of the peri-urban territory can therefore be understood to be representative of the values embedded in the political and social systems. As identified in this thesis, several values have persisted through statutory planning since 1963; however, there have been varying degrees of implementation of these values at the landscape scale.¹¹⁵ Furthermore, while there has been

110. Zube, “Perceived Land Use Patterns,” 39–40.

111. Seddon, *Sense of Place*, 255.

112. Brandt, *Multifunctional Landscapes*.

113. Treib, “Content of Landscape Form,” 121.

114. Ives and Kendal, “Values and Attitudes,” 81.

115. As outlined in the introduction chapter and chapter four, the first statutory plan was adopted was adopted in 1963. This time

consensus in what delineates urban and rural landscapes, and therefore the values and preferences for each land-use type, the implicit difficulty in defining the peri-urban has meant that few studies have been able to explore or articulate collective values across this territory.¹¹⁶ This is also true for understanding disciplinary approaches, as demonstrated Table 4, where complementary and conflicting values between various disciplinary perspectives are evident.

Peri-urban agriculture is one such example. Research into peri-urban areas in Australia continues to identify conflicts between our growing metropolises and their increasing reliance on peri-urban areas to support the urban food supply required for the population.¹¹⁷ Most of this research is undertaken from a planning and policy perspective; therefore, the spatial implications as they relate to perception, value and experience of agricultural areas has been largely overlooked. Further, the economic value of peri-urban landscapes is not understood because it is not highlighted in public policy for Australian metropolitan regions or within separate agricultural census data.¹¹⁸ As Houston demonstrates, peri-urban agriculture accounts for 1% of the total agricultural area in Western Australia, but it is attributed to 13.90% of the total value gross value of agriculture.¹¹⁹ Several studies have also demonstrated that the value of agricultural land has typically been underestimated in many circumstances.¹²⁰ The concern is thus twofold: firstly, the loss of agriculture in its conversion from agricultural land into suburban housing and secondly, the loss of productivity (in that it becomes non-viable land) across agricultural land as a precursor to the anticipation of selling of rural land to developers at a higher value than can be returned from agricultural production.¹²¹

In addition to economic value, landscape research and practice needs to consider the properties and processes that create peri-urban types as well as the human preferences in relation to these. This is important as it reinforces one of the overarching aims of the research to understand the peri-urban and its potential. Using the five values discussed above (economic, natural significance, aesthetic/scenic, recreation and cultural significance), it is possible to assess the value of places within the peri-urban territory of Perth. In this respect, the spatial typologies record the peri-urban condition, as well as being indicators of current value. As a result, to assess this value is to reveal and manifest the meaningful human–landscape relationships currently available or potentially available in the future.

period was selected as it references the timing of the development of the first metropolitan plan in 1955 and includes the latest aerial imagery in 2016 when the analysis component of the thesis was conducted.

116. Ives and Kendal, "Values and Attitudes," 81.

117. Low Choy, *Change and Continuity*; Buxton, Carey, and Phelan, "Role of Peri-Urban," 153–70; Bunker and Houston, "At and Beyond the Fringe," 23–32; Barr, "Future Agricultural Landscapes," 123–28.

118. McKenzie, "Growth Management," 83–99; Llausàs, Buxton, and Beilin, "Spatial Planning and Changing Landscapes," 1304–22.

119. Houston, "Re-Valuing the Fringe," 216.

120. Merson et al., "Challenges to Urban Agriculture."

121. Carey and Buxton, "Use of Planning Provisions," 191–95. This type of land-use speculation often causes previous agricultural land to appear degraded or non-productive prior to its sale.

This integrated approach of values is informed by the disciplinary influences that underpin the paradigms within landscape architecture.¹²² Tables 5 to 8 augment each peri-urban type against the five qualitative criteria of the value framework discussed in Table 4. To assist in determining value further, a review of secondary sources containing authoritative voices of Perth (outside of the profession) was undertaken to determine how their value is carried more broadly.¹²³ The tables identify value as positive, negative and potential, acknowledging that potential has a greater value than positive because *potential value* is framed to include the integration of multiple value sets currently non-existent.¹²⁴ Here, potential is determined through its relational capacity, which is the opportunities for the peri-urban type to be altered so it increases the positive value and therefore influences practices within the landscape through landscape improvement.¹²⁵ The focus here is on practices that inform positive values. When aggregated, these practices influence knowledge and experiences, thus establishing new cultural norms. Therefore, identifying the relevant structural types that increase the value of the peri-urban territory is essential to ensuring this territory not only continues to support the metropolis but also to enhance human health and wellbeing and the nature-dependent values for the city of Perth. Further, understanding the value of the peri-urban territory in this way, through its structure, provides opportunities for restructuring the peri-urban territory in order to influence those values on which people are dependent from the remnant and constructed natural world.

6.8 Pluralistic values

Sections 6.5 to 6.7 explained how value within the landscape can be determined and argued for the importance of strengthening pluralist values to inspire and influence people's perceptions, experiences and actions within the peri-urban. Building upon the idea of pluralism when determining value, this section evaluates how the structural types of the peri-urban (edge, path, threshold and foci) explored in chapter four and five, predict value in accordance with the five conceptual value frames identified above (economic, natural significance, aesthetic/scenic, recreation and cultural significance). Each table can be interpreted in two ways. Firstly, horizontally, where the focus is on each unique peri-urban type as a determiner of value and secondly, vertically, where the prevalence of each overarching conceptual value frame against each structural type can be identified. In the vertical columns, potential has been derived from a comprehensive review of ten years (2008–2018)

122. Furthermore, Appendix B provides a succinct evaluation of the past ten years (2006–2016) of projects within *Landscape Architecture Australia* and subsequently proves the values assigned to peri-urban territories by the profession.

123. This methodology follows the work of Ian Thompson in Thompson, "Trivalent Design," 217–18. Value is not weighed against each other but highlights where values are present or could be present. The diagrams are to be understood in this limited sense.

124. Where a value is not present and is determined to not hold potential in accordance with the five sets of criteria it has been left blank.

125. Brunetta and Voghera, "Evaluating Landscape for Shared Values," 76. These could also be called regarded as extrinsic values or "values to be implemented".

of projects and commentary within *Landscape Architecture Australia*, the only landscape architectural journal in Australia (see Appendix B).¹²⁶

Edge values

Structurally, edges that appear as vegetation (established or re-established) determine areas of high value (see table 5) because they are components of networks that connect green space throughout the metropolitan area.¹²⁷ This connection is amplified when vegetation edges are seen as structural integration devices to (re)situate people within their context of the natural world and therefore the places around them.¹²⁸ Despite this, there was evidence of vegetation edges diminishing across many of the quadrats and the removal of vegetation edges that link conservation areas and adjacent suburban built areas and their POS that act as thresholds within the urban form.¹²⁹ However, vegetation edges are important forms of spatial division and promote what Clay and Smidt define as vividness, the “recognizable level of landscape diversity and/or landscape contrast that seems to visibly exist between the various elements within the scene”.¹³⁰ Furthermore, their research found that vividness was a high predictor of landscape preference, specifically when both cultural and man-made elements along with natural elements formed an integrated whole.¹³¹

Agricultural areas were determined to be of high value when we consider the agricultural industries economic competitiveness within the local industries of metropolitan Perth¹³² as well as the changing spatial patterns brought about by agricultural land. For example, agricultural areas that exhibit low-lying open field conditions (intensive horticulture, nursery and cut flowers)¹³³ typically replace areas of established endemic vegetation. While the removal of endemic vegetation (and subsequent creation of agriculture edges) can be seen to be negative for the loss of naturalness and biodiversity, the landscape change brought about by this transition supports the visual character by creating a series of perceivable landscape rooms, a key factor of landscape preference within the landscape.¹³⁴ The critical component here is the spatial balance between the aesthetic value brought about by openness

126. See Appendix B.

127. Beatley, *Biophilic Cities*.

128. Soga et al., “Reducing the Extinction of Experience,” 69–75. See also, Miller, “Biodiversity Conservation,” 430–34.

129. One of the main reasons this has occurred abruptly over the past five years has been because of the introduction of the Western Australian Planning Commission, *State Planning Policy 3.7: Planning in Bushfire Prone Areas* (SPP3.7) in 2015. The associated Department of Fire and Emergency Services, “Bushfire Prone Area Mapping Tool,” supports the implementation of SPP3.7 and shows that all the peri-urban quadrats contain “bushfire prone” areas. See also Western Australian Planning Commission, “Guidelines for Planning,” 29.

130. Clay and Smidt, “Assessing the Validity and Reliability,” 249.

131. Clay and Smidt, “Assessing the Validity and Reliability.” This is contrary to much of the literature that argues for naturalness as a highly reliable indicator of landscape preference.

132. Harford-Mills, “FACTBase Bulletin 61.”

133. Department of Agriculture and Food, “Plan to support Horticulture Industry Development,” 62.

134. Tveit, “Indicators of Visual Scale,” 2882–88.

and enclosure and the removal of endemic vegetation.¹³⁵

Edges represented by water contain high value, either as an isolated water body such as a wetland or a water path such as a river.¹³⁶ Water edges are valued for their ecological diversity as well as for recreation and tourism, cultural and social, landscape and aesthetic, educational and scientific and the traditional custodians, the Nyungar people.¹³⁷ These values are constantly under pressure due to the impact of human activities including “agriculture, land clearing, urban and industrial uses, recreation and tourism.”¹³⁸ However, despite this, water edges have a large capacity to deploy positive pluralistic values;¹³⁹ for example, water edges that support high biological diversity and recreational and tourism pursuits appear favourable and occur frequently through the peri-urban territory alongside its rivers and wetlands.¹⁴⁰ There is also evidence of value in the subsurface water edges, demonstrated by the location of the major northern and northeast transport corridors and the associated urban development either side of these that define the extent of the Gngangara mound ground water recharge and source area.¹⁴¹

Suburban built edges have high economic value¹⁴² and this is reinforced at meta scale of the city by the spatial arrangement of urbanisation alongside transport spines. However, their negative value in relation to natural and aesthetic values is evident by their uniformness, which can be interpreted to be of “placeless identity” promoted by “a planning system committed to its continuity and control”.¹⁴³ Similarly, the aesthetics of rural built edges set among environmental amenity exude positive values and this amenity migration is supported in planning policy where rural living enhances conservation and improved environmental outcomes.¹⁴⁴ In addition there is a growing trend towards rural living in peri-urban metropolitan regions as housing affordability, liveability and lifestyle factors as well as retirement migration factors come into play.¹⁴⁵ However, negative values are evident when rural

135. Appleton, *Experience of Landscape*.

136. Everall Consulting Biologists, *Economic Development*. 25% of the Perth Coastal Plain consists of wetland.

137. Government of Western Australia, Department of Water, *Waterways and Wetlands*.

138. Government of Western Australia, Department of Water, *Waterways and Wetlands*, 2.

139. Western Australian Planning Commission, *Liveable Neighbourhoods*, 30. For example, when used in tandem with recreation edges to support urban water management. As is the example of the urban water performance requirements for community design as part of this policy.

140. For example, the development of the Swan Valley Food and Wine Trail includes opportunities to interact with the waters at several wineries and food destinations along the Swan River while moving through what is mainly peri-urban territory. See also Western Australian Department of Conservation and Land Management, *Beeliar Regional Park*, 66–68.

141. See Western Australian Planning Commission, *State Planning Policy 2.2*. For example, the Gngangara Mound in the north of Perth is the major below-ground water source for the city and listed as a priority one water source protection area. This is expressed physically by the threshold space of the Gngangara Pine plantation above ground and the western boundary of Wanneroo road and Great Northern Highway to the east.

142. Harford-Mills, “FACTBase Bulletin 61.” The residential construction industry is the third most competitive industry for the entire metropolitan region with nine out of the top ten Statistical Areas Level 2 (SA2s) for construction located in peri-urban areas.

143. Hedgcock, “Planning the Outward Growth,” 124,

144. Argent et al., “The Amenity Principle,” 305–18. See also, section 5.10(d) of the Western Australian Planning Commission, *State Planning Policy 2.5: Rural Planning*.

145. Burnley and Murphy, *Sea Change*. Burnley and Murphy coin these areas as “peri metropolitan turnaround”.

residential subdivision results in a visual impact on the rural landscapes, loss of agricultural land and poor land management.¹⁴⁶

Table 5. Value of Peri-urban edge types

Peri-urban type	Value				
Edge	economic	natural	aesthetic	recreation	cultural
Edge + Field	■	—	■	■	■
Edge + Path (water)	■	■	■	■	■
Edge + Path (road)	■	X	■	■	X
Edge + Recreation	■	■	■	■	■
Edge + Agriculture	■	■	■	○	■
Edge + Vegetation (wetland)	■	■	■	■	■
Edge + Vegetation	○	■	■	■	■
Edge + Vegetation (re-established)	○	■	■	○	■
Edge + Built (rural agricultural)	■	—	■	○	■
Edge + Built (suburban)	■	X	X	○	■

■ denotes positive value

X denotes negative value

○ denotes potential value

146. Burnley and Murphy, *Sea Change*, 220.

Path values

Paths derived from water or vegetation demonstrate the highest value (see table 6). The legacy of value associated with water paths begins with the urban morphology of Perth's colonial settlement, where the original township was defined and structured by its interface with the Swan River and its nesting between the swampy wetlands of the coastal plain.¹⁴⁷ More recently, the role of the *Swan and Canning Rivers Management Act 2006* (WA) in protecting the ecological, community and amenity benefits that the Swan and Canning river systems provide for the city emphasises the continuing value of these major water paths and their tributaries.¹⁴⁸ The former Minister for Environment and Heritage, the Honourable Albert Jacob (MLA), described the Swan and Canning rivers as:

renowned for its natural beauty and cultural and recreational significance. An integral part of Perth's landscape and economy, the Riverpark comprises the Swan and Canning rivers and the public foreshore reserves surrounding them.¹⁴⁹

As living, dynamic systems, water paths extending from the catchments of the peri-urban through the urban proper to the ocean support a wide spectrum of recreation values that are of high value.¹⁵⁰ Paths that demonstrate potential include those that are integrated with a node, as these become crossing points within the landscape. This is because nodes are places to wait, rest and reflect, subsequently creating areas for pause within the peri-urban.¹⁵¹ In this respect, they can be utilised to emphasise peri-urban characteristics of the landscape including structure, morphology and legibility and in doing so, influence attitudes and response to it.¹⁵² Likewise, paths appearing as voids, such as those that result from BRM extraction, show little value beyond the economic but rate highly for potential value. In the same way edges contribute to forming perceivable landscape rooms, paths are negative spaces within the peri-urban territory. Conceiving these spaces as opportunities to construct territory by carving out the landscape is foreseeable.¹⁵³ Conversely, paths attributed to the removal of natural areas as a result of urban expansion at the city's peri-urban interface (or edge) have low value; for example, road paths that remove natural areas can be seen to have negative value and are perceived to be increasingly negative with the decreasing amount of natural endemic areas remaining

147. Morel-Ednie Brown, "Layered Landscape," 390–418.

148. Government of Western Australia, *Swan and Canning Rivers*, 1.

149. Department of Parks and Wildlife, Swan Canning Riverpark and Swan River Trust, *Swan Canning River Protection Strategy*.

150. Department of Parks and Wildlife, Swan Canning Riverpark and Swan River Trust, *Swan Canning River Protection Strategy*.

151. Dee, *Form and Fabric*; Lynch, *Image of the City*.

152. Pérez-Campaña, and Valenzuela-Montes, "Nodes of a Peri-Urban," 406–29. The structural importance of nodes within peri-urban territories has been found to also have strong ecological value.

153. For example, Miralles and Pinos, *Ingulada Cemetery*, Barcelona, Spain (1983), exhibits one such example of reuse of basic raw material paths in an old quarry for a new cemetery on the periphery of Barcelona.

within the metropolitan region.¹⁵⁴ This perception is compounded by the rate of clearing (due to urban development) within the landscape and the location of this development adjacent to existing residential communities, many who value the amenity of natural bushland areas.¹⁵⁵ Conversely, paths related to peri-urban energy infrastructure (such as high voltage overhead powerlines) were traditionally planned to be located beyond the city proper; however, as urbanisation has increased, these path networks are now almost fully engulfed by the urbanisation front. This has caused debate about the perceived visual impact and effects of electromagnetic radiation on residential populations to become more prevalent.¹⁵⁶ Accordingly, these infrastructure paths could be envisioned to have high potential value when associated with new aesthetic, recreation and cultural pursuits within the city, specifically when considered in a post-carbon world context.¹⁵⁷

Table 6. Value of Peri-urban path types

Peri-urban type	Value				
	economic	natural	aesthetic	recreation	cultural
Path + Node	■	○	■	■	■
Path + Recreation	■	■	■	■	■
Path + Goat tracks	—	—	■	■	■
Path + Agriculture	■		■		■
Path + Water	■	■	■	■	■
Path + Vegetation corridors	■	■	■	■	■
Path + Void (BME)	■	○	○	○	○
Path + Equine facilities	■	—	■	■	■
Path + Road	■	X	■	■	—
Path + Railway	■		■	○	■
Path + Void (ghost paths)	—	X	○	○	■○
Path + Infrastructure (energy)	■	—	X○	○	○

■ denotes positive value
 X denotes negative value
 ○ denotes potential value

154. Chambers and Jennings, "Roe 8: Perth's Environmental Flashpoint." Upon been elected state Premier, Mark McGowan announced that the building of a major road project titled "Roe 8" would be stopped as its pathway transected through the significant Beelie wetlands and adjacent natural vegetation areas that contained not only significant natural capital, but also cultural values to the traditional custodians of the southwest of Western Australia, the Noongar People.

155. Chambers and Jennings, "Roe 8: Perth's Environmental Flashpoint."

156. Soini et al., "Local Residents' Perceptions," 294–305; Devine-Wright, "Explaining 'NIMBY' Objections," 761–81.

157. Brown, *Next Generation Infrastructure*; Brown and Stigge, *Infrastructural Ecologies*.

Table 7. Value of Peri-urban threshold types

Peri-urban type	Value				
	economic	natural	aesthetic	recreation	cultural
Threshold + Road	■	X	X○	X	X○
Threshold + Infrastructure	■	X	X	○	○
Threshold + Topography	■○	■	■○	■○	■○
Threshold + Rural	■○	■○	■○	■○	■○
Threshold + Built (institutions)	■	X	X	■	■
Threshold + Cultural	■	X	■	X	■
Threshold + Built (suburban)	○	○	○	○	○
Threshold + Water	X	■	■	■	■
Threshold + Recreation	■○	■	■○	■○	■○

■ denotes positive value

X denotes negative value

○ denotes potential value

Threshold values

Structurally, threshold values associated with rural areas, particularly the Swan Valley, provide the largest existing and potential value.¹⁵⁸ This is followed closely by thresholds that are topographic in form¹⁵⁹ or those that include recreation activities (see table 7). Topographic thresholds are important for two reasons. Firstly, Perth is a relative flat metropolis and the cultivation of its flatness, from the little topography present, is consistent with the historical working of a site of human habitation, as Kullmann identifies.¹⁶⁰ Secondly, undisturbed topography supports endemic woodland vegetation assemblages, soil stability including its hydrological function, roughness and contrast to ordered urban landscapes of parks and gardens. Topographic elevation provides an elevated threshold whereby a vantage point to survey and orientate oneself within the environment and supports the enhancement of the existing landscape by providing this opportunity. In all cases:

The reduction of natural topographic variations should be avoided wherever feasible, especially in relation to road design and levelling for housing estates. This would retain a more diverse topography.¹⁶¹

Therefore, retaining localised topographic forms or creating new forms that allow for the scenic elevation of broad areas of the peri-urban forming vantage points not currently available, exhibits one major potential of this landscape type. Topographic elevation is further enhanced through its juxtaposition to the cultivated flat urbanised areas and through the potential for it to become identifiable within the broader landscape as an anchor between points as a transition space.¹⁶²

Recreational values often require open areas in the form of parks or playing fields for their activities. Although this is not always the case, recreational activities that provide threshold experiences can also be found along paths consisting of high valued natural areas¹⁶³ or those supporting transport and movement through the peri-urban.¹⁶⁴ While new residential areas contain internal threshold values

158. Kobelke, *Swan Valley Planning Review*. This 2017 review into the Swan Valley Planning Act (which attracted over 600 written responses from residents and landowners) found that at least seven in ten from every property type support measures that support both farming and grape growing, consistent with rural land uses. There was also significant support for increases in food tourism as well as maintaining hobby and lifestyle features consistent with rural activities.

159. Western Australian Planning Commission, *Visual Landscape Planning*. Elevated landscapes provide panoramic views, which are most frequently singled out as significant. See also, AECOM, *Visual Landscape Evaluation*. This study applied these guidelines and confirmed that elevated remnant parabolic dune system in Perth's southern peri-urban areas are of "major significance".

160. Kullmann, "Towards Topographically Sensitive Urbanism," 331–51.

161. Western Australian Planning Commission, *Visual Landscape Planning*, 92.

162. There are several excellent examples of this type of work occurring in peri-urban areas overseas. For example, the Northala Fields Park, London, UK by LDA Design, where inert landfill mounds, adjacent to the A40, were re-made into large mounds that now form a distinctive landmark. See LDA Design, "Northala Fields," accessed January 21, 2019 <http://www.lda-design.co.uk/wp-content/uploads/2013/08/Northala-Fields.pdf>.

163. Western Australia Department of Planning, *Liveable Neighbourhoods*, 30. This is consistent with the policies performance requirements for vegetation and natural habitat as a significant contributor to a local community's sense of place and identity.

164. See, Government of Western Australia, "Community Engaged for Morley-Ellenbrook," March 23, 2018 <https://www.mediastatements.wa.gov.au/Pages/McGowan/2018/03/Community-engaged-for-Morley-Ellenbrook-Line-planning.aspx>. New recreation areas were one of three top priorities found in a recent community meeting regarding the planning of a new passenger

within the parks and POS planned in accordance with their structure plan, there is little consideration of their urban edges as transition spaces into the broader peri-urban landscape. Developers tend to address the threshold space at the main entry point to new subdivisions, typically represented by a large wall feature consisting of signage and new planting. However, most lots occurring along the edge of the new greenfield development (adjacent to rural land uses) do not connect with these rural lands.¹⁶⁵ A review of lot layout that integrates threshold experiences between the residential development and associated peri-urban land types at their edges has the potential to magnify and distinguish the peri-urban interface as an important area of transition as well as a threshold that is maintained as surrounding urbanisation increases.

We know from the literature that water within the landscape, appearing as surface water or as a source for improved green spaces or agriculture, has a high value.¹⁶⁶ Certainly this is true when we consider the 20 per cent of the existing wetlands evident across the Perth metropolitan area are considered to retain high ecological values.¹⁶⁷ In this respect, it might be possible to speculate that there is great potential for water as a designed component to be used as a threshold space within the peri-urban territory.¹⁶⁸ Comments made by the Western Australian Minister for Planning, Rita Saffioti, when introducing a Bill to Parliament to rezone the Beeliar wetlands from Primary Regional Roads to Parks and Recreation explains this: “The people of this area and wider Perth made it very clear—they don’t want a road through these wetlands.”¹⁶⁹

However, while water as threshold space has become to be a defining feature of development, the impact of new urban development upon wetland areas remains to be seen.¹⁷⁰

rail link in northeastern peri-urban area.

165. Western Australia Department of Planning, *Liveable Neighbourhoods*, 2. This is consistent with the requirements for community design/lot layout where integration is required with existing communities but not with existing landscape character surrounding the whole development.

166. Department of Water and Environmental Regulation, *Performance Report*, 32. This recent study by the Department of Water and Environmental Regulation found the re-use of waste water to meet the requirements for non-potable water needs for green spaces and agricultural areas within the northeast Corridor would be economically viable and could provide increased potential to these peri-urban types.

167. Department of Biodiversity, Conservation and Attractions, *Wetlands Mapping*.

168. Especially when considered as key components of past landscapes and the historic geology of the city and subsequent cultural patterns still prevalent among the traditional custodians, the Noongar People. Over 80% of all the wetlands that were once present on the SCP prior to European settlement have been cleared, filled or developed.

169. Government of Western Australia, *Beeliar Wetlands to be Preserved*.

170. Western Australian Planning Commission, *Metropolitan Region Scheme Amendment 1308-41*, 5. The rezoning of approximately 2,099.80 ha of peri-urban land from “rural zone” to “urban deferred zoning” to support the development of the East Wanneroo Structure Plan is one such example. This area contains several large wetland areas of environmental significance that have been excluded from the proposed amendment to be reserved as Parks and Recreation in a future Metropolitan Region Scheme amendment process.

Foci values

Structurally, values associated with landscape foci that are water, topographic, recreation or POS exhibit high values (see table 8). Water as a central focal area has always been prominent and assisted in navigating people through the city and its surrounds. The area in which Perth's city centre meets the river has been a dominant foci for millennia by the traditional custodians, the Whadjuk People. Known as the Indigenous name Derbal Yaragan, the river forms both a physical and metaphorical centre for the Nyungar People, through the Dreamtime serpent creation story of the Waugal.¹⁷¹ The structure of the city's grid, by the first surveyor general of Perth, John Septimus Roe, reinforces this, even though the lateral streets are parallel with the river rather than perpendicular, which did not provide the best possible direct focal views and access to the foreshore.¹⁷² However, this relationship has been somewhat repaired when the major development of Elizabeth Quay opened in 2016 after decades of planning and debate. Premier Colin Barnett explained:

I am pleased to now see it come to fruition and for the people of Western Australia to be able to enjoy this fantastic public space. This project fundamentally changes the face of Perth; it connects us to the Swan River and provides a huge boost to the vitality of our city. We have come a long way over the past decade and West Australians have a lot to be proud of. I am delighted that the public can now see what years of planning, creative development and hard work by many people has achieved.¹⁷³

From the centre to the periphery, water as a foci is reinforced. The linear system of geomorphic wetlands that run parallel to the coast, north and south through the metropolitan region between the swales of the geological formations of the Quindalup and Bassendean dune systems, form localised foci for the neighbouring suburbs. Nevertheless, the reclamation of many of these wetlands (in totality or at their edges) for urbanisation¹⁷⁴ has become the physical and spatial reality of "correcting the physical environment".¹⁷⁵ Similarly, the structuring of urbanisation along the coast, reinforced by corridor planning in the 1970s,¹⁷⁶ has leveraged the foci of the Indian Ocean to the west and in doing so, promotes the elongated form of the metropolis. The most recent spatial plan for Perth identifies that water foci are under threat:

171. Bolleter, *Take Me to the River*, 1–2.

172. Bolleter, *Take Me to the River*, 17.

173. Government of Western Australia, *Elizabeth Quay is Open*.

174. Seddon, *Sense of Place*. George Seddon estimated that nearly half a million acres (202,342 ha) of wetlands had been drained, filled and built upon. In 1972. For example, those wetlands in the southern peri-urban areas. See Appendix 1, Quadrats 32, 33, 52 and 65 for evidence of reclamation over time.

175. Bolleter, *Take Me to the River*, 48. This follows the nineteenth-century Sanitary Movement, which originated in Great Britain and spread out to the colonies.

176. Metropolitan Region Planning Authority, *Corridor Plan*.

Table 8. Value of Peri-urban foci types

Peri-urban type	Value				
Foci	economic	natural	aesthetic	recreation	cultural
Foci+ Horizon	—	■	■	—	■
Foci+ Topographic	—	■	■	■	■○
Foci+ Water	■	■	■	■	■
Foci+ Infrastructure	■	X	X	○	○
Foci+ BME	■○	X	X	■○	■○
Foci+ Built (suburban)	■	■○	X	X	■○
Foci+ Built (rural)	■	X	■	X	■
Foci+ Built (industry)	■	X	X	X	X
Foci + Institutions	■	X	■	X	■
Foci+ Vegetation	■	■	■	■	■
Foci + POS	■	■	■	■	■

■ denotes positive value
 X denotes negative value
 ○ denotes potential value

A drying climate is significantly reducing groundwater and surface water availability at the same time as demand for water is increasing. Many of Perth's natural values, such as urban wetlands and bushland are also dependent on groundwater.¹⁷⁷

Diminishing water due to increased urban expansion and subsequent over-extraction of water from underground aquifers could affect the role water foci have within the peri-urban. Planning, design and management of the remaining wetlands areas is needed, not only to ensure their survival but also to support Perth's resilience to climate change through their ability to hold large amounts of carbon and reduce greenhouse gases.¹⁷⁸ Because water foci display ephemeral characteristics, their physical presence draws people to it, and knowing that water is nearby and accessible, creates places that are distinguishable and builds the imageability of the territory.¹⁷⁹ Therefore, water foci become not only a distinct spatial determiner of urban form related to this place but also a natural asset that is embedded deeply into the psyche of the residents of Perth and therefore an integral structural component of continued urbanisation providing benefit for all Western Australians.¹⁸⁰

Areas of high topographic relief (and therefore foci) directly contrast with the low-lying wetland areas of the peri-urban. In this respect, topographic foci provide opportunities for distinguishing areas of different landscape character¹⁸¹ and are important in supporting areas of strong landscape preference.¹⁸² Topography foci reinforce imageability¹⁸³ through their view points, diversity and contrast within the landscape, and through opportunities to determine visual scale through the breadth of view of the metropolis.¹⁸⁴ The location of water towers atop several of these dune systems recall these high points while also demarcating the expanding urbanisation front. The three coastal parallel dune systems (Quindalup, Spearwood and Bassendean) are the dominant topography of the coastal plain, with those closer to the coast consistently shown to be of higher value. This was reinforced by Premier Mark McGowen in his government's decision to protect the Scarborough dunes from further road development. He argued that:

177. Western Australian Planning Commission, *Perth and Peel@3.5million*, 74.

178. Semeniuk and Semeniuk, "Response of Basin Wetlands," 45–67.

179. Ephemera is core concept of the landscape character of restorative landscapes. See Kaplan, "Restorative Benefits of Nature," 169–82; Ulrich et al., "Stress Recovery," 201–30; van den Bosch and Sang, "Urban Natural Environments," 373–84.

180. Western Australian Planning Commission, *Perth and Peel@3.5million*, v.

181. As identified in landscape character assessments developed in Scotland and England. See Swanwick, *Landscape Character Assessment*.

182. Nasar and Li, "Landscape Mirror," 233–38.

183. This follows Lynch, *Image of the City*, 96–97, and the important landform has in shaping the legibility of the city.

184. Ode, Tveit, and Fry, "Capturing Landscape Visual Character," 111.

The decision is in line with a commitment made before the election, following widespread community concern about the planned roads encroaching on the environmentally sensitive dunes at Scarborough Beach.¹⁸⁵

Similarly, government commitment to the coastal dune protection of peri-urban areas along Perth's northern coastline meant funding was provided for their protection.¹⁸⁶ Kullman evaluates several forms of treatment of topography within Perth's northern corridor at the lot and neighbourhood scale since the 1950s and identifies a historic trend towards topographic manipulation as the city has expanded northwards. The "tipping point", he argues, came when suburban terracing was the standard preparation of a site. However, despite concerns regarding the impact on local ecologies and visual impact since early 2000s, there has been an increase in terracing and retaining walls, or constructed topographic foci at the scale of the lot and the neighbourhood.¹⁸⁷

At the neighbourhood scale, POS and recreation areas are often the "frame" around which a new suburb is built¹⁸⁸ and therefore form internalised foci for the suburb that contribute towards "legibility, identity and sense of place that helps build community".¹⁸⁹ As a requisite component of neighbourhood structure,¹⁹⁰ these areas are highly valued and are considered to be elements that create "good neighbourhoods" as they are planned to be within walkable distance to residents of a new community.¹⁹¹ As internal foci, POS is planned to be "overlooked by development" so there are clear sightlines from neighbouring buildings.¹⁹²

Landscape architect and ecologist Margaret Grose explains how the cascading of small decisions in the planning of POS in suburban developments has led to problems in knowledge transfer, which impacts ecological outcomes.¹⁹³ For example, Grose explains that the value of a single endemic tree (foci) within POS provides social value and contributes significantly to ecological diversity within the cleared and altered landscape. Value is also attributed to patches of endemic vegetation species within POS as they facilitate connectivity through a suburban matrix.¹⁹⁴ In many cases, the planning of new suburban neighbourhoods attempts to maximise endemic vegetation by locating POS within

185. Government of Western Australia, *Scarborough Dunes Protected*.

186. Government of Western Australia, *Western Australia's Coast Protected*. In 2004, the Quinn's Rock Environmental Group and the City of Wanneroo was provided with grant funding to increase biodiversity, dune stabilisation and rehabilitation works at the Mindarie Foreshore Reserve.

187. Kullmann, "Emergence of Suburban Terracing," 619.

188. Grose, "Considering Ecological Imperatives," 6.

189. Western Australian Planning Commission, *Liveable Neighbourhoods*, 92.

190. 10% of any residential development must be allocated to POS. This premise (and that it provides active recreation) has been the basis of planning of POS since. Stephenson and Gordon, *Plan for the Metropolitan Region*.

191. Stephenson and Gordon, *Plan for the Metropolitan Region*, 89–96.

192. Stephenson and Gordon, *Plan for the Metropolitan Region*, 89–96.

193. Grose, "Small Decisions in Suburban," 59.

194. Grose, "Small Decisions in Suburban," 51.

areas where as many trees as possible can be retained. However, she argues that the potential ecological value of these areas is somewhat diminished as they are typically surrounded by turf with no understory plantings or opportunities for succession of endemic species through their vegetation associations.¹⁹⁵ In this respect there is still an opportunity for potential value to be included in POS areas when considering trees as foci at this scale.

In table 8, the potential value of foci types has been attributed to infrastructure and BRM extraction sites. The potential of infrastructure has been explained in accordance with this type as a path space. In this way, potential would not be about creating new foci, but about utilising the existing infrastructure foci as “beacons” to attract and connect new aesthetic, recreation and cultural pursuits within the city. Conversely, BRM extraction sites (limestone quarry’s, claypits and bauxite mines) provide opportunities for redevelopment in the form of regeneration, rehabilitation and reimagination. These hollows are foci that are a direct result of the urbanisation process. Limestone, clay, lime and sand are required for the continuation of the urban development front into peri-urban areas. Therefore, they represent not only punctures within the ground plane of the peri-urban but also scars that are tightly connected to the evolution of the city. Proposing these sites as reinterpreted foci that then support urban development through another iteration allows for new potential to emerge.

195. Unlike northern hemisphere counterparts, endemic vegetation assemblages in Australia exist because of their associations rather than single species. The reliance here is on several species acting together to ensure one another’s survival, from canopy trees to understory shrubs to micro-fungal species that are required to sustain nitrogen levels in the soil. Personal conversation with Aunty Frances Bodkin, Dharawal Elder, Sydney, March 10, 2017.

Pluralistic values of peri-urban territory types: a summary

Edges form an important and reliable structural component for contributing to high value within the peri-urban, specifically vegetation or water edges. Several other peri-urban types related to structural edges display potential for increasing the value of the collective peri-urban territory by enhancing the level of imageability of the territory. Accordingly, edges play an important part in creating landscape rooms and contributing to the territory's overall legibility at a range of scales.

Paths help form an important and reliable structural component for contributing to high value within the peri-urban, specifically vegetation or water edges. However, the potential of recreation and cultural values to be increased is evident through the opportunities that many path types provide. Several other peri-urban types related to paths display potential for increasing the value of the collective peri-urban territory by enhancing the level of perceptiveness of this landscape.

Threshold values are emphasised where they assist in the transition through the landscape via the contrast of spaces that make up various landscape rooms. This is where peri-urban types demonstrate high value as well as high potential value in their ability to support enclosure and openness, contrast and complexity throughout the territory. Thresholds, as they relate to built types such as institutions and cultural types such as schools, hospitals, prisons and large retail precincts, generate a presence not only as a physical threshold but also as an economic and social threshold due to their larger range and due to the catchments required to keep them sustainable.¹⁹⁶ Cultural thresholds such as places of religious worship have similar centripetal forces that represent both physical and metaphysical transactions within the territory.¹⁹⁷ Potential value is attributed here, where those value sets related to recreation, rural or residential landscape types can be emphasised more through their associations with institutional or cultural types, so the transition through these spaces is integrated within the landscapes to support complexity, mystery and coherence.

Foci values are not as prominent as the other value types unless they are negative values brought about by infrastructure related to industry and energy. In some instances, built suburban foci are negative when set in adjacency to the open, vast areas of rural lands. Further, one such reason that foci are not as prevalent as other structural types is because of the flatness of the landscape and

196. Curtis and Punter, "Design-Led Sustainable Development," 55. Urbanist Peter Calthorpe was retained as a consultant for the development of St Andrews in Perth's north near the suburb of Yanchep. Calthorpe argued for larger walkable ped-sheds up to 800 m around the central retail precinct and supermarket the full-service catchment for a supermarket of 10,000 people.

197. For example, see Appendix 1, Quadrat 3 and the amalgamation of differing religious buildings.

the emphasis on the horizon as a continuing focal point as you move through the territory. Unlike built foci within more densely built areas, landscape foci are not as pronounced within the peri-urban territory and exist very much at the local or landscape scale.

When assessing the vertical columns (of the five value themes) across all the structural types (edge, path, threshold and foci), natural and recreation values appear to promote the most frequent opportunities for pluralistic values to form while also exhibiting the highest opportunity for potential value.¹⁹⁸ Furthermore, across all the structural types, economic value displays high potential value when interlinked with peri-urban types that included natural structures (vegetation and water), as these values relate to how peri-urban ecosystem services might integrate adaptive measures to support metropolitan vulnerability under climate change.¹⁹⁹ This prediction also supports potential value for cultural values, specifically when they emerge as a response to natural and aesthetic improvements.

Each of the structural components of the peri-urban showed evidence of at least one value theme. However, as deduced, this value is dependent upon the scale of observation and subsequent knowledge that is generated and transferred. At the meta scale of the city, components of water, topography and vegetation remain central to the identity of the metropolitan region and the establishment of a sense of place. However, at the landscape scale (that of the quadrats), there is repeated evidence of alteration, suppression and eradication of these landscape types. Ultimately these changes reflect a change or negotiation in values.

Peri-urban thickness

In this chapter, the imageability of the territory is expanded through understanding the value of peri-urban types and their potential to shape future value. The typologies provide insight into how landscape architects might be able to operate at the scale of the territory. This is an important point when we consider how the landscape types continue to support human and ecological assemblages within the territory; more specifically, how socio-ecological interactions are essential for human health and wellbeing.

Several parameters constituting human health and wellbeing include basic material for a good life, freedom and choice, health, good social relations and security. In this way, the landscape structures (where peri-urban value is derived) support wellbeing because they are experienced and

198. Polat and Akay, "Relationships Between the Visual Preferences," 573–82.

199. Alamgir, Pert, and Turton, "A Review of Ecosystem Services," 112–27.

perceived by people; they are situation dependent and reflect local geography, culture and ecological circumstances.²⁰⁰ While it might be clearer to understand how the provisioning and regulating services of ecosystems support human health and wellbeing, through water, food and shelter and medicinal supplies, it is much harder to attribute services related to cultural value. Cultural attributes not only exhibit ecological phenomena but also reveal patterns generated by human relationships with the landscape over long periods of time.²⁰¹ As Pickett explains, the landscapes we produce say a lot about who we are, how we interact with one another and our relationship with the natural world. When we manage the physical environment in a particular way, we are embossing our values and priorities on the land values and priorities that change over time.²⁰²

The revealed peri-urban structural landscape types display a range of values that have been necessary to support human health and wellbeing (until now). As Douglas explains, the complexity of political, economic and social drivers that result in outcomes for health and wellbeing for communities of a the peri-urban territory is what makes the territory so interesting.²⁰³ This also extends to communities that do not reside in the peri-urban territory but gain value from it; for example, people of the metropolitan area as a whole. In this respect, the transitional and contested territory of the peri-urban becomes not only an issue relating to localised land uses but also includes the negotiation of values from activities and land uses operating at scales that are externalised but still impacting upon it.²⁰⁴

It is largely recognised that urban form impacts the health and wellbeing of humans and subsequently the environment in which they live.²⁰⁵ In Australia, this discourse has been explained in terms of liveability. The Australian Government's Major Cities Unit defines liveable cities as:

Liveability refers to the degree to which a place, be it a neighbourhood, town or city, supports quality of life, health and wellbeing for the people who live, work or visit. Cities considered to have a high degree of liveability tend to have a high level of, and widespread accessibility to, amenity. Amenity includes features such as open and green space; educational, social, cultural and recreational facilities. High-amenity places have not only higher financial value (property prices and rents) but also social, environmental, public health and cultural value.²⁰⁶

200. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*, 3.

201. As is evident in the dataset of the seventy quadrats. See Appendix 1.

202. Pickett et al., "Social-ecological science," 328.

203. Douglas, "Peri-urban ecosystems and societies," 20.

204. Douglas, "Peri-urban ecosystems and societies," 20.

205. World Health Organization, *Our Cities, Our Health, Our Future*.

206. Infrastructure Australia, Major Cities Unit, "Liveability of Australian Cities," 93.

Undoubtedly, the diversity of the peri-urban territory allows for many of the amenity requirements to be delivered for a city to be considered liveable, as well as the basic human needs—shelter, food, water and clean air. In this respect, understanding the landscape structure of the peri-urban territory builds imageability of it in accordance with the socio-ecological benefits it provides. Furthermore, the landscape types reveal where potential for intervention exists to improve quality of life and in doing so, where human wellbeing is considered, within a broader paradigm of ecological wellbeing.²⁰⁷

Natural value is one of the defining components of Perth's metropolitan area. The Western Australian Department of Planning outlined six factors that contribute to high liveability across the Perth metropolitan region:

1. Sense of place: Defined by local character including its role and functions, specifically those related to cultural heritage and narratives of place.
2. Natural environment: Landscapes where conservation, remediation, restoration of biodiversity and air quality are evident.
3. Opportunity, equity and choice: Evident through choice of housing, employment and access to health, education and recreation areas.
4. Sense of community: Where cultural identity is formed through interaction, participation and inclusion.
5. Accessibility: Personal mobility through connection to transport services.
6. Built environment: Human scale and urban design, form, structures and practices are sustainable.²⁰⁸

Factors 1, 2 and 6 relate explicitly to the natural systems and landscape structures of the peri-urban territory. Furthermore, the landscape structures and systems have sacred value for personal reflection or organised experiences and appear in the form of endemic vegetation assemblages such as Banksia woodland, coastal dune sedgeland and the Muchea limestone woodlands.²⁰⁹ Their value as natural systems is also evident through several keynote fauna species of the SCP associated with these vegetation assemblages.²¹⁰ Of these, the Red Tailed Cockatoo, more commonly known as “Carnaby's Cockatoo”, is the most accessible visually, due to their distinct loud calls and tendency to congregate in flocks.²¹¹ Ironically, the clearing of land in the peri-urban territory for urbanisation and agriculture

207. Thompson, *Ecology, Community and Delight*.

208. Western Australian Planning Commission, *Network City*, 56.

209. Some of these species of the woodlands and shrublands include *Melaleuca huegelii*, *Eucalyptus decipiens*, *Casuarina obesa*, *Corymbia calophylla* and *Xanthorrhoea preissii*.

210. Department of Parks and Wildlife, “List of Threatened Ecological Communities.” This includes the Red Tailed Cockatoo, Western Swamp Tortoise, Western Ringtail Possum and Red-necked stint, which are distinguishable and unique to this place.

211. Saunders, Mawson, and Dawson, “Impact of Two Extreme Weather Events,” 147.

are the largest threats to these natural systems in continuing to support liveability of the metropolis.²¹²

Furthermore, a recent study comparing low and high biodiverse areas in urban and peri-urban areas concluded that landscapes where there is at least a perceived level of restorative opportunities in people's experiences, has positive influences.²¹³ In the same study, the green natural areas of the peri-urban, even with low biodiversity, correlated more strongly with the research participants for subjective wellbeing and restorativeness. However, they also found that "urban green areas with high biodiversity have similar potential to peri-urban green areas in exerting beneficial effects on visitors."²¹⁴ Thus, all values associated with biodiversity can contribute to high liveability and, importantly, contribute to fostering positive attitudes to the natural world.²¹⁵ Subsequently, landscape types interacting with biodiverse areas at the landscape scale are critical in building imageability of the territory.

Therefore, the active recovery—the rehabilitation and restoration of the natural world to improve the biological and physical conditions of the peri-urban territory and its landscape processes (towards ecological recovery)—becomes a clear mandate of action within the peri-urban. Importantly here, peri-urban thickness predicts potential recovery as an iterative process derived not only from tradition but also from the courageous invention of the very nature of landscape itself, where "the latter transforms and renews the former" mediating between the idea and the artefact.²¹⁶

Peri-urban potential

The potential of the peri-urban territory in this chapter focused on relational thought and practice in respect to landscape values and the opportunity to deliberately transform these. Many of the landscape structural types identified also demonstrate potential for transformation because of their opportunity to adopt pluralistic values at a range of scales. Subsequently, the value of the peri-urban territory and its potential exist because it is relational. While landscape types have merit unto themselves, the chorography of these types in relation to a larger spatial geographical frame highlights the unique potential of the peri-urban territory.²¹⁷

One key question of the thesis is "How is the peri-urban landscape defined spatially?" The structural components (peri-urban types) form only part of the answer. To understand the peri-urban as a

212. Johnston, Stock, and Mawson, "Foraging by Carnaby's Black-Cockatoo," 284–85.

213. Carrus et al., "Go Greener, Feel Better," 221–28.

214. Carrus et al., "Go Greener, Feel Better," 226.

215. Western Australian Planning Commission, *Network City*, 36.

216. Corner, "Introduction: Recovering Landscape," ix-1.

217. This follows Cosgrove, "Landscape and Landschaft," 58.

distinct territory is to understand the diverse array of landscape types as an expression of individuals and groups. Subsequently, experiences from individuals and groups can cumulate to inscribe value and influence modes of practice within it.²¹⁸ This is a process that essentially forms a map of the territory. As Cosgrove deduces:

To map is in one way or another to take the measure of a world, and more than merely take it, to figure the measure so taken in such a way that it may be communicated between people, places or times.²¹⁹

Therefore, potential exists through the territory and becomes an emergent agent, where the value of society and its natural ecosystems are forefront, and the experimentation and design of spaces to amplify relational value become instrumental in conducting and influencing new cultural experiences. In order to do accomplish this, intentional design of these spaces must occur because the success of valued landscapes lies in developing a deeper understanding with the people that use these spaces.

6.10 Conclusion

This chapter concluded the operational phase of discovery and the third stage of inquiry of the territory's condition. The chapter distinguished how landscapes that we see and value influence how we act within them.²²⁰ The relevance of positioning the peri-urban as a cultural landscape was examined to situate the territory within international and policy governance settings. Landscape value was identified as having tangible and intangible benefits received from the landscape and its ecological systems. Landscape value also revealed the cumulative erosion of value priorities related to wetlands and endemic vegetation within the peri-urban territory despite these having been a priority within metropolitan planning policy. Importantly, the chapter proposed that value, constructed by different cultures and social groups, can accumulate to explain relational value types. As a result, value was proposed as a continuum of relational types and dynamic intersections between perceivers of the landscape and the landscape itself and is therefore a critical component of the territory's potential.

Consideration of the disciplinary background of landscape architecture provided broader scope to how values are conceived and how action is informed within the peri-urban territory. Furthermore, this demonstrated that several value sets were consistent within the allied disciplines. In many cases,

218. As explained in figure 6.1.

219. Cosgrove, *Mappings*, 2.

220. Tuan, *Topophilia*; Thompson, *Ecology, Community and Delight*; Stahl Schmidt, *Landscape Analysis*.

these value sets formed pluralistic values within the peri-urban and exhibited trivalent properties. Further, the *potential* for value to be constructed within the peri-urban was explained, specifically as it relates to human health and wellbeing.

While Arne Nass's reaction to an economic view of value states "you cannot slap a price tag on nature",²²¹ Thompson argues that values are more aligned with core principles that guide the way landscape architects make places better.²²² In this respect, the landscape expression of the peri-urban territory must be seen as a subsequent negotiation of values and its form, a result of deliberate city-making practices. Dee defines this expression of practice as "aesthetics", where the "forms and processes of landscape, which when experienced through the senses, may alter and influence perception and thus insight into reality."²²³ Accordingly, as this thesis argues, to situate active processes (practices) that have the potential to re-prioritise, recover and foreground new city-making values derived from the peri-urban landscape itself establishes new forms and expressions within this territory.

The agency of people (and professionals) to act within the peri-urban territory (and therefore for value to express itself across a range of representations and practices) is profound because "landscapes that attract the admiring attention of human beings may be more likely to survive than landscapes that do not attract care or admiration."²²⁴ In this respect, the adoption of design thinking, beyond the structure planning and design of new communities,²²⁵ begins with a theoretical or conceptual position.²²⁶ Starting here influences paradigms about how to plan the peri-urban, from the policy level where design knowledge can influence planning policies to the applied level where design can actively create spaces that cultivate human interactions with ecosystems. As Corner concludes:

The reciprocal interactions between the built and imaginary is what lies at the center of landscape architectures creativity and contribution to culture. The field embraces significantly more than regressive, sentimental views of "nature" and "countryside" might lead one to believe, and its creative potential far outreaches that of the service professional offering ameliorative services after the land developers have done their damage ...

Just as it is simplistic to consider landscape lightly, as it were merely a fashionable term or an expendable luxury, it is equally negligent to underestimate the transforming effect

221. Naess and Rothenberg, *Ecology, Community, and Lifestyle*, 124.

222. Thompson, *Ecology, Community and Delight*, 6.

223. Dee, "Form, Utility, and the Aesthetics," 23.

224. Nassauer, "Cultural Sustainability," 65–83.

225. As evident by the requirements of under the Western Australian Planning Commission, *Liveable Neighbourhoods* policy.

226. As this thesis does, first by asking what is the peri-urban and secondly by speculating on its potential.

landscape practices exert on environmental, cultural and ideological affairs.²²⁷

Accordingly, the instrumentality of design is paramount because applied design directly influences human interactions and value, which in turn can influence planning and policy through the knowledge and engagement of stakeholders and the augmentation of these cultural norms with that of the expert designer.

227. Corner, "Introduction: Recovering Landscapes," 10.

7.1 Introduction

As demonstrated in chapter six, peri-urban value arises from the individual and collective social and cultural experiences and knowledge of the territory over time. Value was identified from the disciplinary perspective of landscape architecture. Furthermore, those peri-urban types that exhibit high or potential value as well as pluralistic values were identified because they can construct new experiences and knowledge. This, in turn, influences underlying and assigned values in the peri-urban territory, while establishing “norms” that inform attitudes and preferences. Chapters four and five framed the peri-urban as a territory—a topologically continuous surface of landscape that represents “the language of place”.¹ In this chapter, potential, as proposed in the introduction chapter, is constructed through foregrounding the discipline of landscape architecture and the role of design. The research question answered here is “What are the opportunities for the profession of landscape architecture within the peri-urban of Perth?”

This chapter moves the thesis into the final process, part four—*founding*. Founding synthesises the discovery of the peri-urban territory in parts two and three by locating the profession of landscape architecture and situating the opportunities for developing an agenda through research and practice. The chapter will examine how modern urban planning conditions derived from the “urban transect”² limit the potential of the peri-urban.³ This is because to compartmentalise landscape within a spectrum of urban to wilderness denies the very essence of landscape as a dynamic cultural product. In this regard, landscape architectural design responses that are derived directly from the peri-urban territory’s condition enable potential to be established through design experimentation.⁴ Here, landscape, as a culturally made artefact, is configured to be an active agent—one that informs knowledge and experiences—through the process of design.⁵

Here it is useful to examine exemplars of landscape architectural design and planning practice that have configured peri-urban territories in Australia. The opportunity available to the discipline of landscape architecture to claim the peri-urban as an entire project site will be established.⁶ In doing

1. Harvard GSD, “Topology.” This follows the thinking of landscape architect and academic Christopher Girot.

2. Dunay and Plater-Zyberk, *Lexicon of New Urbanism*. This is a code of the urban environment based on a transect from the urbanised city centre to the wilderness at the periphery and formally referred to as Smart Code.

3. Western Australian Planning Commission, *Perth and Peel@3.5million*, 2. In response to Planning Minister Day’s conclusion that it is time to change from a business-as-usual approach to something that is more considered and connected.

4. This follows Reed and Lister, *Projective Ecologies*.

5. After Corner, “Agency of Mapping,” 188–225.

6. The term “landscape architectural project” refers to the planning, design, construction and management of sites for society and its ecosystems where landscape architects play a key role in either leading these projects or in transdisciplinary teams.

so, the chapter argues that landscape architecture design is necessary to increase the value of this territory and its natural systems. Landscape structure provides the best opportunity to improve the environmental, social and economic performance of the landscape and in highly fragmented landscapes like the peri-urban, the quality of these structures to support the overall heterogeneity of the territory is paramount.⁷ This chapter will demonstrate how people's engagement with the landscape and its natural environments (through design), as related to the landscape's structure, activates parameters of flexibility that support resilience and adaptation of the city. On this basis, landscape architecture design proposes an alternative proposition to the urban transect and illustrates how design intervention and experimentation, related to the territory's typologies, forms the foundations for an enlivened peri-urban condition for Perth.

7.2 Returning to landscape architecture

*A country house of yesterday is within the rural urban fringe today, in a suburb of tomorrow and in a renewal area of the not too distant future.*⁸

As Ian McHarg identified, urbanisation was, until only recently, seen to be an “a positive act of transformation”. As cities began to rapidly industrialise during the eighteenth century, the unsanitary effects of crowding and pollution created opportunities for new sites within the city to be established with the aim of improving the health and living conditions of the urban population. For landscape architecture, the early spatial types, derived as a result of rapid urbanisation, are evident by the cemeteries, large parks and commons located at many city peripheries.⁹ In the twentieth century, the linking of these park networks to form greenbelts became fertile ground for the profession of landscape architecture, enabling the designed repair of large-scale ecological networks to occur at the scale of the metropolis.

However, while the periphery was an antidote to density in some of the world's largest cities,¹⁰ those New World cities that were beginning to expand in the immediate decades after World War Two promoted the ideals of modernity and individuality. Here, the “private detached castle” that propagated Australian cities at this time created “Australia's greatest achievement—the suburb”.¹¹ For Perth, the process of (sub)urbanisation and demand for single-storey, detached homes resulted in the

7. Lovell and Johnson, “Designing Landscapes for Performance.” See also Vandemeer and Lin, “Importance of Matrix Quality,” 226.

8. McHarg, “Place of Nature,” 2.

9. For example, consider Pere Lachaise Cemetery, Paris or Central Park, New York as some of the earliest examples.

10. For example, the Boston Bay Fens “Emerald Necklace” designed by Fredrick Law Olmsted in Massachusetts.

11. Boyd, *Australian Ugliness*, 171.

development of some of the largest suburban homes in the world.¹² While many of these suburban greenfield developments arose from the conversion of rural to urban zoned lands, there has been an explicit requirement for POS provisions. However, the resulting POS in many of these suburban developments has resulted in the nullification of SCP ecologies.¹³ As the analysis of the quadrats in chapter four examined, suburban greenfield development in Perth has promoted the irreversible destruction of coastal dune and banksia woodland—ecologies that occur nowhere else on the planet.¹⁴ And while the requisite POS areas were identified, they were often centralised within new suburban developments. Unlike the great peripheral parks and large POS that enveloped expanding cities of our northern hemisphere counterparts and connected them to their broader landscapes at their edges, the rise of the greenfield suburb remains eternally inward-facing, in both a literal and figurative sense.

The destruction of local ecologies, topography and waterways has been rapid, and landscape architects have been one of the professions promoting this destruction. Professionally engaged to “fill in” the areas attributed to POS, landscape architects in Perth have been charged with promoting a vision of new suburbia. This vision has sought to replace the scraggly endemic banksia woodland and its poor soil with lush lawns, sporadically interspersed with mature canopy trees. Here, the landscape architect has narrated a landscape identity that is not of this place, where entry statements, artificial lakes and the “dressing-up” of drainage swales (to make up the requisite 10 per cent public parklands) has become the norm.¹⁵ Landscape architects in Perth have been complicit in this act of erasure and resurrection of a falsified green veil that continues to be the predominant mode of operation for new suburban developments. Arguably, this is largely a result of the profession lacking an aesthetic sensibility derived from the peri-urban territory and failing to operate beyond the scale of the “planned” neighbourhood to that of the landscape.¹⁶

If landscape architects have been complicit in the destruction of many of the attributes of the territory, then why would we call for a return to landscape architecture? It is because a return also calls for a theoretical and practical reorientation of the discipline towards the peri-urban landscapes of cities, where strategic and experimental components of design and design process—at a range of scales,

12. Wright, “Perth Homes Get Bigger.” There has been consistent rise in house size throughout the last decade, with only recent declines in the past two years. A 2017 study revealed the average size of new built suburban homes in Perth to be 327.2 sqm, the largest in Australia.

13. Ramalho et al., “Complex Effects of Fragmentation,” 2468.

14. Myers et al., “Biodiversity Hotspots,” 853–58. The Perth SCP is one of thirty-five biodiversity hotspots in the world.

15. Marot, “Reclaiming of Sites,” 50.

16. Grose, “Considering Ecological Imperatives,” 6–25. While this is largely considered to be the business-as-usual approach, it should be acknowledged that two more recent peri-urban suburban developments, those of Wungong in Perth’s east and Alkimos in Perth’s north, are an exception. This is because both have purveyed landscape architecture planning and design as the predecessor to urban development, considering water flows, connected green networks and topography as the unifying structures that determine the development both internally and externally beyond its edges.

not just the neighbourhood—play a critical role in securing the metropolitan region and its natural systems to support growing urbanisation.¹⁷ As Corner proclaims, not since Ian McHarg championed landscape architecture and land-use planning at the regional scale in the 1970s has landscape architecture been “called to arms” and asked to reconsider its role in shaping and forming cities.¹⁸

The trend towards further urbanisation has Perth predicted to reach 3.5 million people and to cater for 800,000 new homes by 2050.¹⁹ At the time of development of Perth’s first metropolitan plan in 1955, the profession of landscape architecture did not have significant recognition by other professionals to be included in the overseeing committee.²⁰ This is despite the State Council of the Australian Planning Institute, the Royal Australian Institute of Architects, the Institution of Surveyors and the Institute of Engineers all being assembled to contribute to the development of the city’s first plan.²¹ Notably the profession is now actively engaged politically at both the federal and state levels and continues to develop advocacy and profile as core pillars of the organisation’s strategy.²² Therefore, in the first instance, a return situates the disciplinary perspectives of landscape architecture as a critical contributor to metropolitan planning and design because the landscape, its ecologies and its people are central to it. This of course follows a more global trend in the planning and design fields to “design with nature” and to establish designed ecologies and their spaces of societal importance within mainstream planning systems.²³ Likewise, other core knowledge domains and research priorities identified for landscape architecture include:²⁴

- a stronger connection between research and practice;²⁵ and
- urban ecology and human dimensions of landscape change.²⁶

17. Western Australian Planning Commission, *Perth and Peel@3.5million*.

18. Steiner, “Healing the Earth,” 75–86.

19. Australian Bureau of Statistics, *Population Projections by Region, 2017–2066*. The Series B figures indicate another 2.3 million people will reside in Perth by 2066.

20. The Australian Institute of Landscape Architects (AILA) was established in 1973.

21. Stephenson and Gordon, *Plan for the Metropolitan Region*, 5. The plan for the Metropolitan Region of Perth and Fremantle was established in 1955.

22. For example, the establishment of the Federal Government’s Living Cities Alliance, as well as representation on the Federal Minister for Cities Parliamentary Friendship Group for Cities. See also Australian Institute of Landscape Architect, *15 Year Infrastructure Plan*.

23. This follows McHarg, *Design with Nature*; 9. See also Steiner, “Application of Ecological Knowledge,” 108–10; *Making Plans*; Thompson and Steiner, *Ecological Design and Planning*; Steiner and Thompson, *Nature and Cities*.

24. See Langley, Corry, and Brown, “Core Knowledge Domains,” 9–21.

25. Gobster, Iverson Nassauer, and Nadenicek, “‘Landscape Journal’ and Scholarship.”

26. Gobster, “Mining the LANDscape,” 21–30.

7.3 Stewardship through design

As the typologies of chapter five revealed, the peri-urban territory consists of a wide range of diverse landscape types that would enable landscape architects to claim the territory as a site to support the future city. As a territory, the peri-urban is a repository for cultural values and exchange of these values. The peri-urban is the site where connections between ecological systems and human systems of food chain supplies, infrastructure provision, water, urbanisation and regional economies are heightened and constructed. Therefore, a return denotes a desire to care and build upon the primordial idea of stewardship,²⁷ a guiding principle of landscape architecture that recognises an aesthetic driven by the need for and guidance of the human hand, to care and look after the landscape in its entirety.

Landscape architects see themselves as caretakers of nature whereby human intervention is central to this care.²⁸ Stewardship is stated as a commitment to “environmentally and socially conscious principles and practices across all aspects of the profession”²⁹ to ensure that the value of landscapes extends beyond human needs to the need to “protect, sustain and restore landscapes”, while practicing with “integrity and sensitivity”.³⁰ It is therefore positioned as an action within a field of potential relationships with ecological systems, responding to wider social, cultural, economic and political forces that express “the zeitgeists and imperatives of its time.”³¹ More recently, the New Landscape Declaration³² while not specifying stewardship explicitly, does argue that landscape architects should care for the landscape so issues of social and ecological justice for all people and the natural world can be achieved.³³ Therefore, ideas of stewardship clearly support the integration and intentions of humans within the landscape and the creation of socially recognised ecologies that function to support ecological and human health and wellbeing. In as much as holistic landscapes are those where all parts of the landscape are conceived in their full context and existing across a range of scales,³⁴ landscape architectural planning and design must constitute ideas of stewardship framed towards perceiving ecological and human constructed systems in their full context. In this way, the structure of the peri-urban territory becomes essential to achieving this.

If all parts of the landscape, even the unknown spaces, are considered a priori, they then constitute

27. Leopold, *A Sand Almanac*.

28. For example, International Federation of Landscape Architects: Asia Pacific, *Charter*. See also Weller, “Stewardship Now?”.

29. International Federation of Landscape Architects, *Charter*, 5.

30. Australian Institute of Landscape Architects, *AILA Charter*.

31. Swaffield, “Social Change,” 188.

32. Landscape Architecture Foundation, *New Landscape Declaration*.

33. Landscape Architecture Foundation, *New Landscape Declaration*.

34. Naveh, “What is Holistic Landscape Ecology?,” 13.

the potential for natural and cultural interactions that contribute towards a common sustainable future. In this respect, the idea of stewardship is fundamental to achieving this goal. Even more so if a critical function of landscape architecture is to continually interpret the contemporary relationship of human beings to their environment and augment them spatially. Since the change in relationship between people and nature is accelerating, as Thayer argues, new formal interpretations are required at an ever-increasing rate.³⁵

As a result, artistic interpretation (design) plays a key role. Several landscape ecologists have connected the idea of stewardship to landscape character types and aesthetic care.³⁶ Retaining landscape character that has an agreed value for ecosystems and people is a measured process that relates to ideas of aesthetic care for and with the vernacular landscape.³⁷ However, traditional landscape representation does not adequately describe the peri-urban, partly because the scale of “perceptible realm”—the scale perceived by humans—is missing.³⁸ Hence, one of the overarching meta narratives distinguished in chapter three, a “sense of place”, is harder to instil because the aesthetics that transmit the rate of change of ecological systems, related to human experiences, has not been captured at the landscape scale.³⁹ Crucially, because landscape pattern is what people notice, the pattern related to this change is what defines the scale at which design can intentionally intervene to change the landscape.⁴⁰

As explained in the MEA, there must be “an organized attempt to translate key aspects of ecological structure and function into terms that may rise to the level of publicly shared values”.⁴¹ Furthermore, as Iverson Nassauer and Opdam identify, in order to forge a new kind of history where our understanding of nature has implications not only for the natural world but also ourselves, landscape must become both a medium and a method for design.⁴² Accordingly design becomes the act of negotiating landscape change and initiating different ways of seeing and thinking about sites, regions and territories in order to influence the way humans act across the metropolis.

Is it possible to realign the landscape architecture project towards the productive and participatory phenomena of the everyday working landscape of the peri-urban? Brinckerhoff-Jackson argued that to interpret landscapes accurately, we must turn to the common places of ordinary people

35. Thayer, “Experience of Sustainable Landscapes,” 108.

36. Iverson Nassauer, “Culture and Changing Landscape,”; Tveit, Ode, and Fry, “Key Concepts in a Framework,” 229–55.

37. Iverson Nassauer, “Culture and Changing Landscape,” 234–35; Brinckerhoff Jackson, *Discovering the Vernacular*.

38. Gobster et al., “Shared Landscape,” 959.

39. As demonstrated by the quadrats in Appendix 1, chapter four and subsequent landscape types in chapter five.

40. Girot, *Course of Landscape Architecture*, 85.

41. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*.

42. Iverson Nassauer and Opdam, “Design in Science,” 636.

rather than to the rarefied designs of architects and planners.⁴³ However, this approach fails to exemplify the potential role designers can have in connecting places within the everyday in order to build a collective consensus and perception of their condition (both literally and figuratively). It also ignores the potential that lies in speculative scenarios that provoke new thinking and by which their representation is dependent upon the artistic approach of the landscape architect.

The peri-urban territory is a place that is marked by loss and hope of the everyday, and it is through this tension that opportunities for landscape arise: “to articulate the original and the originary (archaic) joining of things” is, as Carter attests, a call for attention to the storylines in which place and landscape are written.⁴⁴ It follows that the unstable and indeterminate dimension of landscape itself is where artistic practices and alternative sets of possibility can be revealed.⁴⁵ As Girot explains, the potential of landscape emerges where invention and transformation of it delivers permutations of humans’ approach to ecology.⁴⁶ Landscape design, therefore, becomes a new mode for active adaptation at the edge that can change the value and image of an entire territory.⁴⁷

The heterogeneity of the peri-urban territory, brought about by human-induced change, provides the opportunity for a new ecological aesthetic⁴⁸ to emerge from the field of landscape architecture. This aesthetic would require a shift in thinking of the peri-urban territory as a milieu of leftover spaces set against the “pristine” backdrop of agricultural and wild land, to an established, visually abrupt condition of city-making processes, where the cycles of carbon, waste, transport, food and energy creation are emphasised. Hereby begins an aesthetically pleasing environment where the ecology of these cycles becomes rooted in social processes.⁴⁹ As Iverson Nassauer argues:

If we probe the social language of landscape form and learn the conventions of landscape appearance, we can use these conventions to label ecological functions. By intentionally using the conventions, we create the possibility the conventions themselves will change.⁵⁰

Thereafter, landscape architecture design processes and their built outcomes, both speculative and actual, focus on sustained socio-ecological systems within the peri-urban territory that portray, and make structurally evident, the ecological systems and the social dimensions that inform their re-making.

43. Brinckerhoff Jackson and Lefkowitz Horowitz, *Landscape in Sight*, xxx.

44. Brinckerhoff Jackson and Lefkowitz Horowitz, *Landscape in Sight*, xxx.

45. Corner, “Operational Eidetics,” 157.

46. Girot, *Course of Landscape Architecture*, 288.

47. Opdam et al., “Science for Action,” 633–44.

48. Whiston Spirn, “Poetics of City and Nature,” 108–26; Iverson Nassauer, *Placing Nature*.

49. Iverson Nassauer, “Appearance of Ecological Systems,” 245.

50. Iverson Nassauer, “Appearance of Ecological Systems,” 246.

7.4 Unravelling the urban transect

*We need a shared reference and scale beyond the neighbourhood scale that is promoted by planning in order to make the peri-urban familiar, comprehensive and relevant for diverse and separate perspectives.*⁵¹

The “transect” (see figure 7.1) is a drawing tool traditionally used in biological and ecological sciences that examines the relationship between a variety of factors in the environment. As an imaginary sectional line or cut through the landscape, the tool shows the biogeographical relationship between plants and animals and their habitat and to one another.⁵² At the beginning of the twentieth century, sociologist and urban planner Patrick Geddes adopted the tool to differentiate the physical and social segregation of urban–rural life. In Geddes’ transect, the city was an expression of human work across the landscape, with labour intensive activities of the miner, farmer, peasant, hunter and shepherd allocated to what would be (now) aligned with the peri-urban areas of the landscape surrounding a city. At the city centre, Geddes’ placed the gardener. Historically, the act of gardening has been aligned with the cultivation of nature by “man” and is congruent with what Dixon Hunt describes as the “third nature”, where gardens became evidence of place making and detail the relationship between a specific culture and the physical world.⁵³

In the last twenty years, the transect was adopted by proponents of the Congress of New Urbanism as a planning and development approach built upon the human-centred components of historic urban centres over the past seven centuries.⁵⁴ “Smart Code”, developed by New Urbanism proponents and founders Andres Duany and Elizabeth Plater-Zyberk and their Florida architecture and planning firm DPZ,⁵⁵ places city and wilderness at opposite ends and cites urbanisation and density as a continuum of urban form.⁵⁶ In the creation of the coded city, deployed predominantly through the principles of New Urbanism,⁵⁷ the representation of the city–country, urban–rural relationship in the Smart Code transect has restricted the connection and relationship between regional and urban ecologies of the city. While the transect method was originally envisaged to represent the relationship between neighbouring biogeographical environments,⁵⁸ the urban–rural transect, as proposed through Smart Code, sought to restructure the relationship between people and their environment through varying

51. Dramstad et al., “Integrating Landscape-Based Values,” 265.

52. German naturalist Alexander Von Humboldt first used the technique at the end of the eighteenth century in his study of South America.

53. Dixon Hunt, *Greater Perfections*.

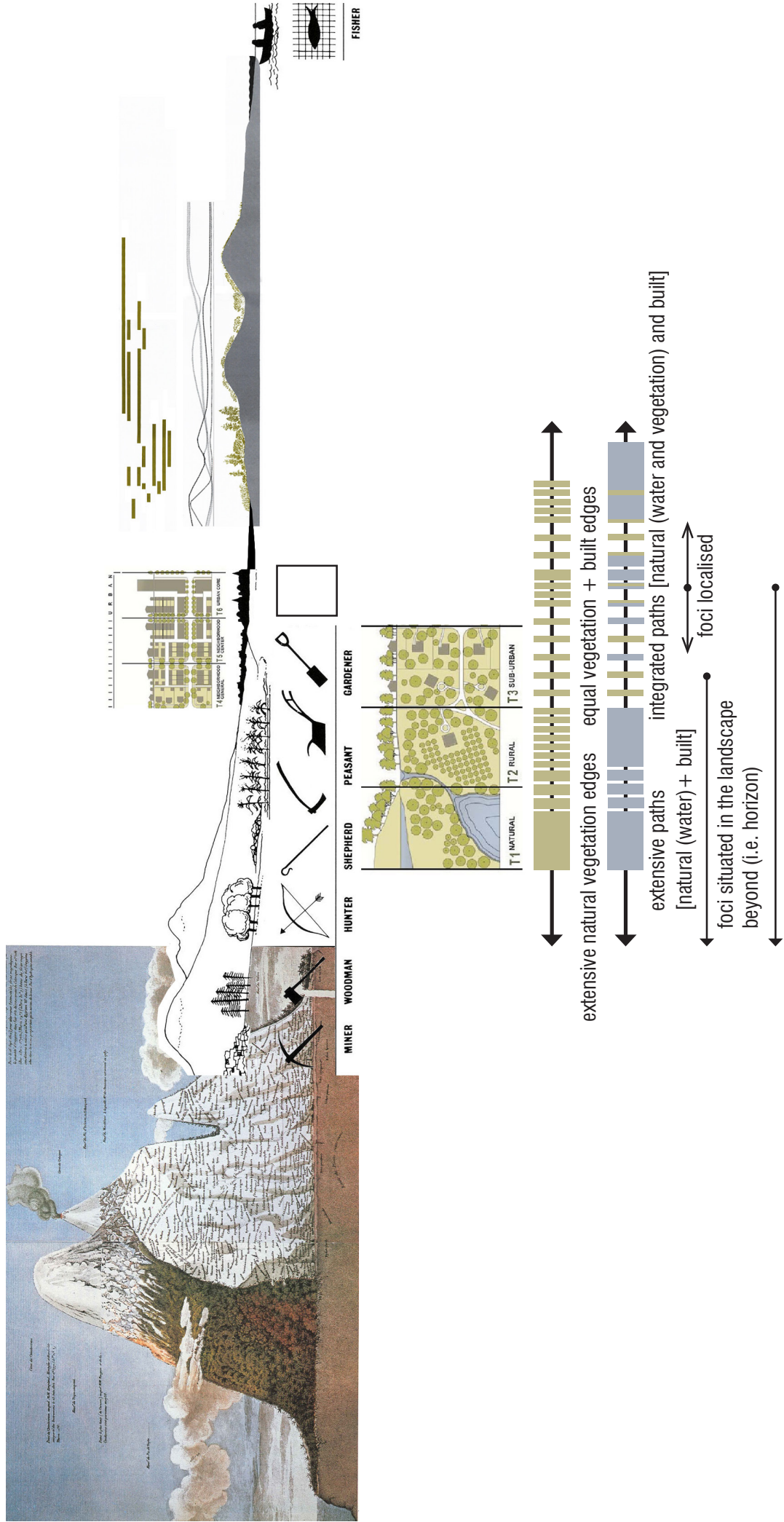
54. See Congress For the New Urbanism, “Charter of the New Urbanism.”

55. Duany, Sorlie, and Wright, *SmartCode*.

56. Duany and Talen, “Transect Planning,” 245–66.

57. Duany and Plater-Zyberk, *Lexicon of New Urbanism*.

58. Diedrich, Lee, and Braae, “Transect as a Method.”



intensities of immersive contexts brought about by the physical and subsequent social character created by architectural and urban codes.

The resulting code-based model for neighbourhood design distinguishes each sector largely on architecture form and appearance.⁵⁹ In Perth, the transect is operationalised in policy and is used to assess and validate the design of regional, district and local plans in metropolitan and country areas for new greenfield or urban infill sites.⁶⁰ This follows on from a relative suitability analysis of existing undeveloped rural land. When this analysis is performed at the metropolitan scale, it identifies a suite of opportunities and constraints that prioritise landscapes as sites for future urban expansion rather than sites for their inherent landscape value or ecological integrity.⁶¹

As Duany explains, the transect was derived from an environmental methodology to describe changes in habitat over a gradient. He argues that New Urbanism brought the methodology into the city, into urbanism and made it all compatible with the environmental transect.⁶² However, as the quadrat studies in chapter four reveal, the application of this method continues to create “sprawl” (single-storey dwellings and car-orientated suburban developments), albeit in a controlled way. The Smart Code transect does not articulate the ecological habitats expressed across the urban–rural gradient,⁶³ nor does it bring an understanding of their structure and function into the urbanism of the city of Perth. Furthermore, codifying the city through a replicable formula assumes that urban environmental conditions, ecological habitats and their relationship to one another across a gradient are similar and that urban models can and should be transferred.⁶⁴ From an environmental perspective, local conditions are defined by geology, climate and culture and therefore cannot possibly be replicated elsewhere. Furthermore, natural systems cannot and should not be compartmentalised; instead, they need to be understood in their scalar relationship to one another across space and time. In this respect, the codified representation of place brought about by the Smart Code transect is restrictive, ignoring traditional and evolutionary landscape types as well as cultural attachment to the landscape across time.⁶⁵

59. Curtis and Punter, “Design-Led Sustainable Development,” 40, 57.

60. Western Australian Planning Commission, *Liveable Neighbourhoods*.

61. While this is based on McHargian land-use planning methodologies, unlike McHarg, the process does not rank the degree of “phenomena”, assign value or consider landscape ecology principles of patches, edges and corridors.

62. See Steuteville, “Rural-to-Urban Transect.” See also Duany, Sorlie, and Wright, *SmartCode*, the theory where urban planning and transportation concentrates growth in compact walkable urban centres to avoid sprawl.

63. See urban–rural gradient paradigm introduced by Whittaker, “Gradient Analysis of Vegetation.” More recently, McGarigal and Cushman, “Gradient Concept of Landscape,” 112–19; Hobbs et al., “Managing the Whole Landscape,” 557–64.

64. In reality, even relationships between neighbouring ecological habitats can be interpreted differently depending on the scale of observation.

65. Berger, *Drosscape*, 19.

Landscape and ecological urbanism⁶⁶ are theories that have been positioned to counteract Smart Code and the more normative metropolitan planning models by rejecting the binary opposition of city and landscape. Despite these normative models being developed as a response to the deficits of suburban sprawl, there is little evidence to suggest that sprawl has been successfully consolidated. As the figures in chapter two illustrated, there is still substantial outward urban expansion in Perth in the form of greenfield sites. These greenfield sites are not considered to be multifunctional landscapes because the very nature of their transference from rural, to urban deferred, to urban situates them entirely within the urban spectrum. Their manifestation prioritises yield and does not consider ecological economies within the site boundaries, nor the overflow of these into and out of surrounding ecological systems.⁶⁷ Certainly, in order to understand the contemporary urban condition of the city, the landscape must be seen as more than the single parts that the urban transect regulates into compartmentalised zones.

At the essence of landscape and ecological urbanism is the premise that landscape replaces architecture as the building blocks of cities and that by making visible the structural efficacy of ecology and the landscape's history, the complex dynamic of the city and its landscape can emerge.⁶⁸ These are theories that operationalise flexibility, are future focused and respond to sustainability from the deep cultural and ecological crisis of our time. In this regard, the potential for large-scale organisation of the peri-urban territory as a landscape driven by multifunctional processes, culture and events to the benefit of local ecologies and people is profound. The methods of inquiry that landscape and ecological urbanism promote are strategic, and the evaluative techniques applied often illustrate generative, indeterminate design proposals that, theoretically, can be applied across various scenarios and locales. However, landscape urbanism is not without its shortcomings. Those that promote the theoretical position openly argue for more robust (built) design scenarios that promote the underpinnings of the discourse.⁶⁹

To reimagine the peri-urban territory in the wake of the land development industry would be to effectively re-create the traditional urban–rural transect. This would augment the existing structure of urban peripheral environments whereby “landscape” is defined through its adjacency to architectonic form by moving towards its spatial structure and relationship between the local, landscape and regional scales of the city's periphery. If new urban form responds to a historic trajectory that focuses

66. See Mostafavi and Najle, *Landscape Urbanism*; Waldheim, *Landscape Urbanism Reader*; Mostafavi and Doherty, *Ecological Urbanism*.

67. Rothwell et al., “Feeding and Housing the Urban,” 377–88.

68. Thompson, “Ten Tenets and Six Questions,” 10; Waldheim, *Landscape Urbanism Reader*; Weller, “Landscape (Sub)Urbanism,” 247–67.

69. Thompson, “Ten Tenets and Six Questions,” 24.; Weller, “Stewardship Now?” 104.

on the relationship of people with the urban environment then, as this thesis argues, this trajectory should focus on the scale of the landscape before us and the cultivation of the peri-urban territory across time (see the bottom of figure 7.1). As the typologies explored in chapter five identify, several structural components of the peri-urban provide these cues and sanction the value of specific landscapes by reinforcing their relationship to society and culture.

7.5 Reconfiguring peri-urban territories

The opportunity for the structure of the peri-urban to be read and understood through the predominant landscape character types, cultural markings and ecological systems is pronounced. This is not just about landscape representation but the potential for socio-ecological knowledge of the peri-urban territory to inform new design and landscape planning strategies. Accordingly, the methods of discovery and inquiry employed here can be transferable to other peri-urban territories.

In addressing this, and to interrogate the design scenarios that are peri-urban in nature, an assessment of the last ten years (2008–2018) of *Landscape Architecture Australia* was undertaken.⁷⁰ Up until 2016, *Landscape Architecture Australia*⁷¹ was the only Australian professional landscape architecture journal. Therefore, we can assume, that the discourse of landscape architecture within the journal is reflective of the modes of practice and thinking of the profession during this time.⁷² In accordance with the landscape types found in chapter five, the publication review was undertaken to capture projects or practices that encapsulate the following three principles: projects located in Perth (peri-urban or otherwise); projects with peri-urban morphology located elsewhere; and statements or articles from seminal figures of the profession.⁷³ Seven themes of peri-urban landscape architecture practice emerged in accordance with peri-urban territories in Australia. These are discussed under the following headings: health, landscapes of food, living infrastructure, infrastructure, the industrial sublime, temporality and engagement.

Health

Health is evaluated in accordance with the ecological health of a landscape system as well as the restorative benefit that natural environments provide for people to improve their physical and mental capacity. Importantly, the peri-urban is framed as a landscape that offers opportunities to reconnect

70. See Appendix B.

71. The journal was previously called *Landscape Australia*.

72. Bull and Ward, "In What Way Influential?". Catherin Bull and Libby Ward undertook a similar reflection of the status of the profession in 2000.

73. For a full review see Appendix B.

with the natural environment. In doing so, the landscape is perceived to offer preventative measures to the broader health system. For example, several projects emphasise participation within the landscape with other people as predictive of fostering good mental and social health. This finding is consistent with the evaluation of peri-urban types in relation to health and wellbeing as discussed in chapter six.

Landscapes of food

There is a sustained and considered approach by landscape architects to develop new food landscapes within urban environments. Adopting what has traditionally been a rural pursuit, food landscapes are emphasised for their availability, location and intersection with local biodiversity values and local communities. Furthermore, they form important ecological and social network connections and the inclusion of nutritious food types ensures that this is a thematic support of health and wellbeing, as well as a multi-generational community engagement. Peri-urban food production that engages with the community in this way is an important consideration for peri-urban territory design and development.

Living infrastructure

Living infrastructure encompasses both green and blue infrastructure and is, as the peri-urban edge and path types identified in chapter five show, highly valued for forging new connections between all species and the landscape. Living infrastructure represents ecological continuity and connection across a range of scales. Located as clusters or corridors, remnant and new living infrastructure systems form important cues within the landscape. The range of projects reviewed demonstrates that living infrastructure is structurally important as a framework for the peri-urban territory and as an instigator for localised approaches within these systems to enforce environmental connectedness. Living infrastructure is framed (by the profession) as an important component of peri-urban territories, notably for its contribution to mitigating climate change including a drying climate, urban heat, stormwater filtration, creek regeneration and adaptation, as well as new carbon economies.⁷⁴ Water landscapes are key structural components that connect people through the landscape, provide amenity and communicate the vernacular language of place.

74. Australian Institute of Landscape Architects, *Greener, Liveable and Healthier Cities*.

Infrastructure

The projects under this theme demonstrate a consistent desire and intent to reconnect people to the broader landscape. Whether they be infrastructure projects for road, rail or cycle ways, landscape architects are integrating these major structural paths within the broader landscape. Infrastructure is considered an important framework that forges a spatial understanding of the extent of the territory. These projects are also exemplary for the value that design brings to this type. While not currently evident in Perth, there is the potential for adopting and integrating the approaches identified elsewhere into the infrastructure types of the peri-urban here. Furthermore, energy infrastructure has not been identified but should be considered as an additional opportunity for potential within the territory.

The industrial sublime

The industrial landscapes of the peri-urban are romanticised as sublime landscapes that, through their adaptive re-use, emerge as new POS.⁷⁵ They are positioned as sites that through transformative processes become new sites within the public domain. Their emergence typically arises from the result of leadership forged between public and private partnerships.⁷⁶ Their formation is the result of a projection of adaptive strategies and the intent to reposition previously hostile landscapes towards experientially rich and complex new landscapes.

Temporality

Landscape is consistently framed as the signifier of the ongoing process of evolution and change. Many projects distinguish ephemerality as critical to the cognitive ownership of a place and the ability for attitudes of place to be transferred. Temporality embraces the physical, social and spatial conditions that are on and of the site. Further, ephemerality is seen to exhibit notions of complexity, through the seasonality and temporal conditions of landscape, the site's scale (and its relationship to others) and the site's age. Several projects discuss the notion of temporality as a mediation and emergent property. Projects that embrace this concept are considered regenerative and are emphasised for their legacy value.

Engagement

Situated within the context of the growing complexity of the world around us and the more recent

75. Roncken, Stremke, and Paulissen, "Landscape Machines," 70–71. Here the authors identify as future sublime as the continuation of a project where artistic and intellectual interpretation supports learning process that "affect the sense, imagination and intellect".

76. Particularly for two of the largest projects identified, Sydney Olympic Park, Sydney and Tonsley Industrial Park, Adelaide.

declaration of the new geological epoch of the Anthropocene, the importance of people becomes a critical component of sustainable peri-urban territories. This is because the engagement of people provokes emotional connection to the territory and in doing so, ensures its value. There is a consistent emphasis on youth as the people where this engagement should be focused. Projects focusing on engagement outline the importance of creating good amenity and delivering public projects. This is distinguished further through the notion of engagement and play, for children and for adults, and the fluidity of this to occur through POS networks, agricultural lands, recreational sites, tourism landscapes and biodiverse areas of the territory.

While the review demonstrates landscape architecture practice has, at times, been daring and inventive in their approach to peri-urban territories, what is now required is a consolidation of this knowledge with landscape architects so the value of this territory can be elevated. What is evident is how landscape architects can create specific insertions within the territory to aid the collective imageability of it. As evaluated in chapter six, building imageability—knowledge and legibility—improves value. Furthermore, as examined in chapter five, the value of landscape types within the territory are a result of landscape transformation (change) as well as the robustness of the landscape structure. Henceforth, beyond the normative modes of planning of this territory, landscape architects can increase the literacy of it (through imageability) and therefore its collective potential. The assessment of ten years of landscape architecture practice in Australia demonstrates the opportunity for developing a heightened structural complexity of the territory's condition, in order to emphasise place and meaning for a growing metropolis. This is propositional in approach and transferable in the methods of discovery and inquiry. Accordingly, from here, four additional and subsequent ideas are introduced—multifunctionality, resilience, liminality and novelty—as conditional actions for designing the peri-urban territory.

7.6 Embracing multifunctionality

One might assume the peri-urban territory is already multifunctional because its part are comprised of multiple zones. Certainly, specific zones of the peri-urban, for example regional green spaces or agriculture, have received a large amount of attention for their multifunctional potential.⁷⁷ However, other zones, such as industrial, transport, energy, suburban and state forests, are not seen to exemplify multifunctional conditions, nor has the peri-urban territory, as a collective territory, been embraced in this way from a planning and design perspective. However, the transition from a

77. See Zasada, "Multifunctional Peri-Urban Agriculture," 639–48; Ives and Kendal, "Values and Attitudes."

reductionist and mechanistic approach to city-making towards a more holistic appraisal of landscape has been a recent development in landscape ecology over the past twenty years.⁷⁸

Naveh proposes that landscape theory “must be guided by a much broader and flexible, future-orientated and holistic view of the world systems and its present deep ecological and cultural crisis.”⁷⁹ Landscape ecologists describe these flexible landscapes as multifunctional landscapes or Gestalt systems that describe the complex whole as more than the sum of its constituent parts.⁸⁰ Multifunctional landscapes are described as holistic when each element within them, for example zones, receives its significance only in its relationship and position to the other surrounding elements. This is important because multifunctionality implies many elements operating not only within a discrete area but also that the relationship between each element is dependent upon another and a change in one element will ultimately affect the whole.⁸¹

Landscapes provide symbiotic relationships that are mutually beneficial, to both the natural world and human society. This mutually beneficial, symbiotic relationship between the landscape acts within and across a range of nested scales.⁸² This naturally integrates the peri-urban landscape across a sequence of space–time relations (as opposed to compartmentalised zones) and it is here, that Naveh argues, new emergent qualities come to the forefront:

Not only the natural but also the cultural components of a regional landscape, its forests, grass and shrublands, its wetlands and rivers, its agricultural fields, its residential and industrial areas, its roads, traffic and power-lines, and their history contribute to this truly holistic Gestalt character of the landscape.⁸³

A multifunctional landscape recognises that the landscape has emergent properties that represent more than the sum of their parts.⁸⁴ In this way, all living biota and non-living abiota, interact and are transformed and influenced by human activity across the earth’s surface. The anthropogenic cultural components of landscape change, often filled with uncertainties and “fuzziness”, are essential to understanding peri-urban landscape types worldwide.⁸⁵ Accordingly, the total dimensions of a multifunctional landscape are the human (anthropogenic) components alongside the biological and

78. Nelson et al., “Modelling Multiple Ecosystem Services,” 4–11; Potschin and Haines-Young, “Ecosystem Services,” 575–94.

79. Naveh, “Ten Major Premises,” 270.

80. Antrop, “Concept of Traditional Landscapes,” 105–17; Antrop and Van Eetvelde, “Holistic Aspects of Suburban,” 43–44; Naveh, “Ten Major Premises.”; Musacchio, “Ecology and Culture of Landscape,” 989–92.

81. Ahern, “Urban Landscape Sustainability,” 1205–06.

82. Lee, Ahern, and Yeh, “Ecosystem Services in Peri-Urban,” 147.

83. Naveh, “Ten Major Premises,” 273.

84. Naveh, “Ten Major Premises.”

85. Naveh, “What is Holistic Landscape Ecology?,” 11.

ecological components.⁸⁶ In this regard, because of the imbedded hierarchical and scaled shifts of time and space that peri-urban territories deploy, they have a generative potential that can articulate innovative ways of thinking about built, natural and cultural relationships within the city. Specifically, it is this “post-industrial symbiosis”⁸⁷ or way of thinking about multifunctionality that involves a method of inquiry that is, at its root, creative.

7.7 Embracing resilience

Geddes was one of the first to describe the city as a system.⁸⁸ He foresaw what Holling later termed resilience—the ability for a system, or relationships within a system, to adapt to and absorb change and to have a capacity to persist.⁸⁹ Similar to how Turner conceives liminality (separation, liminality and reintegration), Holling describes three stages of the adaptive cycle that “shape the response of ecosystems, agencies, and people to crises”.⁹⁰ These are the inherent potential of a system, the internal controllability of a system and its adaptive capacity.⁹¹

Resilience is a term used widely; however, in the context of cities⁹² it is deemed to describe the interdisciplinary approach undertaken to prepare for and to respond to abrupt changes within the city, largely brought about by climate change.⁹³ Resilience thinking has been extended to include worldwide initiatives and policy platforms that encourage vulnerable cities and their communities to booster their resilience.⁹⁴ It is an approach that is used to counter risk⁹⁵ and, as Rose argues, needs to be controlled, often from a techno-scientific position.⁹⁶ However, recently there has been a focus on social-ecological resilience (SER) and the inherent qualities of the landscape and communities that are able to absorb and support these changes.⁹⁷

It is important to recognise that design thinking and development has been central to SER initiatives and continues to provide opportunities to explore speculative scenarios as well as assist in re-making cities and their landscapes. Returning to the form of the urban transect, to design for resilience across

86. See Naveh, “The Total Human Ecosystem.”; Naveh, “Multifunctional, Self-Organizing Biosphere.”; Naveh and Lieberman, *Landscape Ecology*; Naveh, *Transdisciplinary Challenges in Landscape*.

87. Naveh, “Ecological and Cultural Landscape,” 136.

88. Geddes, “An Analysis of the Principles,” 26–27; Wall, “Programming the Urban Surface,” 233.

89. Holling, “Resilience and Stability,” 15.

90. Holling, “Understanding the Complexity,” 394.

91. Holling, “Understanding the Complexity,” 390–405.

92. Brand and Jax, “Focusing the Meaning,” 23.

93. For example the “Rebuild by Design” competition, accessed July 7, 2017 <http://www.rebuildbydesign.org/our-work/sandy-projects>; Hayward, “Rethinking Resilience,” 37.

94. Examples include the 100 Resilient Cities initiative led by the Rockefeller Foundation, the US led “National Disaster Resilience Competition” and the “Global Resilience Partnership”.

95. Large-scale city disasters have been central to the focus on resilience thinking in cities; for example, in the wake of Hurricane Katrina in New Orleans and Hurricane Sandy in New York and, more locally, in the aftermath of Christchurch earthquake.

96. The University of Melbourne, “From Risk to Resilience.”

97. Adger et al., “Social-Ecological Resilience,” 1038–39.

the peri-urban territory allows space for urban environments to shift and be operative.⁹⁸ What enables this is the focus on the natural systems of the urban area, not the architectonic form of the city. The transition to systems thinking across the threshold of the urban–rural–wild–industrial–infrastructural (peri-urban) edge is a critical juncture and opportunity. It is an opportunity for new eco-tones to emerge, derived primarily from the conditions and scales of operation that underpin SER. It is also necessary.

Beilin and Wilkinson deduce that “we cannot ignore the non-human species encapsulated within the territory of and significantly affected by the ever-expanding urban or its amorphous boundaries.”⁹⁹ It could be said that the role of the designer is now critical in order to ensure that cities evolve to be resilient to natural and cultural change.¹⁰⁰ In order to ensure cities are able to meet the challenges of exponential ecosystem and societal change within their urban and peri-urban regions, they must evolve to be responsive and adaptive to change. This requires cities and their peri-urban regions to evolve to be not only equitable, inclusive, sustainable and distinct but also ecologically responsive and rich.¹⁰¹

Landscape ecology, as a transdisciplinary science where the roots of resilience thinking lie, acknowledges that a significant component missing from the transdisciplinary base is that of the designer.¹⁰² The designer is an essential component in “closing the loop”¹⁰³ because their mode of operation is to connect people to their landscapes and therefore to embed a resilience within the landscape that emerges from natural and cultural change generated by the people who experience these landscapes.¹⁰⁴ In that regard, landscape architecture has an obligation to respond to the more recent call from landscape ecologists to contribute to the knowledge innovation of design and the landscape sciences.¹⁰⁵ Just as Malpas argues for the re-evaluation of space because of the connection between space and place,¹⁰⁶ humanity has created large-scale landscape change and it will be humanity who has to re-create its ecological and social connections. Therefore, the design of new socio-ecological networks needs to be adopted as an intentional act within the peri-urban territory in order to overcome the default mechanisms created by the traditional urban–rural divide.

98. Beck, *Principles of Ecological Landscape*, 111.

99. Beilin and Wilkinson, “Introduction: Governing for Urban Resilience,” 1207–8.

100. Iverson Nassauer and Opdam, “Design in Science,” 635–37.

101. Swyngedouw, “Metabolic Urbanization,” 35–27.

102. Ahern, “Urban Landscape Sustainability,” 1203–12; Iverson Nassauer and Opdam, “Design in Science.”

103. Reed and Lister, *Projective Ecologies*,

104. Ahern, “Urban Landscape Sustainability.”

105. Iverson Nassauer and Opdam, “Design in Science,” 635; Bolund and Hunhammar, “Ecosystem Services in Urban Areas,” 293–301.

106. Malpas, *Place and Experience*.

Multifunctionality is key to this intentional act and what the peri-urban types in chapter five reveal is the potential for less disturbance, because the performance of the landscape's function is spread between multiple peri-urban types.

Accordingly, a landscape perspective is the base from which a sustainable approach to the management of peri-urban territory should be formed.¹⁰⁷ This is because the dimensions of human interactions with the landscape arise from the combination of methods from the sustainable sciences in human health and wellbeing and ecology, to the qualitative, landscape research of the experiential and aesthetic qualities of the landscape.¹⁰⁸ This combination of empirical and applied efforts is required to generate innovative schemes that connect scales, cultures, societies and regions.¹⁰⁹

7.8 Embracing liminality

One way of conceiving the interactions of varying combinations of engagement with the territory is through liminality. Liminality is an emergent process of self and collective transition where normal limits of thought and action are relaxed so the novelty of imagination, construction and destruction are open.¹¹⁰ In liminality, the very distinction between structure and agency ceases to make sense; and yet, "in the hyper-reality of liminality, structuration and meaningful formation take form".¹¹¹ Geography has always been important in the depiction of liminal spaces, as has experience.¹¹² Liminality is therefore both formative and transformative. Because landscape is an active medium of imageability that promotes "ongoingness—nurturing, inventing, and discovery,"¹¹³ activation of stories of the landscape (to make them present and generative) creates the conditions for liminality to exist.¹¹⁴

Turner proposed a three-step process in his theorisation of liminality: separation, liminality and reintegration.¹¹⁵ This process is distinctly anthropogenic, as the emergence of potential depends on human interaction with the materiality of the landscape. Here the temporal conditions of landscape, the multifunctional conditions of the rural and the urban (among others) and the interconnected ecological cycles (daily, seasonal, yearly and beyond) are pronounced. Therefore, cementing these transitional qualities as fundamental structures of the territory ensures experience of it; it is

107. Wu, "Landscape Ecology, Cross-Disciplinarity," 1–4.

108. Musacchio, "Ecology and Culture of Landscape," 990.

109. Holling, "Understanding the Complexity," 390–445. See also Folke, Berkes, and Colding, *Linking Social and Ecological Systems*, 1–25.

110. Thomassen, *Liminality and the Modern*, 1. See also Altin and Minca, "Exopolis Reloaded," 385–99.

111. Thomassen, *Liminality and the Modern*.

112. Altin and Minca, "Exopolis Reloaded," 4.

113. Haraway, *Staying with the Trouble*, 132.

114. Haraway, *Staying with the Trouble*, 131.

115. Turner, *Forest of Symbols*. This was a significant rework of van Gennep's original concept of liminality in van Gennep, *The Rites of Passage*.

commensurate with human perception. In fact, the landscape scale (as examined in the quadrats) is critical to this as it knits together the scale of the region above it to that of the local and site below. Equally, Thommasen's more recent theorisation of liminality examines how Turner's concepts apply to twenty-first century social theory of the modern and how societies live through the uncertainty of the in-between.¹¹⁶ He explains that Turner's conceptualisation of liminality should be applied to all social phenomena including spatial. Accordingly, the structure of the peri-urban can aid imageability of this transitional landscape, activate liminality and mark the passage from one end of human experience to the other.¹¹⁷ Just as the very nature of the peri-urban condition lends itself to the regenerative renewal of human experience with the landscape, the act of designing peri-urban spaces encourages and promotes ways to think and experience the landscape in an imaginative way.¹¹⁸ These spaces (of the territory) activate the transition to and establishment of new socio-ecological systems. Accordingly, all participants of the peri-urban become conscious with this territory through the generation of their experiences and together they cultivate response-ability and connection within society.

People form mental maps of the landscape to support their everyday movement and use through it.¹¹⁹ Therefore, utilising landscape structure to coordinate people's ability to navigate the landscape can influence their overall impression of it. Furthermore, seasonality and temporality add to the experience of the peri-urban and enhance liminality because of their socio-ecological connection. Accordingly, landscape design structures the way people navigate and acquire information and impression from the landscape.¹²⁰ Coherence, mystery and complexity in the landscape are heightened not by regular grid divisions of landscape in predictable fashions but by irregular, hierarchical divisions varying in scale and proportion, openness and enclosure, and edges and transition thresholds.¹²¹ Similarly, the pattern of landscape change of the territory underpins its formation and foregrounds the technologies, processes and actions of the development and expansion of the city. Additionally, the changing pattern of natural systems of the territory are becoming more and more critical to ensuring the future of humanity because of the ecosystem services derived from them; water, carbon sequestration, food, amenity and restorative health benefits are just some of these. Haraway charts a role for landscape architecture in enabling the imaginative connection to landscape, to support and stimulate social awareness of environmental risk:

116. Thommasen, *Liminality and the Modern*, 14.

117. van Gennep, *The Rites of Passage*, 11. This follows van Gennep's differentiation of the liminal period.

118. Mariani and Barron, *Terrain Vague*. There is a correlation here with how Barron identifies how transitional urban spaces in the landscape provide cinematic-visual opportunities.

119. Lynch, *Image of the City*.

120. Sang, Miller, and Ode, "Landscape Metrics and Visual Topology," 504–20.

121. Bell, *Landscape Pattern, Perception*, 92.

We must somehow make the relay, inherit the trouble, and reinvent the conditions of multispecies flourishing, not just in a time of ceaseless human wars and genocides, but in a time of human-propelled mass extinctions and multispecies genocides that sweep people and critters into the vortex. We must dare to make the relay; that is to create, to fabulate, in order not to despair. In order to induce a transformation, perhaps ...¹²²

Subsequently, conceiving peri-urban territories as liminal spaces supports the transformative process. Furthermore, as patterns of landscape change and subsequent landscape values that inform these patterns emerge (through the intentional reinvention of the peri-urban condition), it is possible to influence the values bound by human–environmental relations.

Landscape design influences the distinguishable composite pattern, intersections and layers of land use within an area across time and space.¹²³ Landscape planning adopts scientific, technical and other organised knowledge to provide options for consensus and decision making.¹²⁴ Accordingly, landscape architectural design becomes *the* act of analysing, planning, creating and managing landscape to sustain physical, ecological and social processes for the benefit of humans and living processes.¹²⁵ As such, the current projection of peri-urban territories occurs in a state of liminality, where the transition of space and place eludes classification and stability, as the physical manifestation of these processes, is continually marginalised. However, at the same time, this specific “liminal” quality provides the ground for an expanded thickness anchored in the making—the artistic and creative endeavour that is revealed through survey, identification, criticism and inventive analyses. Hence, understanding the structural pattern of the peri-urban territory results in an understanding of the relationship of people to this landscape and the patterns of change induced by human activity, just as this human activity represents meanings and values across time. Therefore, framing the peri-urban as a liminal landscape of potential allows for liminal margins within its structural condition (temporal and material) and can heighten its differentiation among its context within the city.

122. Haraway, *Staying with the Trouble*, 130.

123. Bell, *Pattern, Perception, and Process*.

124. Steiner, *Living Landscape*, 4.

125. Eckbo, *Urban Landscape Design*.

7.9 Embracing novelty

Novel ecosystems are defined as the establishment of new systems and acts that produce new combinations or abundance of species not seen previously as a result of human-induced activity.¹²⁶ They are also considered to be emerging ecosystems,¹²⁷ and account for approximately 35 per cent of the world's agricultural and urban land surface.¹²⁸ The indicators of novel ecosystems are twofold: new combinations of species and human agency. Peri-urban territories have greater visibility for novel ecosystems because of the multitude of land uses that interact due to human-induced change.¹²⁹ These areas can result in severe changes to abiotic factors due to agricultural production, suburbanisation, altered water flows, soil composition, clearing of endemic vegetation or felling of native forest. These actions, compounded by the impacts of population growth and climate change, create ideal conditions for novel ecosystems to emerge.¹³⁰ For example, in the drying climate of Perth, the demand for water, increases in wastewater and less ground water recharge¹³¹ can cause more frequent biotic stresses.

Hobbs et al. argue for new frameworks to be developed for ecosystem management goals as well as for the socio-ecological and socio-economic factors tied to the value of peri-urban landscapes.¹³² Importantly, these frameworks need to move away from the traditional dichotomy of urban and rural¹³³ and instead respond to the mosaic and patches of land uses and interactions, including biodiversity conservation, alongside food production, timber felling, tourism, recreation and respite, so that they represent a historical-hybrid-novel composition.¹³⁴ Territories like the peri-urban are ripe for these frameworks as they interlink site, landscape and regional scales and therefore require more focused policy and management settings to deal with their complexity of change.¹³⁵

The social threshold of novel ecosystems and the distinctive social values that need to be preserved is what makes novelty interesting for the peri-urban.¹³⁶ Moreover, within peri-urban territories, the complex matrix of public and private land ownership, effective public engagement of diverse views and local knowledge are important because they help build environmental literacy and stewardship of

126. From an ecological perspective see Hobbs, Higgs, and Harris, "Novel Ecosystems," 1–7; Lindenmayer et al., "Novel Ecosystems," 133.

127. Milton, "Emerging Ecosystems," 404–6.

128. Marris, *Rambunctious Garden*.

129. Kowarik, "Novel Urban Ecosystems," 1974–83.

130. Hobbs, Higgs, and Harris, "Novel Ecosystems."

131. Webb and Hennessy, *Projections for Selected Australian Cities*.

132. Hobbs et al., "Managing the Whole Landscape," 557–64.

133. Lindenmayer et al., "Novel Ecosystems," 129–35.

134. Hobbs et al., "Managing the Whole Landscape," 558.

135. Vizzari and Sigura, "Landscape Sequences," 42–55.

136. Yung et al., "Engaging the Public," 247–56.

the landscape.¹³⁷

This is also true for pedagogical approaches to novel systems. In her review of tertiary education teaching strategies for ecological restoration, Dooling identifies the danger in using historical restoration timescale references as the endpoint for ecosystems. She found that in doing so, many students developed design strategies that minimised environmental impacts through living infrastructure by focusing solely on historic reference to native species and removal of non-native species rather than on species with larger tolerance ranges, which would ultimately enable adaptation.¹³⁸

In accordance with the principles that underlie landscape and ecological urban theories, conceptualising uncertainty as an enabler for space supports the exploration of novel landscapes and allows slow adaptation to occur. What can also be understood by novelty is the opportunity for landscape architects to embrace transdisciplinary work, so the study of landscape structure and function, as related to human occupation, can be augmented with ecosystem dynamics of other species. Accordingly, developing uncertainty through illustrative, immersive and speculative proposals based on alternative scenarios informed by multidisciplinary agendas, is to affect ethical and political decision-making processes and the aesthetic responses within the peri-urban territory.¹³⁹

7.10 Reflection: peri-urban agency

This chapter synthesised the act of discovery undertaken in previous chapters and provided insight into landscape architecture practice within peri-urban territories in Australia. Furthermore, it identified opportunities for how landscape architecture practice can develop an agenda within the peri-urban territory of Perth. This chapter now reflects on and summarises how peri-urban thickness and potential have been assessed in the final process—founding.

Peri-urban thickness

In this chapter, the expanded thickness of the peri-urban was discussed in accordance with the role of stewardship within the profession of landscape architecture. Stewardship describes the profession's role in caring for landscape, its systems and its people. However, in the peri-urban territory the cultural values of the everyday landscape need to be considered in accordance with the environmental and social conditions of its context. In this way, stewardship, as action within the landscape,

137. Marris, "Perspective: Coming of Age," 245–46. See also Pettorell et al., "Making Rewilding Fit," 1119–21.

138. Dooling, "Novel Landscapes," 99.

139. Sack, "Landscape Architecture and Novel Ecosystems."

should focus on achieving environmental and social justice as an early objective. Furthermore, I have determined that the scale of practice is an important component of being able to achieve this. For landscape architecture, ecological and human constructed systems that support the city must be articulated at the perceptible realm of the landscape scale. As evident in the seven themes that emerged from an assessment of landscape architecture practice, opportunities for intentional construction of this realm, at the landscape scale, are paramount for the peri-urban territory of Perth. Furthermore, the construction of and conventions within these sites aid the collective imageability of the territory and expand the liminality or differentiation of it.

Peri-urban potential

In this chapter potential was discussed in accordance with the transformative role landscape architects can have if there is a reorientation of the discipline to the territory of the peri-urban. The potential of the relationships between social, environmental and cultural forces was explained as was the opportunity for design of the heterogenous condition of the peri-urban. Design potential was explored through the landscape structure of the territory and the negotiation values that can encourage different ways of thinking and seeing it.

The potential for increasing the territory's performance was evaluated through four additional propositions: novelty, resilience, multifunctionality and liminality. Together, these ideas for action can facilitate quasi design experiments employed to generate transferrable knowledge of the connections and relationships between people and the peri-urban territory.¹⁴⁰ Importantly, these do not have to be built outcomes to be empirical because acquired knowledge begins with inquiry and questioning what is possible.¹⁴¹ As Marot concludes, design is an emergent factor. He argues that form and character of landscape is derived from the physical fabric as well as the processes and conditions inherited by past processes of the site and broader territory.¹⁴²

According to Swaffield, "meaning and significance in landscape architecture are determined within field of potential relationships, which include, but are not limited to, concepts of nature and culture."¹⁴³ Henceforth, one way of determining potential is the way in which the landscape performs to deliver ecological, social and cultural benefits.¹⁴⁴ Sites are spatially bounded entities, directed by social and cultural forces and ecological processes that are contained within as well as flow in and out of

140. Goldstein et al., "Narrating Resilience," 1285–303.

141. Goldstein et al., "Narrating Resilience," 1298.

142. Marot, "Reclaiming of Sites," 48.

143. Swaffield, *Theory in Landscape Architecture*, 228.

144. Forman and Godron, *Landscape Ecology*.

their prescribed “boundary”. The optimal function of the peri-urban territory is determined by the aggregation of these sites and the recovery of ecological processes occurring within and between them. The ideas that emerge from a biographical approach to landscape studies as proposed in chapter four and explored through the subsequent peri-urban types in chapter five, provide ideas for the intentional act of design and provocation of the territory through speculative landscape proposals.

In this regard, potential through design experimentation seeks to disrupt what we know and what we think about the peri-urban territory. Furthermore, disturbance is necessary to shift our perception and the parameters that maintain an equilibrium of how we think and act within it to achieve sustainability. This change in thinking also supports resilience by contributing to developing ecological and cultural memory and imageability of landscapes.¹⁴⁵ Equally, landscape memory can be considered as a co-evolution of cultural and natural attitudes, values and experiences, which create “a tangible bridge between human minds and nature”.¹⁴⁶ This supports adaptive processes and disturbance as a necessary, non-linear component of developing connections between cultural and natural environments within the peri-urban territory.

7.11 Conclusion

This chapter introduced the fourth and final stage, founding, and explained how this contributes towards building the conceptual imageability of the peri-urban territory of Perth. It introduced the role of the profession of landscape architecture in designing peri-urban territories and the potential for an expansion of these activities. It identified the urban transect and discussed the implications for this as it occurs within metropolitan planning policy for Perth and the opportunity for reconfiguring the transect approach.

The edge of the city has always been a territory of negotiation, and design becomes a means to create a negotiated solution. The act of design translates cultural and ecological values and creates memorable landscapes, forms and spaces that challenge, expand and alter our conceptions of beauty.¹⁴⁷ Subsequently, the “mesh” required for people and nature to thrive requires new thinking and a new vision;¹⁴⁸ a vision that is derived from a landscape architectonic, active composition of the landscape, where structural elements relate to one another as a system. As Naveh concludes, “for the organised complexity neither mechanical nor statistical approaches are satisfactory and innovative

145. Bengtsson et al., “Reserves, Resilience and Dynamic Landscapes,” 389–96.

146. Naveh, “What is Holistic Landscape Ecology,” 15.

147. Meyer, “Sustaining Beauty,” 15.

148. Forman, *Urban Regions*, 5.

approaches and methods are required.”¹⁴⁹

Undoubtedly, as the quadrats in chapter four prove, peri-urban territories are rich, contested grounds for landscape inquiry, research and action. How analytical and experiential insights into the landscape of the peri-urban territory can be a catalyst for speculative interventions that promote and expand socio-ecological relationships, is open for rich exploration by the profession of landscape architecture.¹⁵⁰ Iverson Nassauer and Opdam describe this as “intelligent intervention” because we must understand nature in order to intervene and to understand where our knowledge informs our action.¹⁵¹ Furthermore, this process urges us to consider an alternative, future landscape approach because there are specific advantages for urban ecological design where the landscape is employed as both medium and method.¹⁵² Finally, the determination of whether this is plausible for the peri-urban territory of Perth should account for societal relevance and significance for ecosystem services. Chapter eight will address these questions and conclude the research.

149. Naveh, “Ten Major Premises,” 274.

150. Iverson Nassauer, “Landscape as Medium and Method,” 222. Iverson Nassauer explains landscape is a spatial entity and subsequently, its experiential and analytical components can be a catalyst for innovation and invention in everyday landscapes.

151. Iverson Nassauer, “Landscape as Medium and Method,” 226.

152. Pickett et al., “Evolution and Future of Urban.”

8.1 Introduction

Chapter seven concluded the analysis of the seventy quadrats by assessing the value of the structure of the peri-urban territory for Perth. Value was evaluated from the disciplinary perspective of landscape architecture and the opportunity for a research and practice agenda for the profession within the peri-urban territory was established and synthesised.

This chapter reflects upon the research and the original proposition and aims of the thesis proposed in the introduction chapter. To reiterate the research proposition:

The rapid transformation of the edge of Perth to accommodate the unprecedented rates of urbanisation is exacerbated by the need for the city to negotiate the loss of biodiversity, agricultural food supply and water scarcity. It is timely, if not critical, to consider how the peri-urban could be a dynamic territory that can enable the expansion of the city and mitigate damage to its natural systems while addressing the social and cultural complexities of urban and living systems. Essential to this is the need to disrupt and restructure the current relationship between people and nature to form new, multi-scalar, socio-cultural-ecological dimensions. Landscape architecture, as a design-based discipline concerned with how people connect to place through local ecologies, offers through its tools and methods a unique opportunity to reconfigure this relationship and spatially re-make this territory.

The research proposition was closely informed by three overarching research questions: first, What is the peri-urban territory of Perth?; second, What is the peri-urban's potential?; and third, What is the appropriate role of landscape architecture in the re-making of the peri-urban? The thesis has been structured to sequentially develop these questions and to build an understanding and knowledge of the territory's imageability and subsequent condition. Each chapter has reflected upon two overarching research tenets—the expanded thickness and the potential of the peri-urban. This chapter will now revisit the research questions and the two overarching research tenets through several themes.

8.2 What is the peri-urban?

Turning to the first overarching research question of the thesis, what is the peri-urban territory of Perth, the research has foregrounded a structural and functional approach to understanding the territory that is unique to Australian studies of peri-urban regions. In accordance with the illustration and analysis of the seventy quadrats and the identification of structural types and their subsequent

value, the research has demonstrated that the peri-urban territory is a distinct area of the city of Perth. The research has proven that this distinctiveness is identifiable through the landscape's structure and function derived from local ecologies and cultural creation of this place and it provides an alternative reading of the territory as compared to normative modes of planning, which focused primarily on geographical extent, physical extent of peri-urban area, fragmentation, population growth, commuting range and agricultural production.¹ Furthermore, the alternative reading has demonstrated, and reaffirms, that landscape structure is among the most important elements for informing values and subsequently meaning. The research deduces that a landscape typology approach provides a greater understanding of the socio-ecological and cultural dimensions of the territory, not currently provided for in the literature.²

The definition

Land diversity is a key indicator of the peri-urban territory just as the terms transition and dynamic are used frequently within the literature to describe an area undergoing constant physical change due to the processes of urbanisation. As chapter one and two examined, the peri-urban territory is a location of choice, because the diversity of land use found within it is often incompatible with residential land use. I explained how the use of the term "transition" denies the uniqueness of the peri-urban territory in its own right, as it implies that the structural and functional landscape characteristics are non-permanent. Theoretically conceiving the territory as "terrain vague" or as a "non-place" emulates from what has primarily been an architectonic reading of the territory between mass and space. As proposed in this thesis, especially in chapters three, six and seven, the alternative construct conceives the territory as landscape and place. The thesis challenges the definition of the territory in accordance with the principles of containment and boundary through the enriched visual conceptualisation of the dynamic processes of urbanisation that underpin its condition. However, as explained in chapter six, this definition extends beyond a spatial understanding to relational because of how experience, memory and their embedded processes create knowledge and understanding for the subject's location within the territory and the natural world.³

This assessment of the definition is consistent with the quadrats in chapter four, in that a high proportion of the assessed peri-urban sites have retained peri-urban characteristics and have

1. Hugo and Smailes, "Urban-Rural Migration in Australia," 11–30; Houston, "Re-Valuing the Fringe,"; McKenzie, "Growth Management"; Burnley and Murphy, "Exurban Development in Australia"; Buxton et al., *Change and Continuity*; Bunker and Houston, "At and Beyond The Fringe," 23–32; Low Choy et al., *Change and Continuity*.

2. In this way it provides an additional dimension to the typology of peri-urban areas in Australia identified in the study by Buxton et al., *Change and Continuity* 85–86.

3. Malpas, *Place and Experience*.

never fully transitioned to urban. This is an important finding as it indicates the structural patterns of landscape are important to the territory's imageability. In this way, further attention to and development of the territory's landscape structure is required in order to ensure multiple dimensions pertaining to heightened patterns of landscape change between people and the natural world. Specifically, those ecological, cultural, health, wellbeing and liveability dimensions that provide for pluralistic values need to be elevated. Furthermore, this assessment could be undertaken in other regions and would be a valuable contribution to the literature and definition of peri-urban territories.

Policy

The paradigm of sprawl is unequivocally connected to the literature on peri-urban territories. However, in an Australian context, the urban and infrastructural form that derives from "sprawl" is intentionally planned. This is a significant point of difference from how peri-urban literature in the US describes sprawl, as the unplanned urbanisation of rural land; nevertheless, this term has been uncritically adopted to describe the expansion of Australian urban areas.⁴ In fact, the first metropolitan plan for Perth identified the need to limit sprawl across the SCP. However, despite this being a defining component of metropolitan policy development for the past sixty years, the literature continues to reference a sprawling city. At the same time, metropolitan policy demonstrates that car dependent, low-density suburban housing at the edges of the city is the preferred model of urban development, despite more recent efforts to limit this. This finding points to the need for the planning literature and discourse surrounding metropolitan development in Perth to think seriously about how the term sprawl is used and consequently and more broadly, how policies respond to this urbanisation. An opportunity distinguished within the thesis is for the landscape structure of the peri-urban territory, at the landscape scale, to be outlined as a crucial component for linking new greenfield neighbourhoods to the vision of the metropolis. Such an approach may help to address some of the concerns regarding sprawl because of the ability to integrate past events of the landscape—its biography—as layers of social interactions with the natural and cultural environments of the periphery.

Similarly, the Smart Code transect locates the peri-urban territory in zones T2 and T1—the untouched agrarian landscapes surrounding the city. However, what is apparent in the literature on the peri-urban and the study of the quadrats in Perth, is that these zones consist of a multitude of conditions beyond "agrarian"; furthermore, those agricultural areas located here are usually intensive and do not convey the same image that the transect proposes. As a form-based code, enacted in Western

4. Saunders, *Sprawl and Suburbia*; Bruegmann, *Sprawl*; Sutton et al., "Darkness on the Edge," 119–33; Western Australian Planning Commission, *Perth and Peel@3.5million*.

Australia through the “Liveable Neighbourhoods” policy, it is primarily concerned with reducing “sprawl” through built form and mobility. As discussed previously, this creates limitations for how new neighbourhoods connect and integrate into their surrounds as well as the existing imageability of the territory.

Likewise, the current process involving land suitability analysis and performance indicators for future urban development in the metropolitan area of Perth favours urban expansion and subsequent urban land allocation within the peri-urban territory. While more recent efforts have been made to increase the value of agricultural land,⁵ a wider range of values are necessary that are congruent with the holistic provisioning and regulating services⁶ required to support a growing urban population, including health and nutrition, wellbeing and the cultural and social dimensions of place realised through design. As identified in chapter five, there is an absence of landscape structural types that relate to how people perceive and engage with the territory at the landscape scale.⁷ Furthermore, because landscape structure that is integral to neighbourhood and regional connectivity is not currently determined to be a defining feature at the neighbourhood scale, it follows that the creation of this structure builds value as the subject moves between the urban, peri-urban and rural areas and scales. Furthermore, policy has potential to enlist incentives for private landholders to increase the performance of their land and to provide a reasonable argument for state government procurement. Equally, adopting performance indicators of specific landscape structures and functions within the peri-urban policy, sheds light on the fact that policy making has a large part in shaping the narratives of the city and thereafter installing value.

Structural cues

An obvious tension exists in the literature in the way significant natural landscape features have been used as the initial structuring device for the settlement of Perth, as was the case with the Swan River, and how these qualities have gradually diminished as the city has urbanised. As examined in the quadrats in chapter four, as the city developed outwards and the accumulation of urban built form increased, the complexity of natural landscape structural features at the landscape scale was largely effaced. Despite the desire of the metropolis to seek a “sense of place” among the natural landscapes of the SCP, the quadrats, and landscape types derived from them in chapter five, prove these narratives are not harnessed at the landscape scale. Moreover, the values that the metropolitan

5. Planning Institute of Australia, *Submission to the National Food Plan*; Santhanam-Martin and Lawrence, “Farms, Mines and Foreign Ownership”; van Gool, Stuart-Street and Tille, “High Quality Agricultural Land”.

6. See Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*.

7. Western Australian Planning Commission, *State Planning Strategy 2050*, 90.

plan seeks to inscribe are often artificially recreated at the neighbourhood scale through a replicable aesthetic of POS.

The landscape structural features of the peri-urban territory take time to be made and re-made. However, the presence of remnant natural and cultural landscape structures also provides guidance to how the territory's form and function has changed over time. Uniquely, a deliberate attempt to establish landscape structures that interpret landscape histories—past, present and future—provides fertile creative and novel ground for new cultural and natural relations at the city's edge. To adopt and embrace the peri-urban territory as a unique structural socio-ecological ecotone for the city provides this opportunity.

8.3 What is the peri-urban's potential?

The premise of this question originates from the hypothesis that the peri-urban's potential is lacking. As established in the introduction, potential has been distinguished throughout by:

1. potential to transform;
2. potential through relational thought and practice;
3. potential through representation; and
4. potential as performance.

In chapter one, I discussed how the city of Perth is reaching a crisis point regarding the impact that urbanisation has on biodiversity, water and food availability. More specifically, the inequality between the value placed on urbanisation and other qualities and on provisioning services of the landscape was established in chapter six. In responding to such issues, I outlined and discussed the NUA and the importance of strengthening urban–rural linkages by breaking down the dichotomy of urban and rural areas. However, it was revealed that normative modes of planning continue to inscribe these areas as zones that compartmentalise the peri-urban into traditional categories of urban and rural that reinforce their separation. The research picks up where neighbourhood planning left off, at the peri-urban interface, and establishes a rationale for increased attention to the social and environmental dimensions of this territory as a necessary component of working towards sustainability.

At the beginning of 2019, UNHabitat released a report outlining the guiding principles for integrating urban–rural linkages, which asserted that peri-urban areas have “untapped potential”.⁸ In accordance with the report's declaration for finding peri-urban potential, this research has demonstrated the

8. UNHabitat, *Implementing the New Urban Agenda*, ix.

opportunity to reorganise and strengthen the urban–rural condition by positioning landscape structure and function as critical to this. The research responds in the following ways to five of the ten guiding principles of the UNHabitat report:⁹

1. Locally grounded interventions:

The research has demonstrated that local context matters because it situates the global agenda for sustainable development at the scale at which local authorities can have an impact and the local community can generate knowledge and ascribe values.

2. Functional and spatial systems-based approaches:

The research provides in-depth consideration to structural and functional flows between people, water, biodiversity and food and between systems at the landscape scale. This complements the knowledge of these flows at the scale of the region and prompts further assessment at the local scale. It considers existing functional and structural ecosystem-based linkages between urban and rural areas and land uses as essential for this.

3. Environmentally sensitive:

The research identifies natural landscape structures as integral to strengthening the urban–rural continuum and establishes the opportunities for sustaining these for ecosystem services, as well as the imageability, knowledge and value of the territory. It proposes four conditional actions for landscape architecture design—multifunctionality, resilience, liminality and novelty—to ensure the integration and transformation of the city to low-carbon, resource efficient and adaptive processes.

4. Participatory engagement:

The research asserts the territory's imageability as an essential quality for the meaningful and active engagement of all people. The research outlines the need to deliberately create these spaces through landscape architectural design to enable this engagement.

5. Data driven and evidence based:

The research improves the knowledge of Perth's peri-urban and contributes to the peri-urban literature in Australia by establishing the importance of landscape structure within urbanisation processes, as a key component of reinforcing the urban–rural continuum and consequently territorial cohesion.

Potential was chosen, in accordance with landscape performance as defined by the Landscape Architecture Foundation, as “a measure of the effectiveness with which landscape solutions fulfil their intended purpose and contribute to sustainability.”¹⁰ In this way, the research proposes the fundamental structure of landscape, as found within the peri-urban, as instrumental to achieving sustainability goals. Furthermore, because all aspects of sustainability are dependent upon landscape, increasing the number of sites within the city for sustainability actions increases the overall performance. This has been demonstrated in chapters four and five, where potential was explained as encapsulating the socio-ecological and cultural dimensions of the peri-urban’s structure through examining opportunities for further engagement by people in the territory. Furthermore, from an ecological science perspective, as discussed in chapter six, the peri-urban territory offers a rich medium through which to fulfil ecological multifunctional landscape requirements and therefore to meet some of the critical environmental challenges brought about by climate change.

Repositioning value

Chapter six identified that the value of the peri-urban territory is derived from the perceptions of people inside and outside of the territory. Furthermore, when social and cultural dimensions were examined in accordance with ecological systems, it was argued that the value of the territory increased because of the recognisable patterns and dimensions of the territory that were connected to liveability, human health, memory and stewardship.

As deduced in chapter six, the landscape structure of edges, paths, thresholds and foci provide distinct opportunities for building value within the peri-urban territory and for making connections between and across a range of scales. Developing pluralistic values was proposed as a significant opportunity to develop the potential of the territory and it was identified that areas containing natural or recreational values offered the highest potential. These values were dependent upon the scale of observation and the research demonstrated that they were missing at the landscape scale—between the metropolis and the neighbourhood. This gap suggests that the intentional construction of values within the peri-urban at the landscape scale is important in order to bridge this nexus and to build knowledge within the nested scales.

Additionally, this study proposed developing a structure at the landscape scale which integrates adaptive and resilience measures that support metropolitan vulnerability under climate change, as this is critical for enabling the city to respond to stresses and for building climate change literacy.

10. Landscape Architecture Foundation, *Landscape Performance*.

Accordingly, developing core shared values for the new epoch of the Anthropocene is essential. Additionally, the landscape structural types predict opportunities for policy, planning and design to directly improve the quality of life for human wellbeing within a broader paradigm of ecological wellbeing.

Finding scale

The peri-urban territory can be identified at a range of scales—spatial, temporal or administrative—with the literature demonstrating the importance of choosing the right scale to examine the significance of the territory. This research identified the landscape scale as the most important for assessing the spatial arrangement of the territory and settled upon the temporal scale of sixty years, from the first to the most recent metropolitan plan, to undertake this analysis. In accordance with the research objective to expand the thickness of the territory by identifying its imageability and to propose its potential, the landscape scale was chosen as this is where the pattern of change is most recognisable for human perception.

Previous research has focused on the major scale of the metropolis. This research proposes that potential can be addressed through intentional design at the landscape scale. Otherwise, at the scale of the metropolis, the landscape architectural project is not easily identifiable and, as Hoessler argues, “the design becomes inoperable or ineffective, and where the writing of the project is rendered impossible because it requires too many partners, too much energy and too much money.”¹¹ Therefore, what this research offers is a method of approach at the landscape scale where the relationships between landscape structural assemblages are evident and utilised for restructuring new connections and practices between people and the peri-urban territory.

In addition, this approach supports the evaluation of nested scales, conceiving the peri-urban territory as a series of nested scalar landscape rooms and thresholds rather than “left over space” of the city waiting to be filled. In this way, distinguishing the peri-urban territory as a key link within the sequence of landscape nodes, from the scale of the backyard or neighbourhood POS to the peripheral conservation estates of state and national parks within the metropolitan area, complements the imageability of the city that is already inscribed at other scales. Furthermore, it situates the scale of intervention at the pattern of landscape change, not at the scale of the neighbourhood or region.

8.4 What is the appropriate role of landscape architecture in the re-making the peri-urban?

In the introductory chapter, several key studies were discussed that placed the importance of research domains relevant to forming a research base within the discipline of landscape architecture, and it identified those most relevant for practice. Several of these, including measuring landscape impact and performance (potential) and the development of applied methods of techniques that support creativity as a research tool, have been addressed here.¹²

Methodology

The research methodology outlined in the introduction and chapter four explained the mixed method approach of the research, in accordance with Swaffield and Deming's methods of inquiry.¹³ A sequential approach was employed to support a staged, layered inquiry into the peri-urban condition that was both textual and visual. Knowledge of peri-urban phenomena was constructed through inductive and objective methods (description) to constructive and inductive (classification) analysis, before concluding at constructive reflexive (interpretation). As a result, knowledge of the territory was developed at each subsequent stage and utilised as both the method and medium for knowledge generation.

The research confirms aerial analysis as a useful collection technique to undertake an assessment of the structural change of the peri-urban across time. This approach follows several similar approaches of description and classification methods, developed previously in the context of US peri-urbanisation.¹⁴ However, this research makes a significant and unique additional contribution to how peri-urban territories in Australia have previously been identified and explained. Specifically, how critical visual studies of the territory's landscape structure have been identified to evaluate value and propose the opportunity for the creative contribution that landscape architects can make is highlighted. For example, reviewing landscape architecture's contribution to peri-urban territories over the past ten years has helped to highlight a range of projects whereby landscape architects have proposed unique socio-ecological connections within the territory as well as many gaps in practice available for the profession to address.

Furthermore, the research is extensive because of the large sample size taken of seventy, 2 kilometre x 2 kilometre square quadrats located within the territory. These sites tracked the peri-urban interface

12. Meijering et al., "Exploring Research Priorities," 9.

13. Swaffield and Deming, "Research Strategies in Landscape Architecture," 34–45.

14. See Hayden, *A Fieldguide to Sprawl*; Lerup, *A Million Acres*; Berger, *Drosscape*.

as the city expanded outwards from the 1950s and accordingly distinguished a wide-ranging visual representation of the peri-urban condition; one that is both geographically diverse across the metropolitan region while providing extensive depth to demonstrating functional and structural change across a sixty-year period. There are limitations produced because of this sample size, as discussed in the conclusion. However, as peri-urbanisation in Australia continues to be a defining characteristic of metropolitan development, it seems hard to imagine that a greater focus on the complexity of local peri-urban territories will not yield helpful observations of the implications of policy on landscape change and subsequent social and ecological relations. Given the connection between visualisation and knowledge of the peri-urban, it seems useful to complete the chapter with a more detailed examination of how the territory's imageability shaped the differentiation of structural types and how it might inform future engagement in the territory by landscape architects through design.

Visual studies and thickness

The traditional structures and functions of the landscape continue to be disrupted by modernisation. The ongoing impacts of urbanisation as well as changes to agricultural practices, infrastructure and waste and water management continue to cause visual disruption within the peri-urban territory. With this comes a loss of structure and identity, and without an attempt to recreate or connect the resultant pattern, the disruption contributes to the territory's illegibility and ultimately impacts on its legitimacy. Uniquely, remnant peri-urban landscapes are important because they are recognisable among the surrounding changed landscape, despite remaining as isolated and disconnected elements within the larger territory.¹⁵

In the introduction, I explained how landscape registers a faster rate of impermanence than built urban form. Subsequently, I outlined the importance of developing an imageability for the peri-urban derived from the patchwork of landscape structure and the perceived transitional qualities of its condition. I used Hirsch's expanded thickness approach, alongside Marot and Girot's conceptual frameworks for a layered discovery of site to situate the visual studies. The method employed here complements more quantitative approaches explored in the literature¹⁶ and demonstrates a new way of undertaking structural and functional analysis in Australian peri-urban regions.¹⁷ Moreover, a landscape-led approach, as the research prioritises, provides an intimate and rich visual catalogue of a specific territory (in this case Perth) and sets the scale and terms of reference for acquiring knowledge of the

15. Antrop and Van Eetvelde, "Sensing and Experiencing the Landscape," 128–33.

16. Buxton et al., *Change and Continuity*.

17. Burnley and Murphy, "Exurban Development in Australia.," Barr, "Future Agricultural Landscapes," 123–27.

peri-urban through design.

Following both Dee¹⁸ and Raaphorst et al.,¹⁹ who argue for the importance of adopting a critical visual research approach to studying landscape and its processes, image making emerges in two distinct ways: firstly, in the procuring of image for interpretation, as found in the initial scan of the territory in chapter two, whereby distinct features are identified and collected into a compendium explaining its condition, as well as in the large sample size evident in the quadrats of chapter four; and secondly, the drawn and analytical interpretation of the territory, which supports the differentiation of types in chapter five. This approach is appropriate to the scale and complexities of the territory. Balmori concludes that:

Seeing ourselves as part of nature demands a different relationship to it, and the change of scale in landscape design projects, which can now encompass whole cities or regions, forces us to search for a different way of looking at landscape.²⁰

Accordingly, for Perth's peri-urban territory, the application of drawing (thinking through drawing²¹), sketching and mapping in chapters one and five becomes a primary method for meaning-making and engages with the semiotic vocabulary derived from the work of Dee,²² to "read" the territory.²³ This "reading" of the peri-urban provides new knowledge through the expression, explanation and communication of how the landscape is structured, experienced and valued.²⁴ This approach is also unapologetically disciplinary because recording, working out and speculating through drawing enables us to see, imagine and represent the world around us.²⁵ Furthermore, this approach is important because landscape architects think, draw and see differently to planners and architects. Recognising this elevates new forms of meaning, derived from the material of landscape itself, to be foregrounded.²⁶

By adopting a critical visual approach to interpret the peri-urban condition, I propose this to be the departure point for transformative practice of landscape architecture through design. As Weller explains, "The landscape architecture of a better world remains the ambit of aesthetics, values and meanings—the qualities of dwelling poetically as well as pragmatically."²⁷ Finally, conceiving

18. Dee, "Imaginary Texture of the Real."

19. Raaphorst et al., "Semiotics of Landscape Design."

20. Balmori, *Drawing and Reinventing Landscape*, 30.

21. Treib, *Drawing/Thinking*.

22. Dee, *Form and Function*.

23. Raaphorst et al., "Reading Landscape Design Representations."

24. For an overview of affordances of representation see Robbins, "Drawing and the Social Production," 42–61.

25. Balmori, *Drawing and Reinventing Landscape*.

26. Biddulph, "Drawing and Thinking."

27. Weller, "Between Hermeneutics and Datascares," 17.

design in this way illustrates not just what the landscape means but sets in motion how it works and interacts over time, both strategically and programmatically.²⁸

Design

Landscape architecture's claim to the peri-urban edge is consistent with the profession's approach in developing large peripheral parks that addressed some of the first issues that emerged from the industrial city such as recreation, health, air quality and overcrowding. In chapter seven, I introduced a review of ten years of landscape architectural practice in Australia, through which I deduced the functional characteristics of landscape architectural intervention into the territory. While some of the projects identified here are exemplars of landscape architectural design in Australia, this has not been translated at the scale of the peri-urban into a generally consistent or reimagined approach to the territory. It would be useful for the profession to utilise this previous work within peri-urban territories as a basis for prioritisation and advocacy for professional influence in the design of the territory.

As there are differing levels of administration and governance across the peri-urban, the profession has an important role in advocating for intervention. Furthermore, a failure to communicate the territory's local distinctiveness only contributes to replicable responses occurring within it, such as in the formulaic application of POS, at the neighbourhood scale and across peri-urban areas. However, we know from the literature that the peri-urban has a higher percentage of ecological systems than neighbouring urban areas. Accordingly, the adjacency of urban ecological systems within the city proper and the peri-urban provide the first opportunity for agency of new narratives about the ecological and cultural scales of this territory that have been hitherto untold.

Chapter seven established the importance of landscape architecture design's potential to reconfigure the social and cultural relations between the urban and rural areas (and their ecologies) by challenging the default aesthetic.²⁹ As distinguished in chapter six, design, management and planning have the ability to construct attitudes, preferences and norms that, in turn, influence the underlying and assigned values of the territory. Importantly, the aesthetic legibility derived from peri-urban territories when landscape structure is considered rejects the romantic and Arcadian projection of this landscape (perpetuated by urban planning) as the antithesis to urban form. Such an approach necessitates a structural re-conception of peri-urban territories for design. As Treib predicts, we must develop new ways of conceiving the landscape:

28. Corner, "Introduction: Recovering Landscape," 9.

29. See Treib, "Ethics ≠ Aesthetics,"; and for a discussion on this locally in Australia, see also Bull, "A purposeful aesthetic?"

To many landscape architects, the ethics of sustainability demands recreation of natural conditions, or at least its “look”, that existed prior to human intervention and habitation. But the conditions of both the immediate site and the world around it have changed, and so too must the design and its aesthetic.³⁰

This does not dismiss the ecology of place, rather, as Nassauer examines³¹ and Meyer differentiates, it situates potential in an aesthetic derived directly from the peri-urban landscape’s structural condition in order to provoke cultural experiences and therefore contribute to sustainable design.³²

I argue that while a new aesthetic of the peri-urban is necessary, so too is the landscape architect’s role in the way we conceive peri-urban landscapes. van den Brink et al. propose this as “boundary spanning”. Here, design is both content and process—the literal drawing of future landscapes as well as the successful negotiation of the social and political forces and varying disciplinary perspectives, values and objectives.³³ This is because social and cognitive capacities are developed through processes of selecting, translating and connecting the landscape through time and across multiple scales.³⁴ My focus has been upon the natural, ecological and cultural structural drivers and interactions of these processes and how this determines the values inscribed in the peri-urban landscape.³⁵

The research provides an analytical framework³⁶ that supports the study and interpretation of heterogeneous, peri-urban landscapes. In addition to the semiotic structures produced by built design responses elsewhere, design processes that engage with the landscape as material also reveal variations to the current representation and interpretation of the peri-urban territory. Henceforth, a major focus of the research has been to connect socio-semiotic thinking and methods. I have shown that the production of images and various modes of representation of the peri-urban is an important first step towards a recognition of the territory as a place and subsequently, the resulting place-based design work within it.³⁷

The issue of place is worth underlining. All landscapes are constructed and therefore all landscapes provide essential components for fulfilling the ecological multifunction as proposed by the MEA.³⁸

30. Treib, “Ethics ≠ Aesthetics,” 40.

31. Iverson Nassauer, *Placing Nature*.

32. Meyer, “Sustaining Beauty,” 6–23.

33. van den Brink et al., “To Draw or to Cross,” 14.

34. Bosselmann, *Representation of Places*.

35. Pinto-Correia and Kristensen, “Linking Research to Practice,” 248–49.

36. For further discussion on cultural framing, see Kress, *Multimodality: A Social Semiotic*.

37. Biddulph, “Drawing and Thinking,” 280.

38. Millennium Ecosystem Assessment, *Ecosystems and Human Well-being*, vi-vii, 103–20.

However, what is underscored in this thesis is the potential for peri-urban territories to embrace the creation of place as a catalyst for changing behaviours and actions that respond directly to the challenges of our time. In this way, landscape is restorative not only in re-establishing large-scale ecological processes at the interface of urban–rural lands but also in purposefully creating new spaces for occupation, enactment, engagement, grounding, orientation and stimulation within the peri-urban.

8.5 Conclusion

The following section concludes the research, outlines the limitations and proposes future research directions.

This study was motivated by my observation, as a registered landscape architect, of the continued outward suburban development of the SCP that appeared to occur without sufficient engagement with the unique ecologies and landscape structural and functional qualities of the Perth metropolitan area. Furthermore, it was driven by the imperative to question this development as the city continues to expand north and south within one of the few global biodiversity hotspots. Indeed, within the timeframe of the course of this study, the *Banksia* woodlands of the SCP ecological community were placed on the Australian Government’s threatened species list.³⁹

When the peri-urban territory was assessed at the landscape scale, I noted a discontinuation of the overarching vision of the metropolis. Through the analysis of the seventy quadrats, I explained the change in landscape structure across the peri-urban territory over a sixty-year period and evaluated numerous peri-urban types. Through such an assessment of the value of these types, in accordance with landscape architectural principles such as edge, path, foci and threshold, I identified the prevailing values that correlate with the landscape structure of the territory. Comparatively, I identified the landscape architectural projects within Australia that distinguished a design response that is consummate with the scale and complexity of the territory. Finally, I proposed a way forward for landscape architectural practice within Australian peri-urban regions in order to construct new, socio-ecological relationships at the edge of the city.

8.6 Limitations and future research

The limitations of the research are discussed within the areas of method, governance and context.

Method

Sample size

The research required a tracing of the peri-urban edge of the city in a controlled and consistent way. As a large, complex territory under constant change caused by urbanisation, a standardised approach and scale of observation was required. In accordance with the expanding urban interface of the city, the research borrowed the method of quadrat study from ecological sciences and applied this to organise sample sites from within the territory. Several “rules” were applied such as sites being situated no closer than 10 kilometres from one another (to ensure a diversity of the territory was covered) and a minimum of two land use zones per quadrat (urban and rural in accordance with the primary definition found within the literature). This enabled a complete picture of the territory to be constructed, with the total number of sites concluding at seventy. This number proved to be an extraordinary number of sites to analyse in-depth and consequently took an extended amount of time. Despite this, the number of sites is perhaps a unique component of this research and differentiates it from other studies undertaken within peri-urban regions in Australia. Furthermore, this method accorded each site to be related to the peri-urban interface determined by the metropolitan plan over several decades.

Ground truthing

Being in the landscape enables the subject to orientate oneself and establish patterns that ultimately connect to form a mental map of the territory.⁴⁰ Accordingly, ground truthing is an important component of ascertaining and verifying the features identified in the aerial image and their allocation at the local level, where human occupation and interaction is implicit.⁴¹ While ground truthing was undertaken for 10 per cent of the quadrats, it was not consistently applied across all seventy. Certainly, I have extensive knowledge of the peri-urban; however, this is knowledge that has been acquired across thirty years and applies mainly to the north and north-eastern areas of the peri-urban territory, where I have lived and worked. Nevertheless, ground truthing did prove to be worthwhile in confirming structural characteristics identified in the 2016 aerial photos. However, the limitation

40. Antrop and Van Eetvelde, *Landscape Perspectives*.

41. Kilbane, Weller, and Hobbs, “Beyond Ecological Modelling.”

of this approach is that ground truthing can only verify the most recent aerial information. Historic accounts of landscape structure are much more difficult to determine and are likely to be inconsistent across the territory. Results could be improved by triangulating the data with archival photos from local government agencies to verify landscape structure from previous decades and to help understand the valuable elements within it.

Qualitative data

While value has been determined through the literature connected to the value of landscape types, secondary sources on the literature of Perth and the profession of landscape architecture, there remains a significant component missing—the end user. Qualitative interviews with residents within the peri-urban, adjacent to the peri-urban and frequent visitors within the peri-urban are a significant and important component missing from this research. While being outside the scope of this study, there appear to be minimal studies of this type undertaken in Perth. While literature exists from other locales, it would be helpful to undertake qualitative research in the form of surveys or interviews to augment the values derived within this study for the city of Perth. It is likely that there are values specific to this territory that need to be revealed in order to assist design and planners making decisions within it. Furthermore, this information is important in establishing more longitudinal research studies that determine the connection between value and landscape change (including designed landscapes) within the peri-urban territory of Perth.

Quantitative data

The researcher acknowledges that more sophisticated levels of experience and knowledge of GIS analysis tools and systems would have enabled faster analysis of the quadrats and an opportunity to quantify the identified edge, path, threshold and foci areas. Furthermore, the opportunity to quantify the ratio of edge-to-interior across time and in several polygons (edge and path) could provide the opportunity for a greater analysis of ecological performance of these landscape structures and, most certainly, proves an exciting opportunity for future research. Finally, situating this research within a transdisciplinary team would provide insight into more nuanced dimensions between landscape structure, character, aesthetics and ecological systems performance.

Governance

Public and private

One of the greatest challenges of re-configuring the peri-urban territory lies in the governance structures across various administration units, particularly in private areas. Much of the area analysed and interpreted occurred on private land. Private property rights determine that an owner has the right to own, use, generate income and dispose of private property. A 2019 State Government of Western Australia inquiry into private property rights⁴² revealed public concerns with the impasse of conservation and heritage values on private property for the greater good. Notably, the economic consequences of impinging upon private property ownership without adequate compensation, when Australia's economy relies heavily on it, makes the next stage of intervention into the peri-urban territory difficult.

Notwithstanding, the capacity of landscape, collectively and as argued within this research the peri-urban specifically, to generate social and ecological knowledge within a new geological epoch and at a time of increasing attention to the global decline of natural systems cannot be underestimated. What is possible is for landscape architects to advocate for a more considered approach to peri-urban territories and urbanisation patterns within Australia. In doing so, there is the opportunity to influence firstly, government agencies and secondly, private landholders and communities to support landscape architectural projects within the peri-urban as a necessary step towards empowering and adapting new relationships within an urbanising world.

Context

Disciplinary

The research revealed that landscape architects are limited, at large, within the peri-urban territory. The complexity of the territory and the importance of accumulating a legibility of it in order to increase its value is important. Notably, landscape architects have the skills, methods and ability to build and influence the relationships between people and the landscape structure of the territory. Furthermore, to establish an approach for landscape-scale intervention that ultimately connects the scale of the neighbourhood to that of the region and influences positive change between people and the landscape through building understanding of it, is still relatively uncharted within Australia.⁴³ Future research that

42. Western Australian Parliament, Legislative Council, "Inquiry into Private Property Rights."

43. I would argue that the Western Sydney Parklands in Sydney is one of the most sophisticated peri-urban parklands in the world; however, its size (27 km in length) is only achievable because it is a remnant of the city's 1948 greenbelt. See Evans and Freestone,

illustrates projects within specific peri-urban territories and the capacity of these to build knowledge and value of the territory and landscape systems, is rich with opportunity. Similarly promising as an approach is a comparative evaluation of the performance capacity of peri-urban territories to measure which landscape solutions deliver upon their intended purpose and thus contribute to local and global sustainability.⁴⁴ Finally, collaborative engagement and knowledge exchange with Aboriginal Australian's would provide opportunities for a rich alternative reading of the territory and its values.

Geographical

This study focused in-depth on one metropolitan city in Australia, Perth. Without similar studies being undertaken, it is difficult to determine if there are prevalent national peri-urban types that could be utilised to begin to restructure the territories. However, Australia's urbanisation pattern is unique, with almost all the nation's population consolidated within 100 kilometres of the coast. Furthermore, of the eight capital cities, three of these (Brisbane, Sydney and Perth) are located within globally recognised biodiversity hotspots. Certainly, there are pronounced opportunities for a greater spatial understanding of peri-urban territories, their latent values and their potential within Australia.⁴⁵ A robust national set of metropolitan city case studies that survey landscape change across a sustained period of time are needed, as differentiated here in this research, across a high number of study sites to determine local differentiation. Finally, connecting these territories and their ecologies to city residents is critical for maintaining and strengthening how people perceive, experience and value the landscape within a continuing, urbanising world. However, the research will have little efficacy if landscape architects fail to empower change and comprehend the transformative potential available within peri-urban territories.

Peri-urban territories are ultimately a negotiation of values. This research accords with the opportunity to renegotiate those values. I will conclude with a final word from George Seddon:

Are Western Australian wildflowers more valuable to the world than Western Australian wheat? Again, there can be no answer without specification. Valuable to whom, and under what conditions of trade? If the value is not economic, then how is it to be assessed against the value of wheat?⁴⁶

"From Green Belt to Green Web," 223–40.

44. Landscape Architecture Foundation, *Landscape Performance*.

45. European Science Foundation, "Landscape in a Changing World." This follows similar conclusions regarding a Pan-European perspective.

46. Seddon, *Sense of Place*, 254.

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