Graham T. Inglert

Urban Planning Portfolio



The University of Melbourne

Preface

This portfolio provides an overview of my academic and professional achievements thus far in my urban planning career. Over the past two years at Melbourne University in Melbourne, Australia-completing key achievements such as my master's thesis and my professional placement at Urbis, Melbourne, I have become a capable and enthusiastic urban planner excited for the next step in my career journey.

This Portfolio provides excerpts from my core university projects each demonstrating my expertise in four distinct domains:

- Argumentative Writing
- Analytical Reports
- Infographic Design Boards
- Academic and Professional Capstones

Within each of these projects, my proficiencies within the core responsibilities of an urban planner are articulated and can be evaluated.

On page 3 of this portfolio, my professional credentials are available including a cover letter articulating my professional achievements and personal information as well as my resume which demonstrates my professional background and educational achievements.

A table of contents is located on page 3 providing insight into the scope of this portfolio as well as the location of each distinct project.

Prior to each of the key sections located within this portfolio, there is an introduction as well as a smaller table of contents introducing the reader to each of my projects. The introduction precursing each section explains the purpose of individual projects and the motivations I had for pursuing each topic.

This portfolio containing eleven distinct projects exhibits the quality of my professional, academic and technical expertise. From narrative and writing skills, technical proficiencies, analytical cues, prior professional experience and research achievements, this portfolio serves as a culmination of my work thus far, available to be reviewed.



Left:
Site visit completed for Urbis, Melbourne in October of 2025 of the Lansell, Toorak; a housing project that Urbis completed planning diagnostics for.

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PROFESSIONAL BACKGROUND

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Cover Letter

Resume

Graham T. Inglert

Urban Planning & Economics

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SUMMARY

Enthusiastic and driven professional urban planner with experience from the University of Melbourne, as an Assistant Urban Planner at Urbis in Melbourne, and as a Junior Public Park Site Administrator in Cincinnati, Ohio. Passionate about delivering innovative planning and design solutions that enhance urban vibrancy and liveability. Proven ability to research and analyze policy contexts, collaborate effectively with peers, correspond with community members, develop visual designs, maps and diagrams, analyze spatial contexts and prepare comprehensive planning documentation. Seeking to leverage these skills and experiences to contribute sustainable, community-focused urban development initiatives that balance growth with public needs.

EXPERIENCE

Urbis, Melbourne

Title(s): **Assistant Urban Planner**
Period: **2025 - 2025**
Location: **Melbourne, Victoria, Australia**

Supported senior consultants in delivering a wide range of urban planning services, including research, analysis, and preparation of planning documentation. Played a crucial role in facilitating commercial, mixed-use, industrial and residential projects within Greater Melbourne and the state of Victoria in Australia.

- Attended site visits at projects that Urbis completed planning diagnostics for.
- Summarized and interpreted planning controls to evaluate site potential and compliance.
- Assisted in the preparation of planning reports and documentation in collaboration with senior planners by utilizing skillls in GIS, report preparation, writing, research and design.
- Participated in site visits to inform planning diagnostics and project assessments.
- Strengthened analytical and problem-solving skills by evaluating development capacity across diverse sites in Victoria, Australia.

Cincinnati Recreation Commission (City of Cincinnati)

Title(s): **Recreation Specialist**
Period: **2023 - 2024**
Location: **Cincinnati, Ohio, USA**

Junior site administrator at the significant public park and recreation asset: the Carl H. Lindner Tennis Center at Lunken Playfield. Played a pivotol role in organizing community social and competitive recreation events such as the Cincinnati Metropolitan Tennis Tournament: A century-long public Ohio valley tennis tournaments event.

- Collaborated with recreation facilities to organize community social events by leveraging extensive community organizing and communication skills.
- Maintained park and recreation facilities.
- Managed event scheduling, reservations and requests.
- Collaborated alongside colleagues to ensure an effectively managed. equitable and welcoming recreation experience for patrons and community members.

Tennis Only Australia

Title(s): **Retail Specialist**
Period: **2024 - 2025**
Location: **Melbourne, Victoria, Australia**

Experienced retail professional with expertise in tennis product sales, customer service, and racquet stringing. Skilled at helping players of all levels locate the appropriate equipment tailored to their performance needs and preferences.

- Skilled in inventory management, merchandising, and maintaining a welcoming, informative retail environment.
- Built strong relationships with customers, partners and co workers.
- Contributed to strong company growth while ensuring a safe, welcoming and equitable space for shoppers, colleagues and visitors.

Midwest Racquet Sports

Title(s): **Retail Specialist**
Period: **2023 - 2024**
Location: **Cincinnati, Ohio, USA**

Leveraged role with Cincinnati Recreation Commission to involve more players in community events for players of many different age categories. Experienced retail professional with expertise in tennis product sales, customer service, and racquet stringing. Skilled at helping players of all levels locate the appropriate equipment tailored to their performance needs and preferences.

- Skilled in inventory management, merchandising, and maintaining a welcoming, informative retail environment.

EDUCATION

Master of Urban and Regional Planning (MURPL)

University: The University of Melbourne
Period: 2024 - 2025
Location: Melbourne, Victoria, Australia

Bachelor of Business Administration (BBA) (Economics, Finance, History)

University: The University of Cincinnati
Period: 2019 - 2023
Location: Cincinnati, Ohio, USA

Exchange Semester: Bachelor of Business Administration (Economics)

University: NHH: Norwegian School of Econnomics
Period: 2022 - 2022
Location: Bergen, Vestland, Norway

SOFTWARE PROFICIENCY

GIS (ArcGIS Pro & QGIS) RStudio Autodesk Revit & AutoCAD SketchUp Pro pgAdmin4 PostgreSQL Microsoft 365 Office Suite Anaconda Toolbox - Python Jupyter Console Blender Adobe Creative Cloud InDesign Photoshop Illustrator Linux (Mint; Ubuntu; Manjaro) MacOSX Windows (7; 10; 11) PTV Vissim Word PowerPoint Excel

SKILLS

Urban Planning Land Use Planning Community Organizing Policy Research Design and Access Statements Site analysis Environmental sustainability Data analysis Geospatial Analysis Peer Collaboration Written Communication Verbal Communication

REFERENCES

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Kieran Peake — Tennis Only Richmond
Retail Manager
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Introduction

This secion outlines my own intellectual and creative capacity regarding writing and argumentation. Each individualized document demonstrates excellency within a distinct subject and utilising unique references.

I. Historical MasterPlan Evaluation

ABPL90134 - PLANNING THEORY AND HISTORY

This essay was written following my first semester of my master's program. It was an open-ended project completed for the course: ABPL90134 Planning Theory and History designed for us to research and discuss a historical urban masterplan. I chose to research John Nolen's 1926 plan for Venice, Florida as this city is the home of my grandmother and a place I spent much of my youth in. Venice is a major inspiration for me and idiomatic of many of the United States' planning shortcomes invigorating much of my interest in urban planning and urban design.

II. Participatory Planning Topic of Choice

ABPL90315 - PARTICIPATORY PLANNING

Completed following my second semester at The University of Melbourne, this essay was also designed around student autonomy whereby we approached a choice of topic within the realm of participatory planning through an argumentative essay. I chose to discuss 'citizen agonism' or subversive citizen action in institutionalizing more democratic urban planning methods.

III. Urban Design Theory Personal Essay - Terrain Vague

ABPL90017 - URBAN DESIGN THEORY

This essay was completed following my third semester at The University of Melbourne. Unlike the previous two essay examples, this essay had a defined prompt I chose from a list. I chose to write about the concept of 'Terrain Vague' discussed by Ignasi de Sola Morales-a prominant spanish architect, historian and urbanist. This essay discusses the concept of 'Terrain Vague' and its application within Melbourne Australia's Nylex Clock.

I.

HISTORICAL MASTERPLAN EVALUATION
ABPL90134 - PLANNING THEORY AND HISTORY

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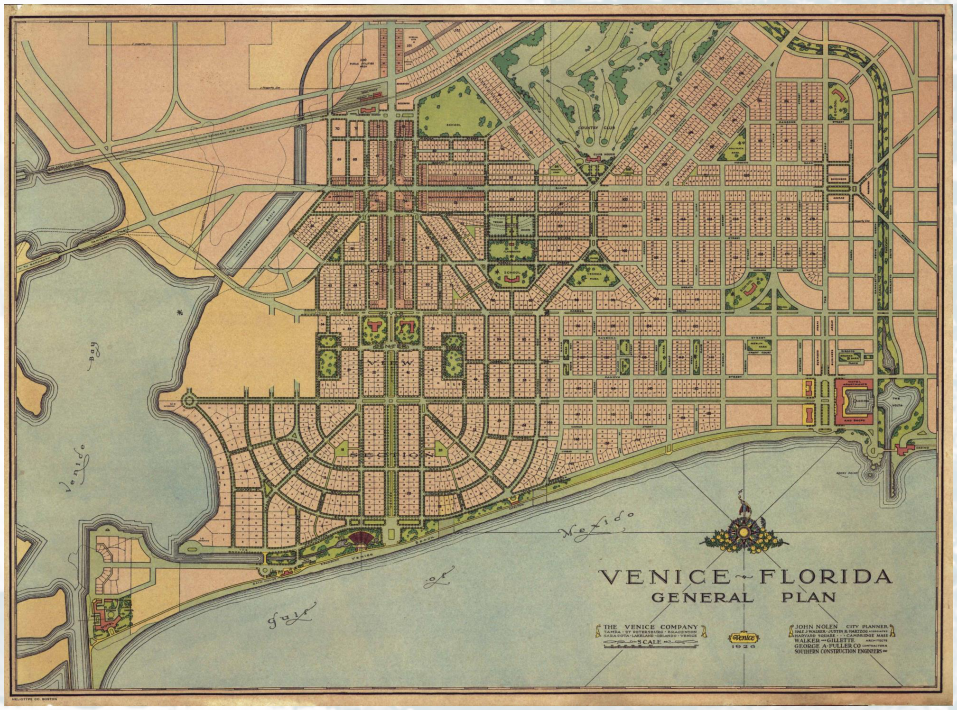
Graham Inglert 1493308

Select a historic (19th century onwards) or contemporary plan and discuss the ideas (planning ideas or strategies) present. Where did the idea/s that shaped the plan come from? Why did they become dominant? What ideas present in the plan might we retain or dismiss in 21st century planning? Please include an image of the plan at the beginning of your essay.



Masterplan of John Nolen's original envisioning of Venice, Florida, USA (City of Venice Government, 2024)

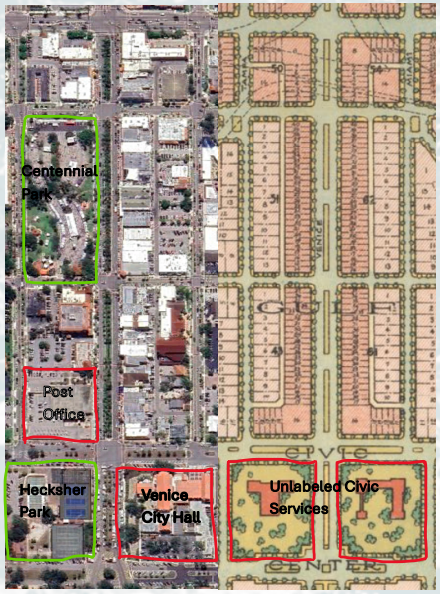
Venice, Florida is among several significant American master-planned cities of the early 20th century designed by revisionist planner and architect, John Nolen. Today the city is a small coastal beachside retirement community nestled on the western side of the Florida coast displaying somewhat poor and unremarkable land use choices common among modern North American cities, such as an inability to overcome the car-orientation of the surrounding suburban environment (Filion. 2018) that could pose serious environmental threats to the already vulnerable state of coastal Florida (Brody et. al, 2006). Nolen's vision of the city however was indicative of the 'city of the future' that many of his plans foresaw, a city that could accommodate the grandeur of the European city in their reverence of art and recreation without denuding the landscape for quick profits, obliterating natural features, and producing monotony (Stephenson, 2002). Through a further analysis of how Venice's original plan was metamorphosed into what we see today and how Venice's legacy as a garden city permeates its urban form, planners may take inspiration from the retention of legacy urban plans and the importance that density and urban beauty can have in preventing environmental dilapidation and encouraging placemaking among modern urbanist perspectives.

John Nolen and his city vision took place during the turn of the 20th century: a period of notable upheaval in public sentiment and technological progress that changed the underlying conditions of urban life. These developments aimed to address the qualms that the industrial city exhibited: "The underlying social, economic, political causes of the chaos and misery of impoverished neighborhoods and congested streets." (Warren (Ed), 2005. p. xi). The *Garden City movement* as it would originate in Britain helmed by figures such as Ebenezer Howard and others hoped to improve this squalor by combining the benefits of the countryside and the city environments such as access to natural landscapes and the economic opportunities of the modern industrial centre, while avoiding the disadvantage of both (Nabila, 2021). The United States at the time would take great inspiration from these movements. Cities such as Chicago were described as "hideous" and "floundering monsters" (Henry Blake Fuller, 1894/2005, pp. 48) resulting in the *City Beautiful movement* and exemplified in Daniel Hudson Burnham's *Plan of Chicago* (1909) (Hines , 2019). Developing into a "Great Civic Awakening" (Warren (Ed), 2005.p. xi). Nolen while inspired by these movements saw the future of urban development to instead lie in smaller, regional cities and would choose these sites to develop his methods (Nolen, 2005 p. 2).

Influenced by Raymond Unwin's plan for Letchworth (1904), Nolen hoped to incorporate the *Garden City* aims within the United States. His goals aligning with this 'widespread civic awakening' was to provide convenience in streets and buildings, to meet the requirements of public health, to recognise the true function and place of art, and to satisfy the love of nature and the desire of outdoor life. (Nolen, 2005 p. 2). Coinciding with the 'great Florida land boom' of the 1920s Nolen and his firm took particular interest in the

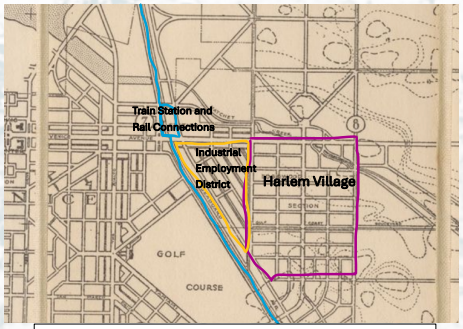
southern state for many of these small cities. Venice among 53 other projects worked on in Florida by Nolen's firm represented an opportunity where he could implement his vision unabated by the quick profits sought by the financiers of many of his other projects within Florida (Stephenson, 2024). The city was commissioned by labour union: Brotherhood of Locomotive Engineers (BLE) for the purpose of long-term growth as a regional centre for agriculture and light industry, Nolen saw this as an opportunity to implement his vision completely through the involvement of greenbelts, parkways, linear parks, amphitheatres and civic centres. (Stephenson, 2024). Today, Venice is credited as the most complete example of the garden city in Florida (Stephenson, 2002). When analysing the city's present form however, many of these ideas struggle to maintain coherency as the fundamental conditions of North American city building have changed.

Examples of this discontinuity present can be illuminated through a juxtaposition of Nolen's masterplan and today's satellite photographs of locations of services and land use present. Although the original masterplan has been retained in many aspects such as the concentration of civic amenities (red colour on map) and the significance of park/recreational areas (green colour on map). Notable discrepancies between the two include the obvious modification of civic service locations such as the Venice city hall and the post office no longer being adjacent to each other, the allocation of the site labelled 51 on the masterplan to now be 'Centennial Park', and a general reimagining of urban land use away from the density that Nolen envisaged. The significant transformation that ignited much of this augmentation can be explained through Nolen's miscalculation of the transportation methods of the future American city and a shift away from environmental preservation in planning considerations.

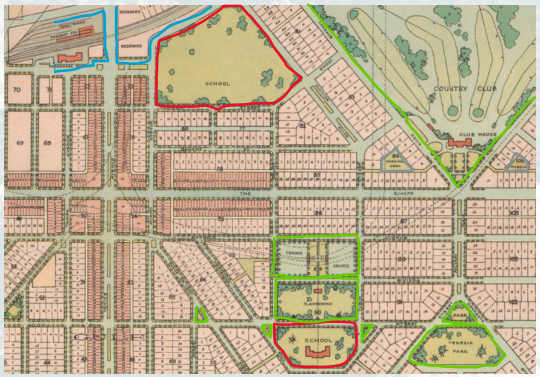


View of the central commercial and civic district of Venice, Fl along Venice Avenue. Left: aerial photograph of the modern city (Google Earth 7.3, 2024). *Right: original John Nolen masterplan (John Nolen Papers, 1926)*

According to Nolen: "Transportation will change the present tendency (of population movement) towards concentration" (Nolen, 2005, p. 2) and "The Railroads have been instrumental in past years and will probably be more so in the future in establishing and developing new towns of all classes." (Nolen, 2005, p. 154). At the time however, this was an effective response to the patterns that railroad transportation had on urban habits. Nolen's plan for the 'Harlem Village' working-class neighbourhood of inexpensive lots adjacent to the Venice train station would reflect this belief (Stephenson, 2002). The proposal would be a diversification in the economic and population sectors of Venice although was never fully realised as the economic insecurity of the Great Depression would hinder investment in Florida and nearly bankrupt Nolen's firm. (Stephenson, 2002). More critically for planning, the depression would fundamentally change how investment agencies, professionals and governments would approach city planning. No longer was landscape architecture an integral piece of city planning, instead, civil engineering and social science would characterise future American planning and would fail to recognise the economic benefits of beauty and nature. (Stephenson, 2002).



Regional plan of Venice and Environs indicating proposed Harlem Village and industrial employment region (John Nolen Papers, 1926).



Subsection of Venice Masterplan Florida, USA (John Nolen Papers, 1926)

This miscalculation by Nolen and the transformation seen following the Great Depression is then made more obvious when analysing the fate of the transportation, park, and civic centre footprint of Venice. The masterplan displayed a prominent train station (coloured blue) large concession of urban land dedicated to park and recreational purposes (coloured green) and significant land diverted to civic duties (coloured red) while negligible urban concessions would be made to car parking

(coloured grey). As epitomised in Nolen's belief: "American emphasis, also seems to be placed more and more on the desirability of smaller cities. A most significant testimony to this tendency is the recent manifestation of Mr. Henry Ford's business sagacity." (Nolen, 2005, p. 4). Nolan recognised Ford's impact in city planning but would incorrectly believe this significance to lead in favour of centralisation as opposed to the sprawl that would instead direct later planning efforts. These efforts would see Venice train station's ceasing all rail operations and being converted into a heritage site and museum, the large country club in the upper right of the masterplan to be converted into detached single-family housing, and an agglomeration of many of the civic utilities such as the community centre and the Elementary and High School to inhabit a much larger footprint in the city, all the while more and more urban land to be converted in the accommodation of car parking.



Satellite Photograph of Venice, Florida, USA (Google Earth 7.3, 2024).

Despite the changes present from the original 1926 plan and today's city, Venice's legacy as 'the best example of the garden city ideal in Florida' is revered by its population, even dedicating a memorial to Nolen in 1977 near the intersection of city hall and Venice parkway (Stephenson, 2002). Venice remains a popular destination for tourists and is ranked at among the happiest beachfront towns in America (aldea, 2019). With an increase in scientific studies exploring the significance of ecosystem preservation and sprawl mitigation in preventing environmental disaster in Florida (Brody et. al, 2006), The success of more modern master-planned interpretations of urbanism displaying garden city ideals in Florida such as Seaside (1981) (Marthya & Major, 2022), along with renewed public and private interest in rail investment within the state of Florida in the form of privatised high-speed rail (Schorung, 2022), Venice may revitalise itself from its current amalgam of contradictory garden city ideals and suburban sprawl into a model of how legacy urban plans can be reimagined in the modern age to combat the ecological degradation and accompanying vulnerability to natural disasters that urban sprawl can entail in Florida.

The early 20th century saw many of the same challenges that the urban regions of today face; rapid technological advancement and unmitigated private responses to land development have led to environmental degradation and a disconnection between citizenry and the natural environment. While John Nolen recognised centralisation and rail development to be the primary catalysts for urban development, urban regions of today instead see decentralisation, fragmentation and the dependence of private automobiles to dictate urban development. Although the conditions of existing urban fabrics and transportation methods have fundamentally changed, the critical state of environmental concerns necessitate alternative approaches to built-form. Alongside renewed public interest in alternative transportation methods, urban beauty, and environmental considerations, existing examples of garden city ideals in Venice, Seaside, and others may guide planners in establishing urban regions that can account for the needs of the modern age in establishing desirable urban regions while satisfying environmental considerations.

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Words excluding References: 2723 (2500 +10%)

Option 1: Pick **one topic** explored in Participatory Planning and write an in-depth essay on it.

The Value of Citizen Agonism in the Formalisation of Co-Production Methods of Planning

In this essay I discuss the importance of grass-roots participatory methods in expanding the '*Who Decides?*' of urban planning decisions from traditional planning power hierarchies. I employ Andy Inch's (2014) discussion of the 'Agonistic Citizen' and how strategies of organising these citizens can redistribute planning power to those citizens typically alienated in planning discourses. Through a characterisation of traditional citizen power hierarchy informed by Sherry Arnstein's: *Ladder of Citizen Participation* (1969) among others, I argue that ordinary citizen-led initiatives play a transformative role in reconciling power redistribution in urban planning cases. That citizen agonism and other grass-roots initiatives provide a critical methodology for attaining a redistribution of power in combatting neoliberal practice. I then propose that co-production as informed by Vanessa Watson (2014) is an outcome of citizen-led planning initiatives that can formalise the agonistic citizen in future planning cases. Finally, I demonstrate that a formalisation of citizen agonism within co-production presents a manner to which endemic social, political, and environmental issues contingent to traditional neoliberal planning discourse may be mitigated through not only citizen action but through planner action.

What is a traditional power hierarchy in urban planning?

Arnstein within her ladder (1969) confronts the power hierarchy in planning discussions by characterising two categories of persons in the planning society: the powerholders and the have-nots (Arnstein, 2019). Through Arnstein's bimodal characterisation, she denotes power distribution as a function of polarity, simply those with power and those without power. While this is an effective simplification to explore her ladder in describing the categories of participatory planning as a political question, it is not a complete representation of how planning power is distributed through the echelons of society. Especially as larger criticisms of technocratic and neoliberal planning approaches have emerged. Schatz and Rogers' *manage a trois* (2016) *description* of urban governance strategies is valuable in further defining the planning power hierarchy. Schatz and Rogers describe three parties that employ sway over planning agenda. These three parties being the 'technocratic' (elected representatives who set planning agenda), the 'neoliberal' (private market actors who operate on independent arbitrage), and the 'participatory' (local ordinary citizenry). Important to Schatz and Rogers' framework is the alleged "duplicity" that planning professionals and the elected ministry who assume the role of the technocratic elite would have if they 'compromised' the democratic principles of the governance status-quo by choosing to devolve agenda-setting or decision-making power to private market actors, ordinary citizenry or both. Notwithstanding the influence many private actors currently have within planning agenda through reliance on often privately provided technology platforms as exemplified by *Type, tweet, tap, and pass* (Johnson et al., 2020) or access to an elevated amount of capital. Schatz and Rogers recognise the beguiling democratic framework in inhibiting a truly democratic planning process. *"Shared Language" Or "Straitjacket"?* (Legacy, Barry, et al., 2023) explains the dangers that a supposed democratic form of planning governance that relies on the expertise of professionals or political elites has. The problematic emergence of 'best practice' and the ignoring of local contexts, manifesting in low-stakes and largely ineffective 'box-checking' strategies of planning participation (Legacy, Barry, et al., 2023). According to a great deal of the discourse in participatory planning literature, much of the decision-making power is held by government elites espoused in planning policy and deluged to planning professionals for enforcement. Within the traditional arenas of planning and participation in that planning, often these private market actors and government elites utilise their heightened power in reinforcing neoliberal frameworks the planning process.

Citizen Agonism as a tool to redistribute planning power

Andy Inch in his *Ordinary citizens and the political cultures of planning* (2014) describes how this misuse of participation has normatively become an obligation by many within the democratic ethos and therefore led to limitations in practice and a summoning of the sensational citizen concerned with questions of NIMBYISM rather than a more productive future (Inch, 2014). As a disruption to this gloomy overview of democratic misnomers in a pseudo-democracy of citizen planning, Inch provides citizen agonism and its application in communicative planning strategy as an element to be used in participatory planning alongside consensus-based deliberative methods. Inch recognises that conflict, through the exemplification of ordinary citizen experience and a quantification of the costs of power deluge as integral to ensuring equitable outcomes. Particularly, Inch highlights the role planners have in ensuring that individual interests are adequately channelled and do not lead to reaction by already privileged groups. Contrary to traditional planning participation discourse, Inch advocates for citizens not to see politics just as rational deliberation or narrow-minded self-interest but as a passionate expression of conflict for which power can be openly wielded and therefore contested (Inch, 2014). Inch recognises that for planning to be democratic, the institutions that oversee planning must embrace the conflict that is innate to democracy as a tenant within planning processes for then "citizens may learn to make decisions together even across lines of difference." (Inch, 2014. P. 408).

To illustrate how citizen agonism may be institutionalised within planning practice, Inch describes experience developed through involvement in planning cases in Scotland. Particularly how the act of being 'ignited' provided greater utility in reaching more productive: 'Pro-growth' outcomes that better serve individual citizen interests compared to opposing 'end-of-pipe' planning decisions (Inch, 2014). Inch describes that the primary motivation for citizen involvement was not the agency or choice awarded to citizenry to be active in planning but rather the personal obligation felt after hearing a nearly complete plan for development may jeopardize the perceived integrity of their place of residence. This opposition was only further antagonised by general distrust in planning professionals whom the ignited citizenry rightly felt dismissed the interests of citizens as overly 'self-interested' and 'narrow-minded'. Inch demonstrated that 'ignition' is valuable for motivating citizen participation. Through relationship building, NGO support and a balancing of both deliberative and agonistic methods of citizen participation, citizen ignition throughout the whole planning process can lead to more democratic planning outcomes (Inch, 2014).

Inch's citizen agonism is useful in recognising that citizen conflict when appropriately channelled by planning professionals can yield more productive and more democratic planning outcomes. The struggle as Inch recognises is when during the planning process the agonistic citizen becomes 'ignited' to participate in the discourse. As he points out, agonistic participation only once a project nears plan completion disrupts the project outcome, and these 'end-of-pipe' oppositions can yield poor resolutions in the form of NIMBYISM whereby already privileged groups typically prevail. Thereby explaining that without proper channelling, those in power seldom offer their own power to those who could be considered have-nots. That the *Who Decides?* of 'end-of-pipe' oppositions are those citizens already ingratiated in power ignited only because of learning of a projects cost's late into proposal and acquiesced by the technocratic elite who's planning systems allow this kind of opposition. It is therefore important to note the role that planners have in ensuring that appropriate power deluge can occur as to verify the appropriate redistribution of power.

How can we channel citizen agonism in disrupting the status-quo?

Recognising and defining the neoliberal frameworks that encompass the planning process is necessary to discussing how and why planners or the technocratic elite even should pursue power redistribution. As Faranak Miraftab (2009) explains neoliberalism in planning as a "hegemonic drive of neoliberal capitalism to stabilize state–citizen relations by implicating civil society in governance" (p. 32). And that this "hegemonic power is pursued through citizens' consent and perceptions of inclusion." (p. 33). Miraftab discusses that neoliberal frameworks are products of colonial frameworks through an inherent call for 'modernisation' demanded by colonial frameworks. This is derivative of a Western idealism. That Western idealism is echoed

narket efficiency or economic growth (Miraftab, 2009). Miraftab recognises the role these onial forces have in exposing a "Western urban imaginary in enforcing exclusionary cities and zenship." (p. 45). Miraftab explains that to combat neoliberal practice in planning that orces social exclusion, one must engage with practices of decolonisation. This 'hegemonic wer' is only allowed through the permissive citizen.

This discussion can explain the value that an 'ignited' citizen through conflict and nism and well involved throughout the planning process as discussed by Andy Inch can have disrupting the traditional power structures in planning. This neoliberal discussion also borates on one of the major obstacles identified by Inch in discussing how 'end-of-pipe' zen ignition is permissible in disrupting planning projects: the planning professional and cted officials who reinforce these planning systems. According to Miraftab (2009), similar to onial liberation, a neoliberal mitigation may take place through a " 'decolonizing the mind': setting the internalized inferiority of the colonized and the superiority of the colonizer." (p. . To resist the power hoarding of those current holders of power, planning professionals and inary citizenry alike must disrupt those frameworks that permit neoliberal principles. To ieve urban planning outcomes that can combat the exclusionary practices inherent to liberalism, new methods of citizen inclusion must be incorporated. Agonistic methods that y on conflict to demonstrate costs and a planning professional who can involve these citizens ng the way must emerge.

Laskey and Nicholls' (2019) *Jumping Off the Ladder* provides insight into how ditional formal methods of participation that do not always serve the interests of ordinary zenry may ignite this disenfranchised citizen to involve themselves through conflict-based *nning insurgencies*. Laskey and Nicholls describe the role that Community Development rporations (CDCs) had in allocating resources to specific communities in Detroit, Michigan, A. An important factor in how these CDCs operated was the reliance on a 'market based' proach to urban revitalisation, often resulting in gentrification and community alienation as nomic productivity superseded neighbourhood character preservation or equitable resource tribution (Laskey & Nicholls, 2019). Within this case, the neoliberal framework of planning l pervaded the entities responsible for community development therefore leading to a ouring of economic interests and an exacerbation of the social exclusion contingent to liberal planning.

Laskey and Nicholls (2019) articulate the process to which the reaction to the perceived nflict of interest presented by these CDC's ignited *planning insurgencies* in which those zens "jump off the participatory ladder" allowing them to express an independent political ce and disrupt that planning process. Through this disruption in which the CDCs were ntified as structures funded by government or financial institutions that enforced traditional liberal methods favouring the attraction of newcomers and a 'resegregation' within the city. is identification led to insurgent knowledge inspiring the need for institutional reform. rough volunteer work and ordinary citizenry accounts and a conflict approach to those

pervasive neoliberal structures, the flaws of the CDC foundation of Detroit's neighbourhood development process became identified and an institutional mediation process began.

Unlike in the cases in Scotland identified by Andy Inch (2014), whereby 'end-of-pipe' conflict and opposition resulted in a reinforcement of traditional power hierarchy, the planning insurgency displaying conflict-based planning participation in Detroit resulted in attempts to reorganise that traditional power hierarchy. The inherent market-bias presented by CDCs and the undermining of community needs presented by this bias became scrutinized first by ordinary citizenry and eventually by neighbourhood officials themselves. This insurgency resulted in a serious rejection of the CDC norm and one element of formalised planning neoliberalism.

How can we Incorporate conflict-based planning in formal planning arenas?

Co-production is an increasingly emerging method of divulging planning agency to ordinary citizenry who would be directly subject to the consequences of planning decisions. Co-production as informed by Elinor Ostrom (1996) and Vanessa Watson (2014) is defined as "a process through which inputs from individuals who are not 'in' the same organization are transformed into goods and services" (Ostrom 1996) and serves as a disruption of that "collaborative" or "communicative" form of planning (Watson, 2014). For Watson and Ostrom, co-production serves as a direct link between communities and governments in planning decision making. In that analysis co-production may be a contrary perspective to the deliberation that Andy Inch (2014) and Laskey and Nicholls (2019) identified as contributing to that market-based neoliberal approach. According to Watson (2014), "co-production represents one way in which poor urban communities have been able to secure significant improvements to their living environments under conditions in which governments are either unwilling or unable to deliver land and services." (p.63). Importantly Watson claims co-production cases to be able to "deepen the pot" from which planning ideas can be drawn and hence potentially expand the scope of planning thought." (p. 63). In planning discourses that have identified that neoliberal answers cannot appropriately resolve social inequity and where a potential replacement to the neoliberal framework has not emerged, co-production and the contingent expanding of planning knowledge through ordinary citizenry accounts may present a critical method to expand the power hierarchy. In doing so, planning decision may unveil new methods of citizen-based planning that can better address social inequity.

Watson presents the planner as playing a significant role in assuring the success of co-production cases. For Watson, the planner "needs to play a teaching role", "ask the right questions without controlling the process" in allowing communities to "find the answers for themselves" ultimately to set up a process that is "sustainable without need for intervention" (p.69). Watson recognises the inherence that power plays in co-production and how this form of

bottom-up planning takes a different stance to conflict than that of collaborative or deliberative methods of communicative planning. Watson argues that this community challenging of control through individualisation allows different modes of governmentality to be considered (Watson 2014). Unlike the methods of deliberative planning participation co-production can wield ordinary citizen accounts in creating a method of communicative planning less reliant on "talking or debate and more showing and learning" (p. 72). This method provides an alternative to the flawed deliberative planning systems presented by Sherry Arnstein, Andy Inch and Laskey and Nicholls with a direct and practical manner to ensure the inclusion of the agonistic or the insurgent citizen who is disapproving of a planning power hierarchy that forgoes direct citizen action.

While large scale attempts to incorporate co-production within formal planning arenas have remained limited within global north contexts. *Working with Infrastructural Communities* (Johnson, Bell, et al., 2020) discusses co-production on a smaller scale. Johnson and others contextualise calls for co-production methods within these smaller scales to be a strategy for which individual citizens may combat the wastefulness brought on by neoliberalism in natural resource preservation such as bathing water. (Johnson, Bell, et al., 2020). Johnson and others describe how co-production principles in this case in the Meakin Estate housing development in the UK can result in a codesigned future that allows citizens who wish to improve the design of their apartment building to better address a perceived moral obligation to preserve water may utilise co-production frameworks to address this need. In this case, a deliberative and argumentative approach in which personal accounts of citizens and planning expertise were utilised in enabling ordinary citizenry to express the associated costs and relative benefits of urban retrofit ultimately resulting in the construction of water retention infrastructure to be used in providing bathing water to residents involved.

Conclusion

In this essay, I have discussed the role that citizen agonism, planning insurgencies and citizen-led initiatives have in disrupting traditional planning power. Through a discussion of the planning power hierarchy informed by Arnstein (1969), Miraftab (2009) and others I have proposed planning insurgencies and agonism informed by Laskey and Nicholls (2019) and Inch (2014) as a disruption to this power hierarchy. Finally, I have demonstrated how these forms of conflict-based communicative planning present alternatives to typical deliberative methods of communicative planning that may better combat neoliberal frameworks in achieving more democratic and equitable planning solutions. The alternative I have proposed takes the form of co-production in citizen-led planning in which ordinary citizenry armed with the technical skills of planners are able to decide their own built forms and better combat power inequity, gentrification and wastefulness that are often associated with traditional neoliberal frameworks present in planning. Through the discussion presented within this essay, I have demonstrated that the '*Who Decides'* in planning decisions is contingent to the holders of power and within new

frameworks of more democratic planning informed by grass-roots planning insurgency, ordinary citizens are increasingly becoming deciders of their own built environments.

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Graham Inglert 1493308

Terrain Vague and Cremorne's Nylex Clock

Urban Design Theory: ABPL90017_2025_SM1
A3 - Essay



Figure 1. Image of Nylex clock at dusk (I. Invincible, Wikipedia Contributor, 2007)

Prompt:

3. TERRAIN VAGUE M
What do Solà-Morales and others mean by 'terrain vague' and why is it significant? Find two or more parts of the city that you would describe as terrain vague and study how these spaces work in terms of spatial structure, everyday life, power and meaning.

Using one example (Nylex clock) as approved by Merrick

words excluding titles, prompt, figures, and references. Verified in third-party word counting software: ~1611

Terrain Vague as defined by Ignasi de Sola Morales (1995) refers to those areas of the urban domain that through processes of abandonment or dereliction assume the fascination and imagination for what an urban realm once was or could someday be (Sola Morales, 1995). In this essay, Terrain Vague is applied to a prominent site in Metropolitan Melbourne, Victoria, Australia: The Nylex Clock, Cremorne. Through an analysis of this space using frameworks of urban power and legitimation informed by Kim Dovey (2016) and neoliberal urbanism informed by Peck et al. (2009), this essay contextualises these spaces as artefacts of legacy urban form superimposed within regions of contemporary urban neoliberalism. This essay illuminates how the urban history and cultural character present in greater Melbourne can be expressed through the *terrain vague* and retained in contemporary and future urban design through processes of citizen power, legitimation, and urban mythology.

Terrain Vague originates etymologically as described by Sola Morales (1995) with the Latin words: *Terra,* meaning "earth" or "land" and *văgus* meaning "indeterminate", "imprecise" or "blurred". In colloquial French the term may also mean; "wasteland" translated into English, which brings a connotation of an area that may act parasitically towards society. Sola Morales adapted the term from the visual mediums of photography or filmmaking as an abstraction, a technique at visualisation dependent on framing, representation, and narrative.

For Sola Morales, it is not so much the ontological space itself, rather an epistemological 'what'; that which is told by those people who inhabit the space, who understand the region's lore. It is an urban realm as one of knowns and unknowns which are compounded by variables of society and time. But critical to this framework is not to demonise space. Unlike the connotation of "wasteland" as denoting removal or re-habitation, these spaces, varied as they are, should never be weaponised as a waste of land. For there in that weaponisation can be found a *carte-blanche* for displacement, not just a displacement of one individual's polemic of a building, a park, a factory but of the legacy of that space as ever being something else, the city ever being something more, and therefore the soul of territory itself. Within *terrain vague* is a people, culture, and as Sola Morales alludes to, a target for "Architecture's destiny for colonisation" (Sola Morales p. 122); to turn the unproductive into the productive, even at the expense of urban legacy. In many ways, the *terrain vague* can be the victim of hostile development and colonisation but it may also be a totem for what Jamie Peck (2009) calls: "The creatively destructive urban processes of neoliberalization" whereby path dependent, powerful contradictions give way to revanchist democratic reappropriations of city space (Peck et al., 2009. P. 65)

Melbourne, Victoria, as a city that has experienced a radical transformation in economic productivity, exhibits a tension between the *terrain vague* and what are seen as opportunities for financial arbitration. *Terrain Vague* in the neoliberal city of Melbourne can be seen as reflections of the lower echelons that were left behind by a significant economic pivot, those voices and those stories that are at risk of elimination but nevertheless endeavour to oppose that elimination. These spaces can range from the derelict labyrinthine tunnels and forgotten rooms of Flinders Street station, the extending North Wharf in the Docklands, or even an overlooked small alleyway stretching off from Little Bourke Street (Fig1.).

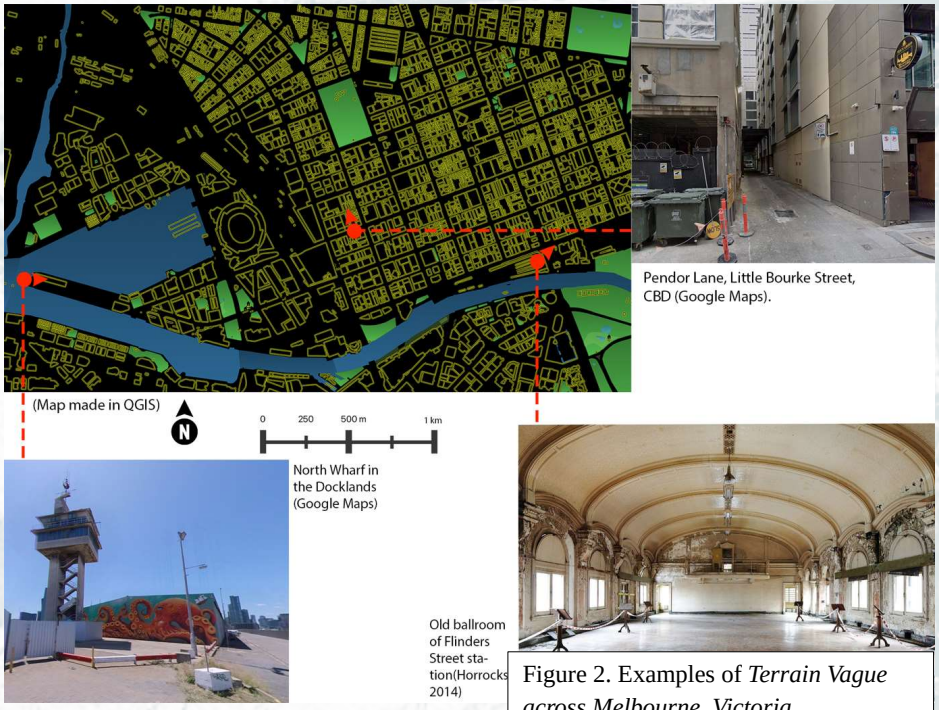

Figure 2. Examples of *Terrain Vague across Melbourne, Victoria*

There is no qualifying scale for *terrain vague*, only that its purpose today is an ephemeral mystery to those queried. For this essay, the Nylex Clock in Cremorne is analysed as one of these spaces.

The Nylex clock, located in Cremorne, Victoria, exhibits an unworking electrical clock elevated above concrete silos whose expanse not only make it a *terrain vague* allegorical to narratives of an industrial culture that no longer exists, but also a target for the next erasure and replacement by the tendrils of neoliberalisation.



Figure 3. Nylex Clock and Location, (Maps made in QGIS and photography from Google Maps)

The Nylex clock was constructed in 1961 by the South Melbourne company: Neon Electric Signs on behalf of Nylex, an Australian manufacturer of plastic products (Nitschke, 2023). The clock became inoperable for many years and was left as a vacant site for the imagination of the community. In that vacuous state, the clock has assumed a role as a cultural totem for Cremorne, a towering visual locater akin to Roland Barthes' (1979) analysis of the Eiffel tower in Paris as an object of mythology. The Nylex tower is a mythological structure for Cremorne, featured in the music videos for Paul Kelly's 1986 song: *Leaps and Bounds* (Paul Kelly, 2010) and Dallas Woods Baker Boy's 2018 song: *Black Magic* (Baker Boy, 2018). The site has also been one of activism and rebellion, where in 2015 a group called 'The Nylex Clock Collective' broke into the silos and activated the switch, briefly reilluminating the clock (Cowie, 2015). As a *terrain vague*, the Nylex clock functions as a tapestry of community intervention for cultural elevation.

The site was recognised for its significance to the community and added to the Victorian heritage register in 2004 (Victorian Heritage Database, 2017). The site has been the subject of several development plans. One in 2002 that failed due to its conflict with the heritage listing, and more recently in 2018, a $1 billion development plan that was approved for a mixed-use development for apartments, shops, and offices but also failed due to the 2022 insolvency of the developer as well as high defiance in VCAT and other methods of citizen opposition.

According to Kim Dovey (2016), urban power and authority are legitemated through two processes: power to and power over. The Nylex clock's presence in Cremorne and its significant history to the diverse voices of Cremorne reflect urban design's capacity to galvanise resistance through a citizen's power to act. For the Nylex clock, the failure of capital infusion for redevelopment can be viewed as a rejection of neoliberalism. The community views the development proposed as a violation of the local character and heritage the site is entitled to as legitimated by the clock's mythology. Urban authority according to Dovey (2016) is legitimated by state actors through individual themes of power exertion such as stability, scale, dynamism, history and ritual. The Nylex clock offers an opportunity where urban form may be commandeered by grass-roots citizenry for their own power exertion. Mythology serves as a justification for rebellion where history and ritual are wielded as instruments to combat that "Architectural destiny for colonisation" in favour of more progressive, radical democratic reappropriations of city space (Peck et al. 2009).

The outcomes of the failed development plans do not mean that citizen action was necessarily successful in saving the Nylex clock. In Cremorne, the encroachment of large-scale neoliberal developments is increasingly prevalent as the district has been targeted as the site for tech-urbanism. Major venture-capital technology firms such as Tesla, Uber, Carsales.com.au and Seek, among others, have recently made financial encroachments in Cremorne with the intention of creating 'Melbourne's Silicon Valley'. (Collective_100, 2025). The area is seeing rapid development with the headquarters of MYOB completed in 2019, Seek in 2022, and development on 'Cremorne Place' beginning soon (Architectus.com.au, 2025). Likely, the Nylex clock will see some kind of development within the next decade. The critical piece for local citizenry is to leverage their power and the site's heritage legacy to ensure that their diverse imaginings of the Nylex clock may survive into the site's future and may serve not just the economic interests of global firms.

With the Nylex clock's development stalled after the insolvency of the previous developer and the unknown prospects to attract a large developer to the site despite a community and governmental desire to build homes (Cowie, 2024), there remains an opportunity for a different approach to be applied. Greater Melbourne has been the arena for breakthrough bottom-up developments in recent years. The Nylex clock may offer an opportunity for new and experimental renovations to take place. Developers such as the Nightingale housing group (Nightingale, 2025) who have been active in the last 20 years in sites across greater Melbourne have challenged the normative reliance on large developers for housing provision. Instead, a new

model of transparent partnership is proposed where citizens and individual architects finance housing developments instead. The Nightingale model has been applauded by academic literature as providing an innovative alternative to housing provision with the potential to transform underutilised urban spaces into environmentally sustainable and socially equitable housing (Doyon & Moore, 2019). There have been criticisms of scalability for the Nightingale model, relating to the financial and labour pressures placed on individual architects and stakeholders, which have led to Nightingale changing the structure of their model to cooperate more with land holders (Lucas, 2021). The case of Nightingale displays that there are alternatives to large developer-dependence for equitable housing provision that citizen-led groups may take a leading position in providing. Sola Morales' *terrain vague* provides a theoretical basis for citizens to exert their knowledge of Nylex clock to inform a future that retains the legacy of the urban space while also achieving desires for equitable and sustainable housing development.

This essay has discussed Sola Morales' *terrain vague* in relation to greater Melbourne through a spatial and narrative analysis of Cremorne's Nylex clock. Through a discussion of citizen power, legitimation and urban mythology, *terrain vague* is elevated as a method to challenge the path-dependent neoliberalisation of urban space. Nylex clock with its unique history, cultural appeal and opportunity for change offers a future that is inspired by its past and present stories as legitimated through citizen action.

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Introduction

This secion outlines my own intellectual and creative capacity regarding report drafting and analysis. Each individualized document demonstrates excellency within a distinct subject and utilising unique references.

I. Bendigo Australia Further Development ArcGIS Suitability Analysis

ABPL90319 - GIS IN PLANNING, DESIGN & DEVELOPMENT

This report was drafted following a winter semester intensive between my third and fourth semester. It outlines a detailed methodology for locating new growth zones within the Australian regional city of Bendigo, located within the state of Victoria north of Metropolitan Melbourne. By utilising advanced analytical techniques and data collection methods, this report demonstrates my proficiency using ArcGIS for technical geographical analysis.

II. Green Axes Melbourne Urban Environmental Policy Proposal

ABPL90341 - URBAN ENVIRONMENTAL POLICY & PLANNING

Completed during my third semester at Melbourne University, this project compiled for Urban Environmental Policy and Planning represents a policy proposal approach to achieve a 'Nature-Based Solutions' (NBS) approach to achieving a more favorable environmental approach to Melbourne, Victoria.

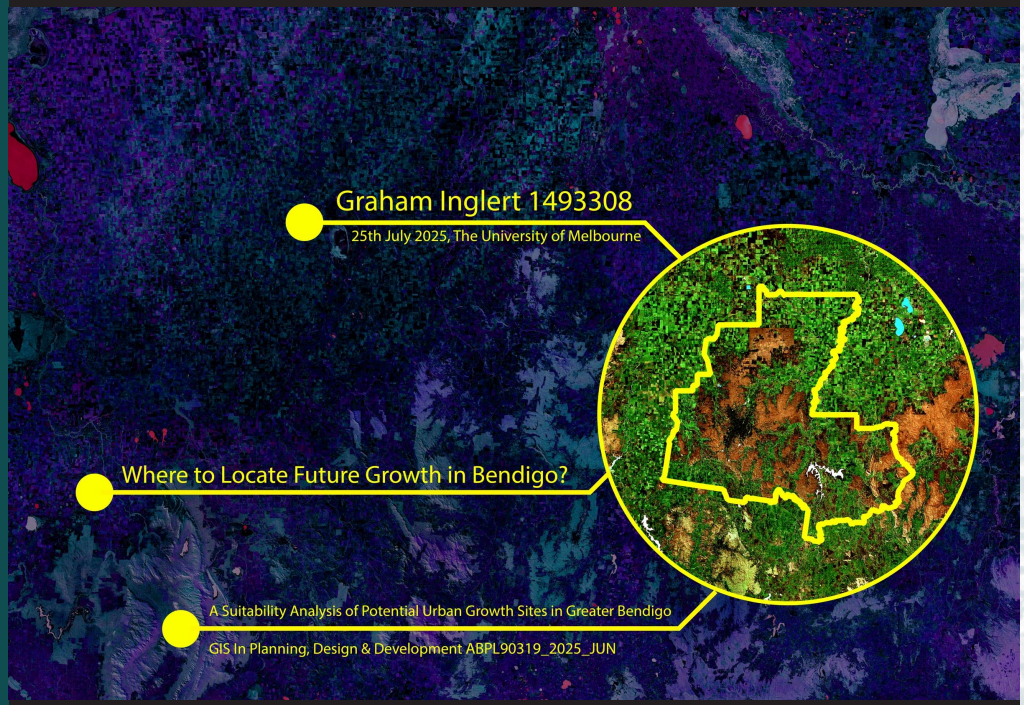

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Figure 1. A photograph of Bendigo's urban centre.[1]

[1] Radevski, Isabella. 2022. "Selected Guide to Open House Bendigo." Open House Melbourne. October 14, 2022. https://openhousemelbourne.org/selected-guide-to-open-house-bendigo/.

1.0 CONTEXT: GROWTH IN BENDIGO

The City of Greater Bendigo is a significant urban region within Victoria, Australia. Located 150km northwest of the Victorian Capital of Melbourne, Greater Bendigo appreciates a population of approximately 125,000 persons and a steady growth rate of 1.7% annually. According to The City of Greater Bendigo council, the region expects the population to reach 155,596 by 2036. [2] Contingent on this population growth, it is therefore necessary the region addresses which locations can be identified as most suitable for urban growth to welcome the expected population growth.

Greater Bendigo appreciates an extensive cultural and physical landscape, therefore it is sensitive where to place growth areas. Located on the lands of the Dja Dja Wurrung and Taungurung first nations, there are significant cultural ties to many of the features of interest across the Loddon Valley. These sites include the Greater Bendigo National Park, Kow Swamp and Kara Kara National Park among many other significant areas.[3] It is important that new development within Greater Bendigo can facilitate community engagement in these regions without compromising their integrity.

Greater Bendigo also contains many sites of significance relating to its legacy as one of Victoria's early boomtowns. These sites include Bendigo Gold mine, Bendigo Art Gallery, Bendigo Town Hall, and others.[4] La Trobe University, Bendigo, Bendigo Health Hospital, Bendigo Tafe Vocational Institution, and more features of significance now comprise opportunity and amenity wealth to Bendigo's growing population. It is imperative that future growth in Bendigo can address the needs of incoming persons while retaining significant cultural areas and addressing for challenges related to disaster risk and facilitating infrastructure.

As identified in contemporary academic literature, *Geographic Information Systems (GIS)* have become a necessary feature of planning for growth in Australia[5] and abroad[6]. These developments relate to smart and now, smarter city growth[7]. This report addresses using these systems to locate suitable growth areas for Greater Bendigo's ongoing population growth.

[2] City of Greater Bendigo. 2025a. "Application of Overlays | Rural Areas Strategy." Let's Talk Greater Bendigo. 2025. https://letstalkgreaterbendigo.com.au/rural-areas-strategy/application-overlays?

[3] Parks, Victoria. 2025. "Greater Bendigo National Park." Www.parks.vic.gov.au. 2025. https://www.parks.vic.gov.au/places-to-see/parks/greater-bendigo-national-park.

[4] City of Greater Bendigo 2025b. "Explore Our History and Heritage | City of Greater Bendigo." Www.bendigo.vic.gov.au. 2025. https://www.bendigo.vic.gov.au/things-do/explore-our-history-and-heritage.

[5] Bohnet, Iris C., and Petina L. Pert. 2010. "Patterns, Drivers and Impacts of Urban Growth—a Study from Cairns, Queensland, Australia from 1952 to 2031." *Landscape and Urban Planning* 97 (4): 239–48. https://doi.org/10.1016/j.landurbplan.2010.06.007.

[6] Hegazy, Ibrahim Rizk, and Mosbeh Rashed Kaloop. 2015. "Monitoring Urban Growth and Land Use Change Detection with GIS and Remote Sensing Techniques in Daqahlia Governorate Egypt." *International Journal of Sustainable Built Environment* 4 (1): 117–24. https://doi.org/10.1016/j.ijsbe.2015.02.005.

[7] Zanella, Andrea, Nicola Bui, Angelo Castellani, Lorenzo Vangelista, and Michele Zorzi. 2018. "Internet of Things for Smart Cities." *IEEE Internet of Things Journal* 1 (1): 22–32. https://ieeexplore.ieee.org/document/6740844.

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Figure 2. Thomas Benjamin Kennington's 1890 Work: "Homeless". Housed in Bendigo Art Gallery

Purchased by Bendigo Art Gallery in 1906.

A work that possibly denotes the sociological cost of modern urban life, marked by unabridged industrial progress.



[8] Kennington, Thomas Benjamin. 2025. "Homeless." Bendigo Art Gallery. 2025. https://collection.bendigoartgallery.com.au/objects/158.

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2.0 LITERATURE REVIEW

Urban development in the second half of the 20th century is denoted by the advancement of computer technology. During this period, forecasting for growth became intrinsically conjoined to the development of computer technologies, data collection and retention technologies, and information systems. Authors such as Roger L. Creighton, Douglas Carroll Jr. and Graham Finney are among the earliest academics to have applied the newly emerging digital technologies with direct urbanism considerations in their 1959 journal article: *Data Processing for City Planning*[9]. In this article, the authors discuss the emerging distinction between the analogue machine and the digital machine. Specifically, they discuss the digital machine's capacity to produce vivid spatial imagery of urban phenomena with the potential to "reduce voluminous data to the point where they can be analyzed".[10] Critically, they describe how the skills to operate these instruments of spatial analysis will increasingly become a prerequisite for the urban geographer.

In the following decades the inclusion of this new *Geographic Information Systems* field became inextricably married to landscape and urban fields. Carl Steinitz, in his 1993 article: *GIS: A Personal Perspective*[11], describes how the advancements in GIS technology became used for simulation and disaster risk assessment, locating of conservation areas, behavioural patterns for wildlife, development proposal visualisation and truly infinite possibilities for urban and landscape spatiality.

Today, *Smart City* discourse has become all the rave. Helmed by academics such as Michael Batty and Simon Joss, Smart Cities are the culmination of the Internet of Things (ICT), Global Positioning Systems (GPS), Data Generation and Data Retention on a mass scale, utilising powerful hardware for never-ending analysis, simulation and forecast. Computer technologies within this paradigm are no longer the future, but the past and the present. The future likely reserved instead for an esoteric insatiable quest for further efficiencies to the point where human involvement altogether shall be deemed superfluous.

On a local level, nearly every urban decision maker consults GIS technology in some way. In Australia, the state and local governments provide spatial data to the public for analysis. Some of this data has even been used in this analysis. For constructing urban growth analyses in the era of rapid urbanisation, GIS technology is non-negotiable. Recent research on the capacity of GIS technologies for regional planning have revealed that there are benefits in addressing ancillary goals for urban development of broad environmental significance

[9] Creighton, Roger L., J Douglas Carroll, and Graham S Finney. 1959. "Data Processing for City Planning." *Journal of the American Institute of Planners* 25 (2): 96–103. https://doi.org/10.1080/01944365908978312.

[10] Creighton, Carroll, and Finney 1959, P. 103.
[11] Steinitz, C. (1993). GIS: a personal historical perspective. *GIS Europe*, *2*(5), 19–22.

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conservation, climate resiliency, disaster mitigation, sprawl reduction and appropriate forecasting of population growths[12 13].

Bendigo, Victoria, Australia is seen within the literature as one of such subjects for advantageous GIS planning[14]. Perhaps intelligent computer-aided planning for this regional area may relieve the stress that rapid urbanisation is wreaking on metropolitan Melbourne. Indeed, many of the regional population centres within Victoria possess the capacity to absorb the rapid population growth the state is experiencing, potentially diminishing the burden on Melbourne.

The Greater Bendigo area is expecting significant growth before the year 2036. According to the *City of Greater Bendigo Managed Growth Strategy 2024*[15], the expected growth includes 34,375 additional persons, up from the 2021 figure of 121,221. This incoming population is expected to require and additional 13,000 dwelling units. Along with managing the expected growth, Greater Bendigo has outlined requirements to maximise housing quality within the 2016 *Greater Bendigo Housing Strategy*[16]. The qualities to be prioritised that Bendigo has identified include density, proximity to urban centres, community health and the provision of diverse housing options.

In Bendigo, the local council has composed a growth plan expressing their own desires for the outcome of growth within the LGA. According to the managed growth strategy[17], there are four major strategies that should be included when planning for growth in Greater Bendigo:

- **Using existing suburbs and activity centres**: Infill development (70% of new development) and Greenfield development (30% of new development) (Maximising the use of established suburbs)
- **Safe, resilient, sustainable growth**: Planning for disaster risk, conserving significant environmental regions, and reducing climate footprint.
- **Amplifying City Structure**: Prioritising employment areas, public amenity, leisure areas, existing townships and suburbs.
- **Planning with Existing Services**:

[12] D'Ambrosio, Valeria, Ferdinando Di Martino, and Enza Tersigni. 2023. "Towards Climate Resilience of the Built Environment: A GIS-Based Framework for the Assessment of Climate-Proof Design Solutions for Buildings." *Buildings* 13 (7): 1658. https://doi.org/10.3390/buildings13071658.

[13] Hawchar, Lara, Owen Naughton, Paul Nolan, Mark G. Stewart, and Paraic C. Ryan. 2020. "A GIS-Based Framework for High-Level Climate Change Risk Assessment of Critical Infrastructure." *Climate Risk Management* 29 (May): 100235. https://doi.org/10.1016/j.crm.2020.100235.

[14] Siqing, Chen. 2016. "Land-Use Suitability Analysis for Urban Development in Regional Victoria: A Case Study of Bendigo." *Journal of Geography and Regional Planning* 9 (4): 47–58. https://doi.org/10.5897/jgrp2015.0535.

[15] City of Greater Bendigo. 2025c. "Managed Growth Strategy 2024." Let's Talk Greater Bendigo. 2025. https://letstalkgreaterbendigo.com.au/managed-growth-strategy.

[16] City of Greater Bendigo. 2016. *Greater Bendigo Housing Strategy 2016.* Bendigo: City of Greater Bendigo.

[17] City of Greater Bendigo. 2025c

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Planning with already established areas with access to sewerage and water access, energy infrastructure, and major road and rail infrastructure.

The implementation of these strategies possesses the opportunities for GIS technology to forecast effective methods for development and for the purpose of this project, the location most amiable for these interventions.

The evolution of digital planning technologies has changed the practice of urban development, transitioning it from abstract speculation to data-driven, spatially precise modelling. As discussed within this literature review, the evolution from early computer-aided planning to contemporary Smart City frameworks has not only changed the scale and depth of what can be planned, but also raised the standard for evidence-based decision making. In this context, GIS serve as a critical foundation for managing the projected growth in regional centres like Greater Bendigo. With the area expecting large population increases and an ancillary demand for housing, a measured approach to spatial planning using digital technologies is more important than ever. The following section outlines the criteria and objectives used in this analysis, each developed to align with both the policy directives of the City of Greater Bendigo and broader principles of sustainable, resilient urban growth. These criteria were calculated through spatial analysis and modelled in GIS to locate areas of high suitability for future development.

3.0 RESEARCH OBJECTIVES AND PLANNING CRITERIA

This project principally is concerned with locating 38,000 new dwelling units within the Greater Bendigo Local Government Area. For the preparation of data, a scale similar to that of Caroline Springs, Victoria is used: one dwelling unit per 1000 square meters or 10 dwelling units per hectare. The target spatial region to locate is therefore approximately 3,800 hectares at a minimum on either one continuous site or multiple smaller sites that in aggregate, sum 3,800 square meters. This project, while finding a suitable location to place these 38,000 units, aims to address many ancillary objectives such as climate responsibility, disaster risk mitigation, transit-oriented development and with respect for areas of environmental and cultural significance.

This project justifies where to place new growth in Greater Bendigo using the preparation of spatial data sourced from online data repositories and analysed using ESRI's ArcGIS Pro software. The application and acquisition of data has been processed through five major criteria to determine the most suitable region to place new growth. These criteria reflect a culmination of strategies and principles advocated for within local and state planning policy and informed by academic literature. These are discussed in the following section: 3.1.

[18] City of Greater Bendigo. 2025c.
[18] [19] City of Greater Bendigo. 2025c

3.1 CRITERIA

3.1.1 PLANNING WITH LANDSCAPE TOPOGRAPHY

Planning with topography considers the physical characteristics of the landscape within the Greater Bendigo LGA, emphasising elevation, slope, and hydrological features. A key strategy is to identify land that is topographically suitable for urban development; generally, areas with elevations above 200 meters (average slope which mitigates erosion related risks , gentle slopes (<10 degrees), and adequate drainage, avoiding flood-prone valleys and steep, erosion-prone terrain.

The *Managed Growth Strategy*[18] and *Housing Strategy*[19] for Greater Bendigo both discuss the significance of landform suitability in directing future development, particularly in avoiding high-risk areas related to erosion, disaster risk, and environmental atrophy. According to the Department of Environment, Land, Water and Planning (DELWP), Topography is a critical factor in ensuring safe, efficient, and climate-resilient urban expansion[20].

3.1.2 PLANNING WITH EXISTING INFRASTRUCTURE

Planning with existing infrastructure is a crucial consideration for new developments. Key factors include access to major transport infrastructure such as rail corridors, train

[20] Department of Environment, Land, Water and Planning (DELWP). 2017. *Planning Permit Applications – Bushfire Management Overlay Technical Guide*. Victoria State Government. P.52.

stations, and major highways, as well as proximity to established urban centres that operate as service nodes.

A future development site should be located within proximal reach of transport routes and nodes, allowing reduced reliance on private vehicles and promoting active and public transport alternatives. Areas near train stations such as Bendigo railway station and major roads like the Midland Highway are prioritised for their ability to support higher population densities and mitigate future infrastructure delivery costs.

Access to existing service infrastructure is also important, composing sewerage networks, electricity supply, and broadband internet. Development near already serviced areas reduces the need for costly extensions of utility networks and supports more sustainable growth. In contrast, growth in disconnected areas leads to less effective infrastructure expansion, higher maintenance costs for government providers and increasing burdens on residents.

3.1.3 ACCOUNTING FOR DISASTER RISK

As climate change intensifies climate related risks, the need to avoid exposure to natural hazards is increasingly necessary. Regions in Victoria such as Shepperton are now exposed to disaster risks that render much development uninsurable. Disaster risk assessment with particular emphasis on bushfire and flood risk have emerged in Australia as among the most critical factors for development suitability analysis. Each of these are imperative considerations for future growth in the Greater Bendigo region. The unique environmental profile of Bendigo located at the junction of forested ridges and flood-prone valleys, necessitates a careful spatial assessment of risk-prone areas when identifying suitable land for development.

New growth areas should be situated in locations with low exposure to bushfire and flood hazards. This includes avoiding land mapped within the Bushfire Management Overlay and known floodplains, especially near corridors such as Bendigo Creek and its tributaries. Areas with steep slopes, dense vegetation, and limited access for emergency services further exacerbate bushfire vulnerability, while low-lying areas present inundation risks and drainage challenges.

Urban growth in hazard-prone areas has been linked to increased economic and social vulnerability, infrastructure damage, and long-term maintenance burdens[21]. Strategic planning literature emphasises the importance of spatial hazard avoidance as a cost-effective and sustainable approach to climate adaptation[22]. In the Victorian context, the Planning Policy Framework requires that development minimises risk to life and property by avoiding identified hazard zones. Both the Greater Bendigo Housing Strategy and Managed Growth Strategy reflect this policy direction, prioritising resilient development that avoids potential disaster risks.[23] [24]

[21] Burton, Ian, Robert William Kates, and Gilbert F White. 1978. *The Environment as Hazard*. New York : Oxford University Press.

[22] León, Jorge, and Alan March. 2016. "Taking Responsibility for 'Shared Responsibility': Urban Planning for Disaster Risk Reduction across Different Phases. Examining Bushfire Evacuation in Victoria, Australia." *International Planning Studies* 22 (3): 289–304. doi:https://doi.org/10.1080/13563475.2016.1234368.

[22] City of Greater Bendigo. 2016.
[24] City of Greater Bendigo. 2025c

3.1.4 INCORPORATING STATUTORY CONSIDERATIONS

Appropriate future development should occur on land zoned for residential or future urban use and within or directly adjacent to existing Urban Growth Boundaries. Areas heavily constrained by overlays such as the Bushfire Management Overlay (BMO), Environmental Significance Overlay (ESO), or Land Subject to Inundation Overlay (LSIO) may present statutory limitations that significantly hinder or forbid development. Such areas require thorough planning assessments and, in many cases, should be deprioritised in growth strategies to avoid prolonged approval processes or environmental conflict.

Planning schemes and statutory instruments play a central role in shaping urban form by defining where and how land can be developed.[25] Strategic implementation plans such as regional growth plans, structure plans, and the Planning Policy Framework (PPF) provide a guide that must be interpreted together with zoning and overlays.[26]

3.1.5 INCORPORATING COMMUNITY AND ENVIRONMENAL ASSETS

the importance of protecting and enhancing both community infrastructure and environmental values in the selection of suitable growth areas cannot be understated. Successful urban development is contingent not only on physical suitability and infrastructure access, but also on access to quality public spaces while preserving natural systems and cultural landscapes.

Bendigo's growth areas should support access to existing leisure, recreation, and community facilities such as sports grounds, parks, walking trails, libraries, and community centres. Current understanding illuminates that these assets contribute to public health, social cohesion, and a sense of place.[27] Areas that enable the integration of new residents into existing community networks without overwhelming local networks are prioritised. Environmental conservation zones, significant biodiversity corridors, water catchments, and areas of Aboriginal cultural heritage significance are also prioritised for protection. Development in or near such areas is discouraged as to uphold environmental and cultural integrity.

The strategic planning literature emphasises the importance of incorporating green space and ecological networks into urban structure as a method of confirming, biodiversity, and resilience.[28] Planning policy in Victoria supports this approach through instruments such as the Environmental Significance Overlay (ESO), Native Vegetation Framework, and Clause 12 of the Planning Policy Framework.[29] In Greater Bendigo, the Managed Growth Strategy integrates biodiversity,

[25] Stephen Rowley, "The Victorian Planning System: Practice, Problems and Prospects," *Urban Policy and Research* 31, no. 3 (2013): 286–303.

[26] Department of Transport and Planning (Victoria), *Planning Practice Note 37: Urban Growth Boundaries* (Melbourne: State Government of Victoria, 2020).

[27] World Health Organization, *Urban Green Spaces and Health: A Review of Evidence* (Copenhagen: WHO Regional Office for Europe, 2016).

[28] Beatley, Timothy. 2011. *Biophilic Cities*. Washington, DC: Island Press/Center for Resource Economics. doi:https://doi.org/10.5822/978-1-59726-986-5.

[29] Department of Transport and Planning (Victoria), *Victorian Planning Provisions: Clause 12 – Environmental and Landscape Values* (Melbourne: State Government of Victoria, 2023), https://www.planning.vic.gov.au/.

open space, and recreational planning into its future vision for sustainable growth.[30]

[30] City of Greater Bendigo. 2025c.

4.0 TRANSLATING PLANNING GOALS TO GIS METHODOLOGY

4.1 DATA ACQUISITION

This project utilises a multi-process spatial analysis approach using ArcGIS Modelbuilder to calculate development suitability within the Greater Bendigo LGA. The methodology is comprised of a weighted overlay model, supported by spatial datasets of data from publicly accessible government and community repositories.

Data was sourced from the project supplied data, the Victorian Government's Spatial Datamart (DELWP), DataVic, the Australian Urban Research Infrastructure, OpenStreetMaps contributors and the City of Greater Bendigo's planning documents. Supplementary Satellite reference mapping was drawn from Bing Maps. These datasets included a mix of polygon, polyline, and point vector files, as well as raster data (e.g. DEMs for slope and elevation analysis). The input Data files are all available to be viewed in Appendix Item 1.

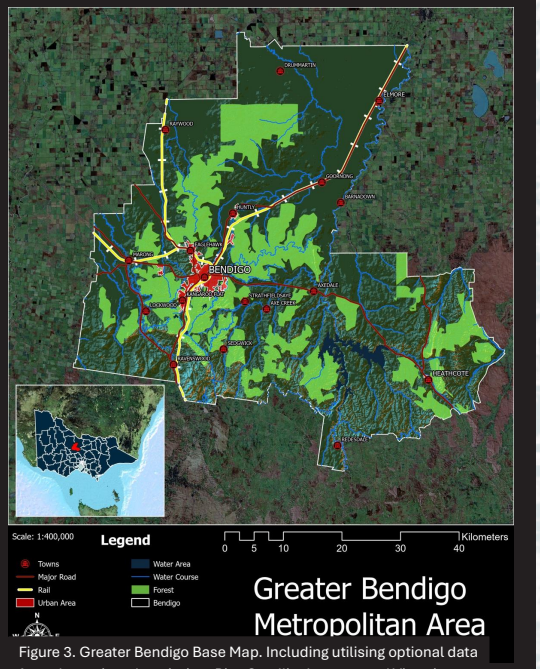

Figure 3. Greater Bendigo Base Map. Including utilising optional data from the project description, Bing Satellite Imagery and Victorian spatial data.

4.2 DATA PROCESSING

The analysis involved processing and transforming raw datasets into suitability layers for each criterion based on Euclidean distances, reclassifications to and from features into five distinct suitability scores, weighted overlays and finally a raster calculation to export those areas that are either suitable or unsuitable for use in final suitability weighted overlay analysis. This analysis is used to compose final suitability maps for each criterion as discussed in section 3.0.

All processed layers were integrated into a geodatabase and categorised by their thematic relevance: topography, infrastructure, disaster risk, statutory planning, and environmental/community assets. Each criterion was analysed individually, with thresholds set according to policy documents and academic literature, before being compiled into a final aggregate model. The final weighted overlay identifies the most suitable areas for accommodating projected urban growth within Greater Bendigo, with respect to the objectives of the Managed Growth Strategy[31] and Greater Bendigo Housing Strategy[32].

4.1.1 EUCLIDEAN DISTANCE

The first stage of the analysis involved generating proximity rasters using the Euclidean Distance tool in ArcGIS. This process was applied to key point and linear features such as train stations, major roads, and urban centres. The tool calculates the tangent-line distance from each raster cell to the nearest feature of interest, producing a raster surface representing proximity. This approach provided a consistent spatial bedrock for evaluating accessibility, assuming that shorter distances to infrastructure and services increase the suitability of land for urban development. This was also understood vice versa as closer distances to features such as water courses were seen as less suitable when calculating flood risk.

4.1.2 RECLASSIFY

Following proximity analysis, each input raster was reclassified onto a standardised 1–5 suitability scale to allow for consistent comparison. In this scale, a value of 1 does not always represents the least suitable conditions and 5 the most suitable, instead it is specified within the legend for each map how each value corresponds. For continuous data (such as elevation, slope, or proximity rasters), reclassification was based on relevant thresholds justified in policy documents and academic literature, translating raw values into suitability classes. This step was useful for compacting diverse spatial variables into a common analytical variable.

4.1.3 WEIGHTED OVERLAY

After creating the reclassification layers, each data input criteria were assigned a weight reflecting its relative significance in identifying suitable areas for urban growth. The resulting suitability map comprises environmental constraints, infrastructure proximity, and planning priorities into a spatial decision-support output to inform potential growth area identification within the Greater Bendigo LGA.

[31] City of Greater Bendigo. 2025c.

[32] City of Greater Bendigo. 2016.

4.1.4 RASTER CALCULATOR

To collect the five major criteria for organising the final suitability analysis, a raster calculator plaintext function was utilised to output each of those input sets the preliminary five criteria analyses as binary regions (those regions that are either suitable or unsuitable for development based on the specified criteria). The plaintext function that was utilised within the raster calculator process is as follows:

Con("[ReclassifiedInputRaster] " >= 3, 1)

This function displays only those areas ranking 3 (moderate) and higher as to determine areas that are moderately suitable and higher for output.

4.1.5 RASTER TO POLYGON

The final stage involved processing the output weighted overlay binary raster to a polygon feature class shapefile where statistically significant output areas (those layers that either are mostly suitable or mostly unsuitable depending on output data and are specified within each map legend). These Polygon feature classes are used for final; spatial analysis for locating final feature class urban growth areas. The complete map generation and analysis process is visible within the flow chart located in figure 4. The generation process for each individual map is available in APPENDIX A, figures 2 through 19.

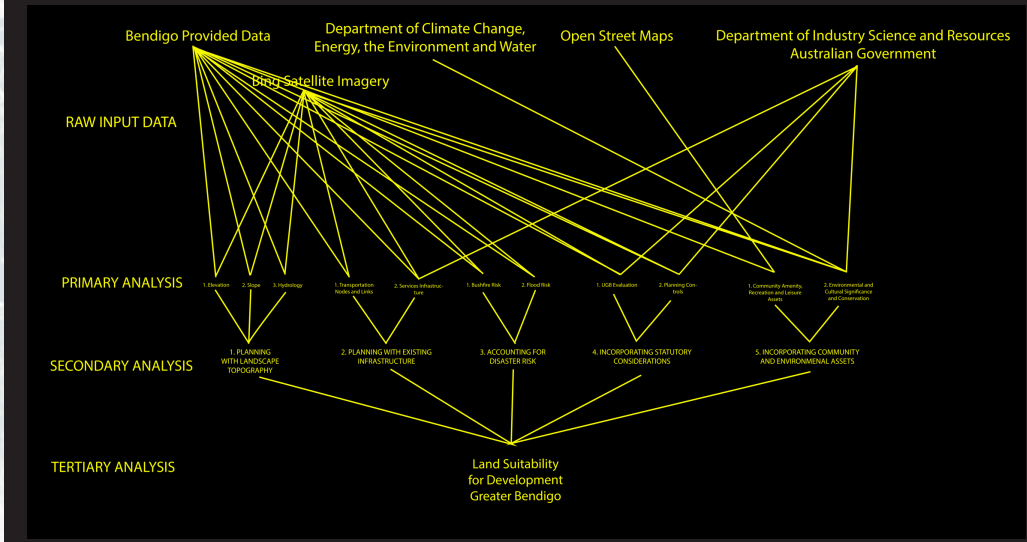

Figure 4. Flow Chart of map analysis process moving from raw input data at the very top to final analysis at the bottom.

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5.0 SPATIAL ANALYSES AND RESULTS

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5.1 CRITERION 1: PLANNING WITH LANDSCAPE TOPOGRAPHY

This criterion evaluates the physical characteristics of the landscape within Greater Bendigo. With a focus on elevation, slope, and hydrology to ensure topographic suitability for urban development. As shown in the map below, areas above 200 metres with gentle slopes (less than 10 degrees) and adequate drainage are favourable, while low-lying floodplains and steep, erosion-prone terrain are discouraged

The analysis comprises an initial Euclidean distance using watercourse information, water area information, forest information, urban environment information and elevation information. Three initial analyses are produced using the above raw input data to produce suitability for development within just the areas of elevation (figure 5), slope (figure 6), and hydrology (figure 7). Then, a final analysis of these three inputs is used to calculate a total topography suitable for development analysis.

By prioritising elevated and well-drained land, the analysis supports climate-resilient growth and reduces construction challenges. The analysis can be found in the adjacent tables.

Topography	Weighted	Overlay
Data Input	Source	Analysis Process
Elevation (DEM)	Provided data	Reclassify by Elevation (select median)

Slope	Analysis	
Data Input	Source	Analysis Process
Elevation (DEM)	Provided data	Slope analysis by degree

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Figure 5. Greater Bendigo Elevation Analysis Map. Using provided optional data.

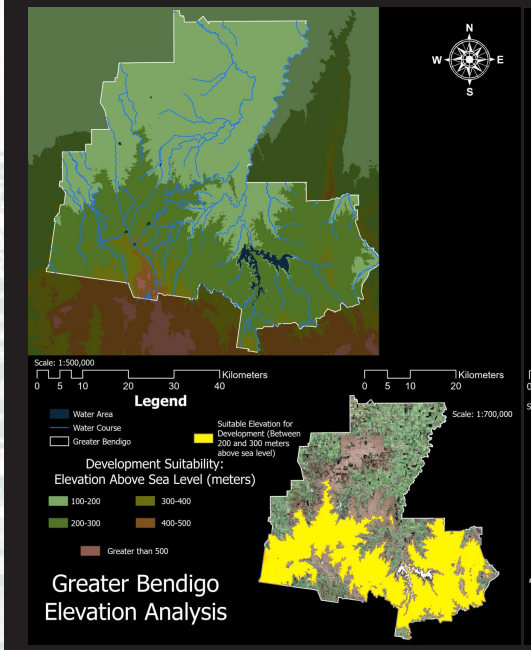
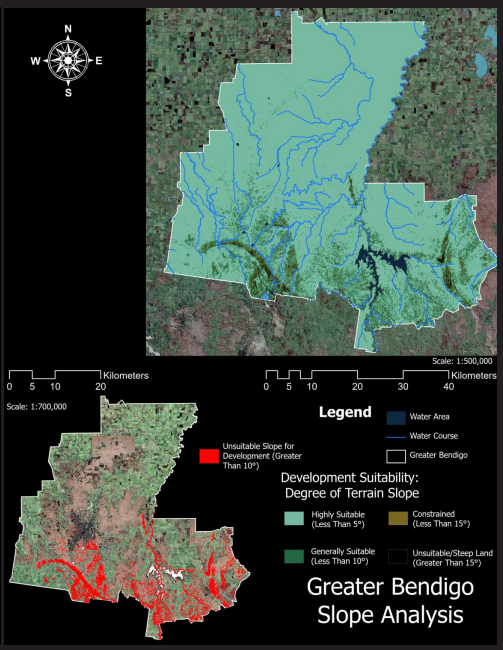


Figure 6. Greater Bendigo Slope Analysis Map. Using provided optional data.



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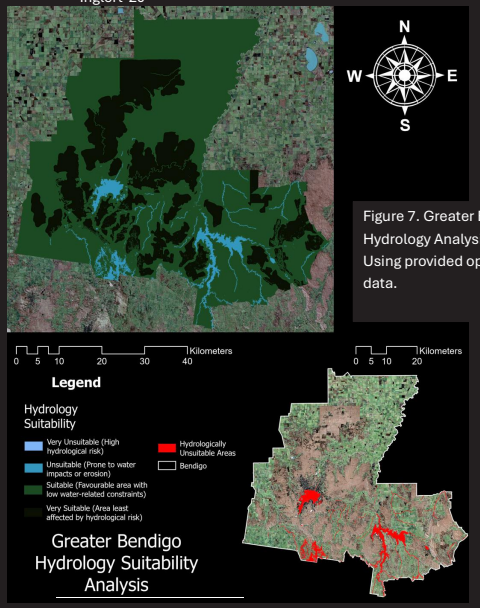

Figure 7. Greater Bendigo Hydrology Analysis Map. Using provided optional data.

[33] Stewart, Stephen; Fedrigo, Melissa; Roxburgh, Stephen; Kasel, Sabine; & Nitschke, Craig (2020): Climate Victoria: Precipitation (9 second, approx. 250 m). v3. CSIRO. Data Collection. https://doi.org/10.25919/5c3be5193e301

Hydrology	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Urban Areas	Provided Data	none	Five 250m increments Suitability increases with distance	15%
Water courses	Provided Data	Buffer: 30m increment	Five 50m increments suitability increases with distance	20%
Water areas	Provided Data	Buffer: 30m increment	Five 50m increments Suitability increases with distance	15 %
Forest Areas	Provided Data	none	Five 100 m increments Suitability increases with distance	20 %
Area Elevation (DEM)	Provided Data	Reclassify: 5 classes by 100m increment	None	20%
Precipitation Victoria[33]	Acquired Data	Calculate Average rate using July and Jan, Reclassify by 10mm/month	none	10%

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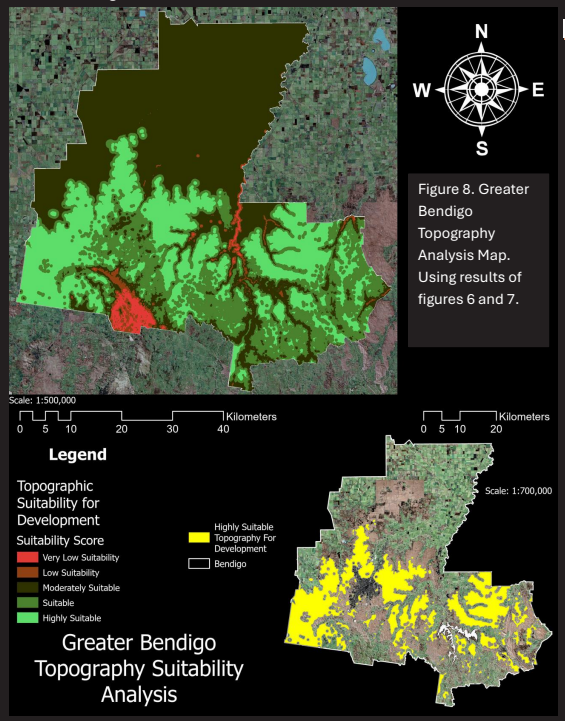

Figure 8. Greater Bendigo Topography Analysis Map. Using results of figures 6 and 7.

Topography	Weighted	Overlay		
Data Input	Source	Analysis Process	Euclidean Distance Reclass	Weight
Suitable Elevation	Primary Analysis generation	none	Five 250m segments	40%
Unsuitable Slope	Primary Analysis generation	none	Five 250m segments	40%
Suitable Hydrology	Primary Analysis generation	none	Five 250m segments	20%

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5.2 PLANNING WITH EXISTING INFRASTRUCTURE

This criterion evaluates the suitability of land based on its proximity to key infrastructure, including major transport corridors, train stations, and established urban centres. As shown in the map below, areas near nodes such as Bendigo Railway Station and highways are prioritised to support higher population densities and reduce infrastructure delivery costs.

The analysis also considers proximity to essential services such as sewerage, electricity, and broadband. Focusing growth near existing networks reduces the need for costly infrastructure extensions and enables more sustainable, staged development. The process for analysis can be found in the adjacent tables.

Services Infrastructure	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
NBN Wireless availability[34]	Acquired Data	Clip to Bendigo border	Five 1000m increments suitability decreases with distance	25%
NBN Fixed-Line Availabilit[34]	Acquired Data	Clip to Bendigo Border	Five 1000m increments suitability decreases with distance	25%
Sewerage Infrastructure[35]	Acquired Data	Sort by major pipelines	Five 1000m increments suitability decreases with distance	25 %
Major Electricity Infrastructure[36]	Acquired Data	Clip to Bendigo border	Five 1000m increments suitability decreases with distance	25 %

Services Infrastructure	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Major Road Network	Provided Data	none	Five 250m increments suitability decreases with distance	40%
Rail Network	Provided Data	none	Five 250m increments suitability decreases with distance	35%
Train Station	Provided Data	none	Five 250m increments suitability decreases with distance	25 %

[34] NBN Co. 2024. "NBN_Coverage_Footprints_2024 (MapServer)." *Infrastructure.gov.au*. https://spatial.infrastructure.gov.au/server/rest/services/NBN_Coverage_Footprints_2024/MapServer?

[35] Victorian Government Data Directory." *Vic.gov.au*. https://discover.data.vic.gov.au/dataset/sewerage-network-main-pipelines/resource/c0c74337-4554-4a33-8917-917a1b1ba594.

[36] Department of Industry, Science and Resources (DISR). 2024. "Vicmap Infrastructure - Power Line - Victorian Government Data Directory." *Discover.data.vic.gov.au*. https://discover.data.vic.gov.au/dataset/vicmap-infrastructure-power-line.

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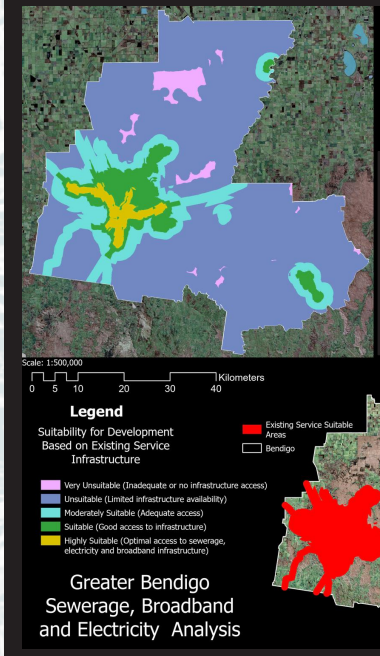

Figure 9. Greater Bendigo Services Infrastructure Analysis Map. Using provided optional data, NBN Co., Electricity grid, and sewerage data.

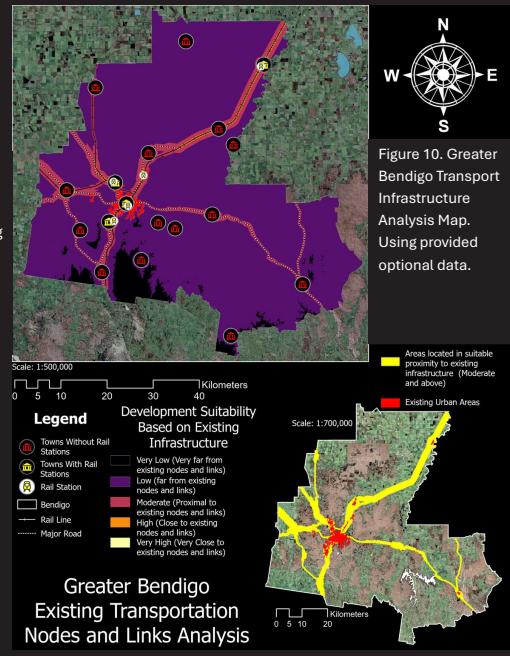

Figure 10. Greater Bendigo Transport Infrastructure Analysis Map. Using provided optional data.

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Infrastructure	Weighted	Overlay		
Data Input	Source	Analysis Process	Euclidean Distance Reclass	Weight
Suitable Service Infrastructure	Primary Analysis generation	none	Five 500m segments suitability decreases with distance	60%
Suitable Transportation Infrastructure	Primary Analysis generation	none	Five 500m segments suitability decreases with distance	40%

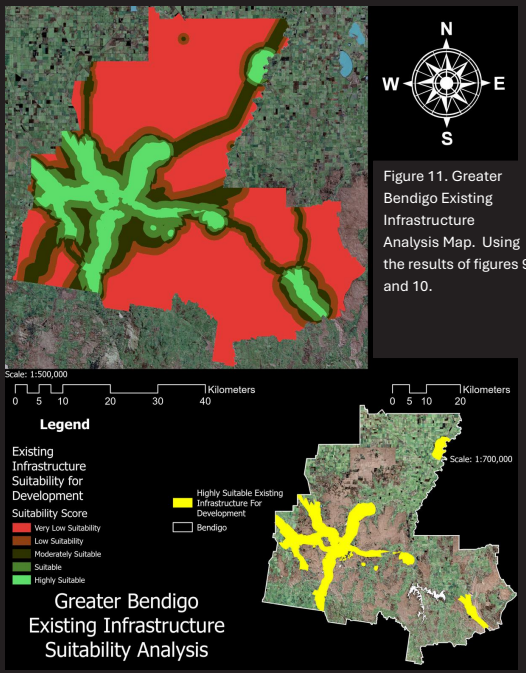

Figure 11. Greater Bendigo Existing Infrastructure Analysis Map. Using the results of figures 9 and 10.

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5.3 ACCOUNTING FOR DISASTER RISK

Accounting for disaster risk is critical to regional planning. Especially in response to recent flood risk in Shepparton and the black summer fires of 2019 which caused enormous damage for regional Victoria. This focus addresses the increasing importance of disaster risk reduction in planning for urban growth, particularly in the context of climate change. This analysis utilised areas within water catchments using a buffer layer and reclassifying these by increments of 50 meters. Areas close near to water catchment were deprioritised for growth and those far from water catchments were prioritised for growth. Similarly, the areas near forests, located at steeper inclines and higher elevations and far from water areas and water courses were more at risk for bushfire.

Given Greater Bendigo's location between forested ridgelines and flood-prone valleys, the spatial analysis aligns with the Victorian Planning Policy Framework, which prioritises life and property protection by steering development away from hazard-prone land.

Bushfire Risk	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Water courses	Provided Data	Buffer: 30m increment	Five 50m increments suitability decreases with distance	15%
Water areas	Provided Data	Buffer: 30m increment	Five 50m increments Suitability decreases with distance	10 %
Forest Areas	Provided Data	none	Five 100 m increments suitability increases with distance	50 %
Area Elevation (DEM)	Provided Data	Reclassify: 5 classes by 100m increment suitability decreases	None	25%

Flood Risk	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Urban Areas	Provided Data	none	Five 250m increments suitability increases with distance	5%
Water courses	Provided Data	Buffer: 30m increment	Five 50m increments suitability increases with distance	20%
Water areas	Provided Data	Buffer: 30m increment	Five 50m increments Suitability increases with distance	20 %
Forest Areas	Provided Data	none	Five 100 m increments suitability increases with distance	15 %
Area Elevation (DEM)	Provided Data	Reclassify: 5 classes by 100m increment suitability increases	None	40%

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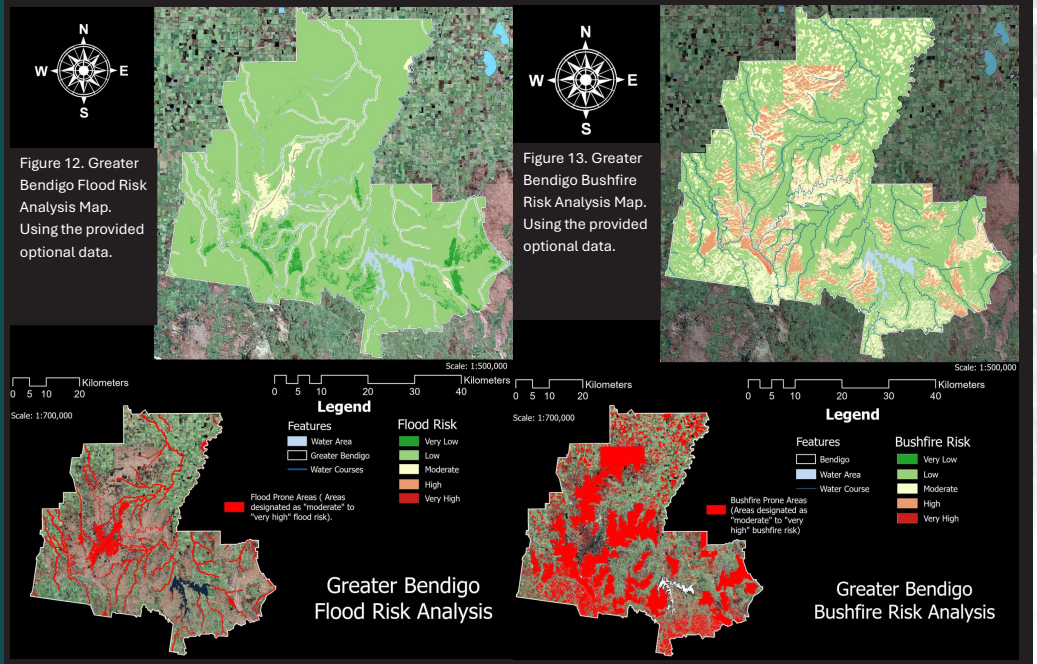

Figure 12. Greater Bendigo Flood Risk Analysis Map. Using the provided optional data.

Figure 13. Greater Bendigo Bushfire Risk Analysis Map. Using the provided optional data.

Inglert 27

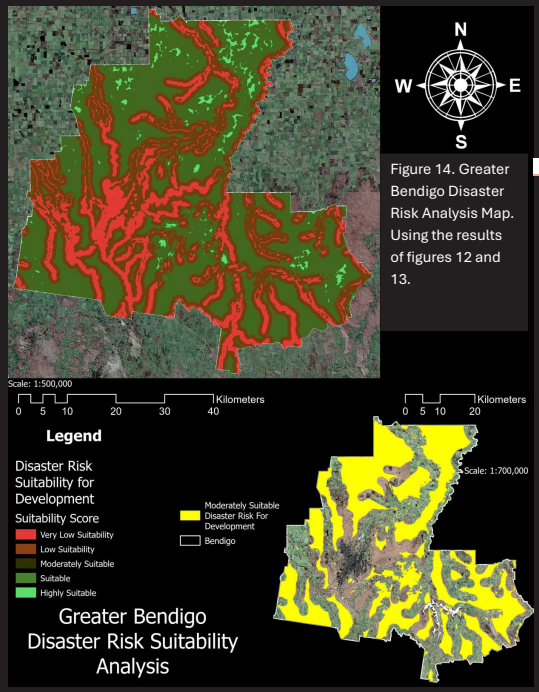

Figure 14. Greater Bendigo Disaster Risk Analysis Map. Using the results of figures 12 and 13.

Disaster Risk	Weighted	Overlay		
Data Input	Source	Analysis Process	Euclidean Distance Reclass	Weight
Bushfire Risk	Primary Analysis generation	none	Five 500m segments suitability increases	50%
Flood Risk	Primary Analysis generation	none	Five 500m segments suitability increases	50%

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5.4 INCORPORATING STATUTORY CONSIDERATIONS

Considering statutory requirements is legally required before work can commence. Statutory precedents also indicate the direction that municipal governments are interested in deciding on land development. This criterion ensures that future development is directed toward land that aligns with existing zoning and strategic planning controls. As shown in the maps below, areas zoned for residential or future urban use and located within or adjacent to Urban Growth Boundaries are prioritised for development due to their alignment with municipal planning intent. Spatial data was downloaded from Victorian public access data and layers of development significance and specific areas pertaining to the Bendigo Urban Growth boundary were sorted by attribute and used for analysis. Finally, a weighted overlay was prepared as to measure how each region faired with respect to planning considerations.

Land constrained by statutory overlays such as the Bushfire Management Overlay (BMO), Environmental Significance Overlay (ESO), or Land Subject to Inundation Overlay (LSIO) is avoided due to the potential for conflict with planning barriers and environmental precedents.

Using these requirements for planning reflects the role of zoning and overlays in deciding permissible land use under the Victorian Planning Policy Framework (PPF). By drawing on strategic documents such as structure plans and regional growth strategies, criteria such as this can ensure development occurs in locations supported by current policy.

Planning Controls	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Planning Overlays[37]	Acquired Data	Sort by relevant overlays opposing development	Five 250m increments suitability increases	50%
Planning Zones[36]	Acquired Data	Sort by relevant zones opposing development	Five 50m increments suitability increases	25%
Planning Zones[36]	Acquired Data	Sort by zones relevant to supporting development	Five 50m increments suitability decreases	25%

Bendigo UGB	Analysis		
Data Input	Source	Analysis Process	Euclidean Distance Reclass
Bendigo UGB[38]	Acquired Data	Reclassification based on distance: suitability decreases	Five 1000m segments suitability increases

[37] Department of Industry, Science and Resources (DISR), A.G. 2025. "Vicmap Planning - Victorian Government Data Directory." *Discover.data.vic.gov.au*. https://discover.data.vic.gov.au/dataset/vicmap-planning.

[38] Department of Industry, Science and Resources (DISR), Australian Government. 2024. "City of Greater Bendigo : Urban Growth Boundary Proposed Extension - Data.gov.au." *Data.gov.au*. https://data.gov.au/data/dataset/city-of-greater-bendigo-urban-growth-boundary-proposed-extension.

Inglert 29

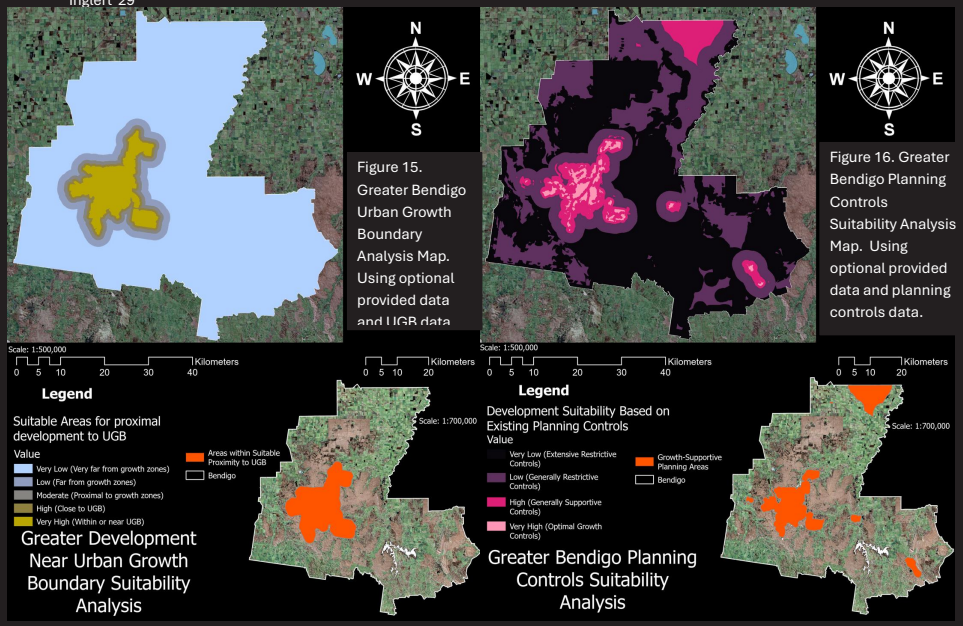

Figure 15. Greater Bendigo Urban Growth Boundary Analysis Map. Using optional provided data and UGB data

Figure 16. Greater Bendigo Planning Controls Suitability Analysis Map. Using optional provided data and planning controls data.

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Statutory Suitability	Weighted	Overlay		
Data Input	Source	Analysis Process	Euclidean Distance Reclass	Weight
UGB Suitability	Primary Analysis generation	none	Five 500m segments suitability increases	50%
Planning Controls Suitability	Primary Analysis generation	none	Five 500m segments suitability increases	50%

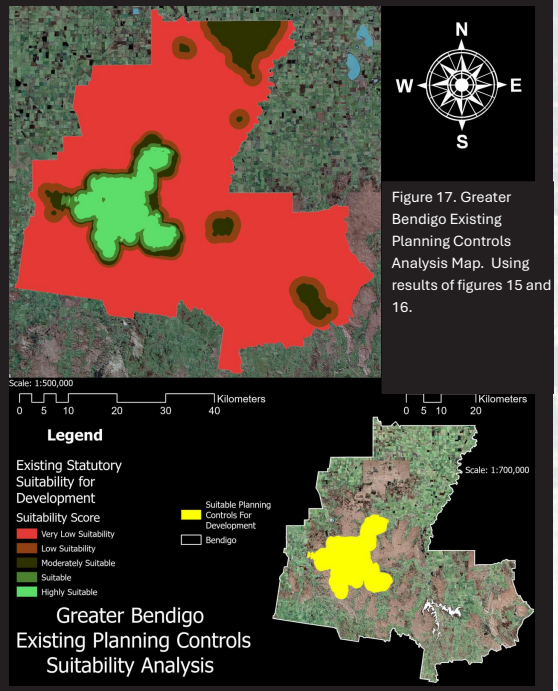

Figure 17. Greater Bendigo Existing Planning Controls Analysis Map. Using results of figures 15 and 16.

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5.5 INCORPORATING COMMUNITY AND ENVIRONMENTAL ASSETS

This criterion recognises the importance of protecting environmental values and supporting access to community assets by incorporating community and environmental assets,. Identifying suitable growth areas, land near recreation facilities, health centres, parks, and community centres is prioritised. These factors are essential for well-being, social cohesion, and a sense of place.

Areas containing or adjacent to biodiversity corridors, water catchments, conservation sites, and sites of Aboriginal cultural heritage significance are unfavourable for development to protect environmental and cultural integrity.

This approach responds to the strategic direction of the Greater Bendigo Managed Growth Strategy and is supported by Victorian planning instruments such as the Environmental Significance Overlay (ESO), the Native Vegetation Framework, and Clause 12 of the Planning Policy Framework, which together identify an integrated planning policy for open space, biodiversity, and resilient communities as integral to societal cohesion.

Conservation Areas	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance	Weight
CAPAD (Collaborative Australian protected areas database)[39]	Acquired Data	Clip By bendigo	Five 250m increments suitability increases	70%
Forests	Provided Data	none	Five 250m increments, suitability	30%

Access to Community Assets	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Employment regions: Industrial Tagged Areas[40]	Acquired Data	none	Five 1000m increments suitability decreases	10%
Employment regions: Commercial Tagged Areas[41]	Acquired Data	none	Five 1000m increments suitability increases	20%
Housing regions: Residential Tagged Areas[42]	Acquired Data	none	Five 1000m increments suitability decreases	15%
Leisure Tagged Areas[43]	Acquired Data	none	Five 1000m increments suitability decreases	25%
Amenity Tagged Areas[44]	Acquired Data	none	Five 1000m increments suitability decreases	30%

[39] Department of Climate Change, Energy, the Environment and Water. 2024. "Collaborative Australian Protected Areas Database (CAPAD) 2024 - Terrestrial." *Dcceew.gov.au*. https://fed.dcceew.gov.au/datasets/ac356a872d8048459fe786c80213dc70_0/explore?location=-37.298764%2C145.615302%2C8.85.

[40] OpenStreetMap contributors. OpenStreetMap database [QGIS: Anaconda Python via Overpass API]. OpenStreetMap Foundation: Greater Bendigo, AU; 2025 [cited 20 July 2025]. © OpenStreetMap contributors. Available under the Open Database Licence from: *openstreetmap.org*. Data mining by QuickOSM. https://plugins.qgis.org/plugins/QuickOSM/

[41] OpenStreetMap contributors. 2025.
[42] OpenStreetMap contributors. 2025.
[43] OpenStreetMap contributors. 2025.
[44] OpenStreetMap contributors. 2025.

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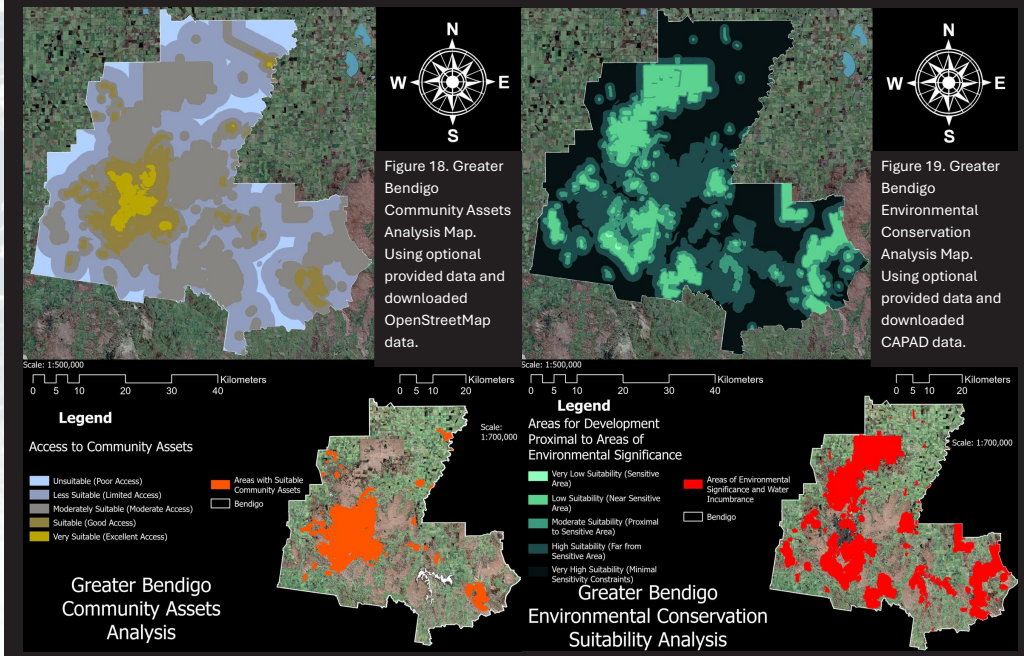

Figure 18. Greater Bendigo Community Assets Analysis Map. Using optional provided data and downloaded OpenStreetMap data.

Figure 19. Greater Bendigo Environmental Conservation Analysis Map. Using optional provided data and downloaded CAPAD data.

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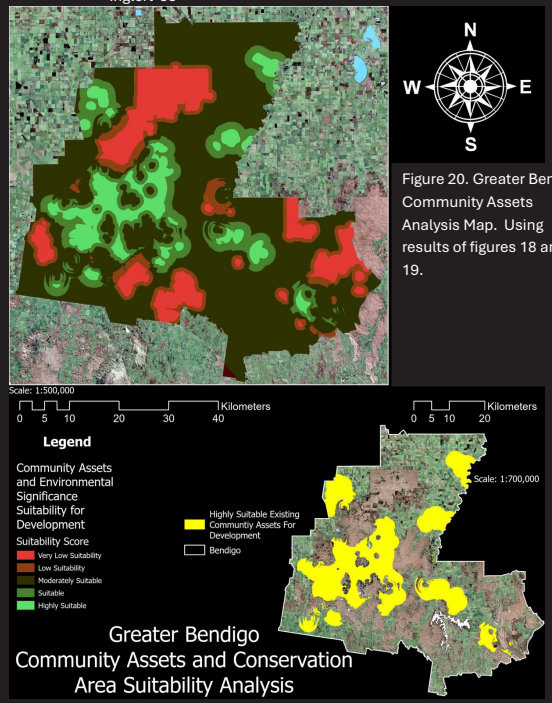

Figure 20. Greater Bendigo Community Assets Analysis Map. Using results of figures 18 and 19.

Community Assets and Conservation	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance	Weight
Community Assets Suitability	Primary Analysis generation	none	Five 500m increments suitability increases	50%
Areas of Significant Environmental and Cultural Conservation	Primary Analysis generation	none	Five 500m increments, suitability	50%

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5.6 FINDING FINAL FUTURE GROWTH AREAS

For finding the final suitable areas for targeting development, the five binary polygon shapefiles from the previous five input criteria suitability analyses are used: those being topography (high suitability), existing infrastructure (high suitability), Disaster Risk (moderate suitability), existing planning controls (favourable suitability) and environmental significance and conservation zones (Low suitability).

The outputted areas are then exported as a polygon vector shape where only the highly suitable regions are included. Finally, those areas with contiguous land areas of larger than 1300 hectares are exported.

Access to Community Assets	Weighted	Overlay		
Data Input	Source	Initial Analysis Process	Euclidean Distance Reclass	Weight
Topography: High Suitability	Secondary Analysis generation	none	Five 1000m increments suitability decreases	20%
Existing Infrastructure: High Suitability	Secondary Analysis generation	none	Five 1000m increments suitability increases	25%
Disaster Risk: Moderate Suitability	Secondary Analysis generation	none	Five 1000m increments suitability decreases	25%
Existing Planning Controls: Suitable	Secondary Analysis generation	none	Five 1000m increments suitability decreases	20%
Environmental Significance and Conservation: Low Suitability	Secondary Analysis generation	none	Five 1000m increments suitability increases	10%

Inglert 35

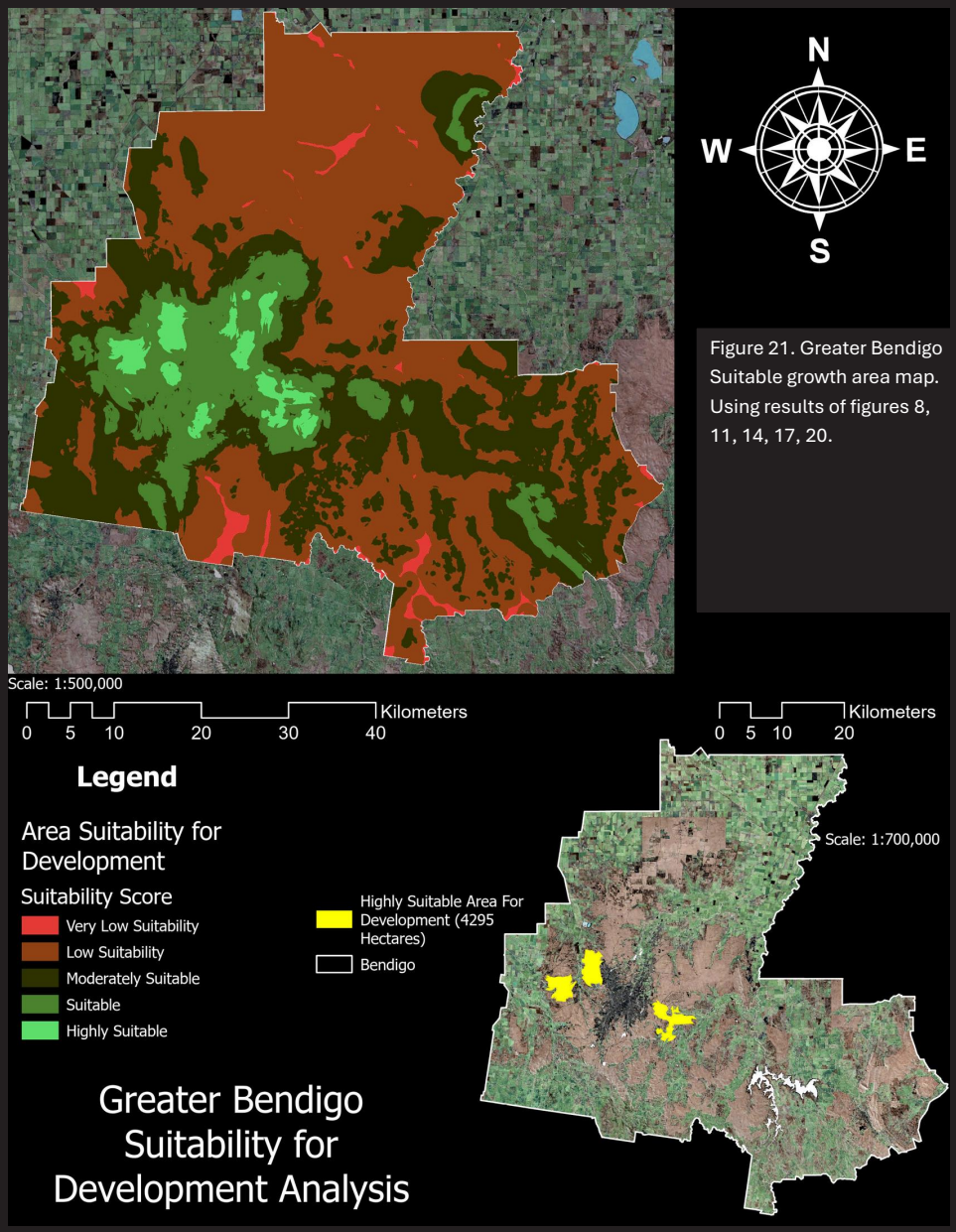
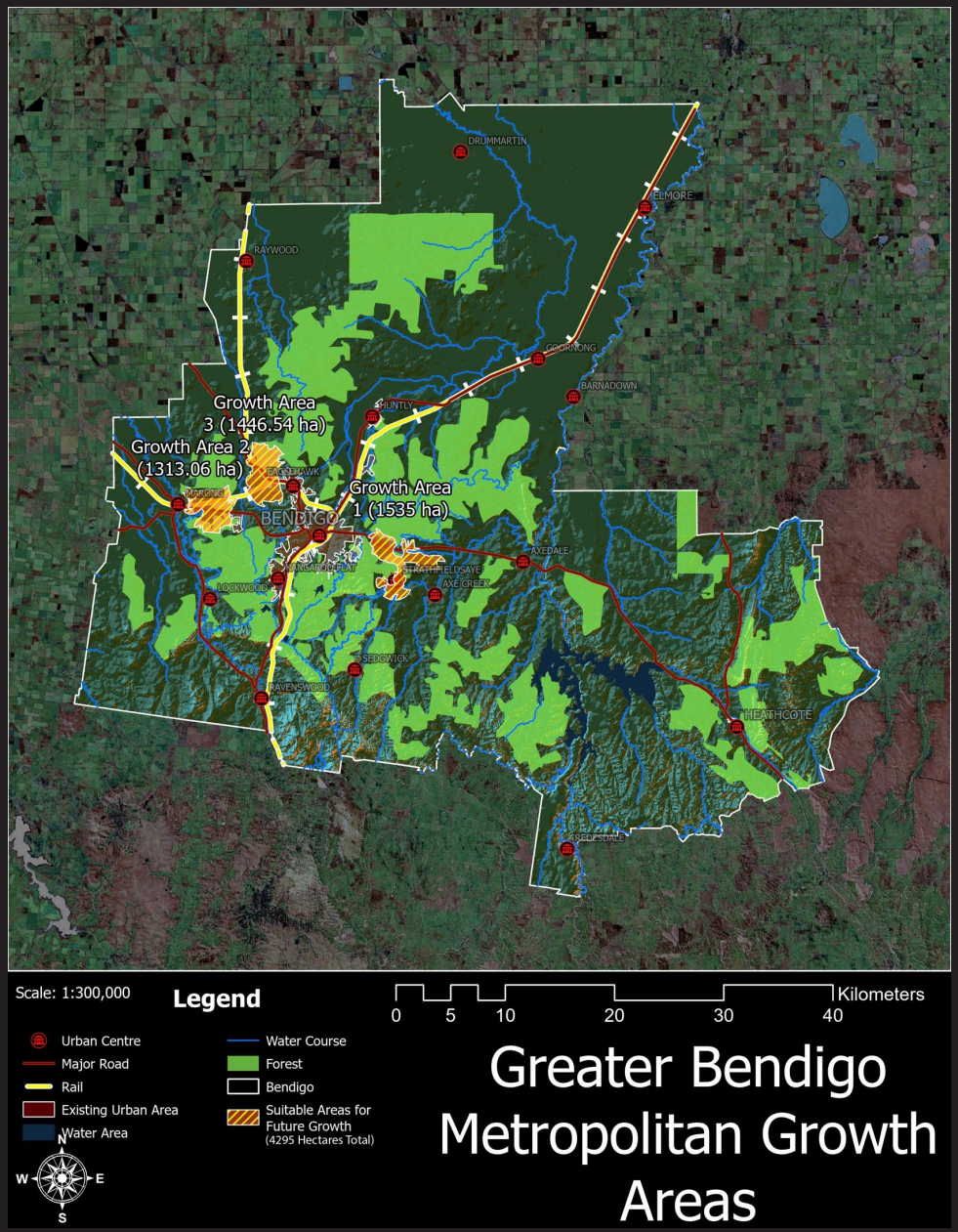


Figure 21. Greater Bendigo Suitable growth area map. Using results of figures 8, 11, 14, 17, 20.

Figure 21. Metropolitan growth areas map. Using results of figure 20 and calculating area of located growth zones.



6.0 CONCLUSION

The results of this analysis display the application of spatial analysis tools in AtrcGIS in identifying areas most suitable for future urban growth within the Greater Bendigo LGA. Through the employment of the spatial functions: Euclidean Distance, Raster Reclassification, a Weighted Overlay Analysis, and finally, a Raster Calculator to export specifically suitable or unsuitable regions, the model aggregates feature proximity and constraints into a coherent decision-making framework. The workflow shows a replicable method to integrating spatial data within overall planning objectives and local policies. The final map output identifies three similarly sized areas summing to 4295 total hectares around Marong (Growth Area 2: 1313.06 hectares), Eaglehawk (Growth Area 3 1446.51 hectares) and Strathfieldsaye (Growth Area 1: 1535 hectares) which may contain future development potential under the current planning and design constraints to address the development target of 38,000 dwelling units (under the established scale of 10 dwelling units per hectare). Their proximity to features ancillary to human development along with their relative concealment from unsuitable development constraints make them favourable targets for future development within greater Bendigo.

7.0 RECOMMENDATIONS

Considering these results, future analyses may benefit from the following considerations to enhance precision, academic and policy relevance:

- **Inclusion of More Comprehensive Urban Services and Amenities**: Expanding beyond transport infrastructure to include schools, health services, and open space access would enrich the suitability criteria.
- **Network-Based Service Area Modelling**: Incorporating network analysis for walkability and drivetime catchments would provide a more accurate reflection of accessibility, especially from an active transportation/ 10-minute city perspective.
- **Dynamic Policy Alignment and Scenario Testing**: Integrating more recent or evolving strategic frameworks (e.g. Plan Melbourne, regional housing targets, more specific greater Bendigo council policy targets) and enabling stressor scenario-based comparisons could help ensure long term planning effectiveness.

An ever-present challenge when conducting spatial analysis using GIS software is the consistency of data used. While Victoria does possess a strong foundation of public spatial data repositories, the data available favours large metropolitan areas such as Melbourne while comparable regional data useful in conducting such local analysis in Bendigo is often missing. Continued refinement of spatial tools and closer integration with planning policy is necessary to ensuring sustainable, connected, and responsive urban growth across regional Victoria.

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7. Figure 7. Greater Bendigo Hydrology Analysis Map. Using provided optional data. [47][48]
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20. Figure 20. Greater Bendigo Community Assets Analysis Map. Using results of figures 18 and 19.
21. Figure 21. Greater Bendigo Suitable growth area map. Using results of figures 8, 11, 14, 17, 20

[45] Radevski, Isabella. 2022. "Selected Guide to Open House Bendigo." Open House Melbourne. October 14, 2022. https://openhousemelbourne.org/selected-guide-to-open-house-bendigo/.

[46] Kennington, Thomas Benjamin. 2025. "Homeless." Bendigo Art Gallery. 2025. https://collection.bendigoartgallery.com.au/objects/158.

[47] NBN Co. 2024. "NBN_Coverage_Footprints_2024 (MapServer)." *Infrastructure.gov.au*. https://spatial.infrastructure.gov.au/server/rest/services/NBN_Coverage_Footprints_2024/MapServer?

[48] Stewart, Stephen; Fedrigo, Melissa; Roxburgh, Stephen; Kasel, Sabine; & Nitschke, Craig (2020): Climate Victoria: Precipitation (9 second, approx. 250 m). v3. CSIRO. Data Collection. https://doi.org/10.25919/5e3bc5195e301

[49] Victorian Government Data Directory." *Vic.gov.au*. https://discover.data.vic.gov.au/dataset/sewerage-network-main-pipelines/resource/e0fe74337-4554-4a33-8917-917a1b1ba594.

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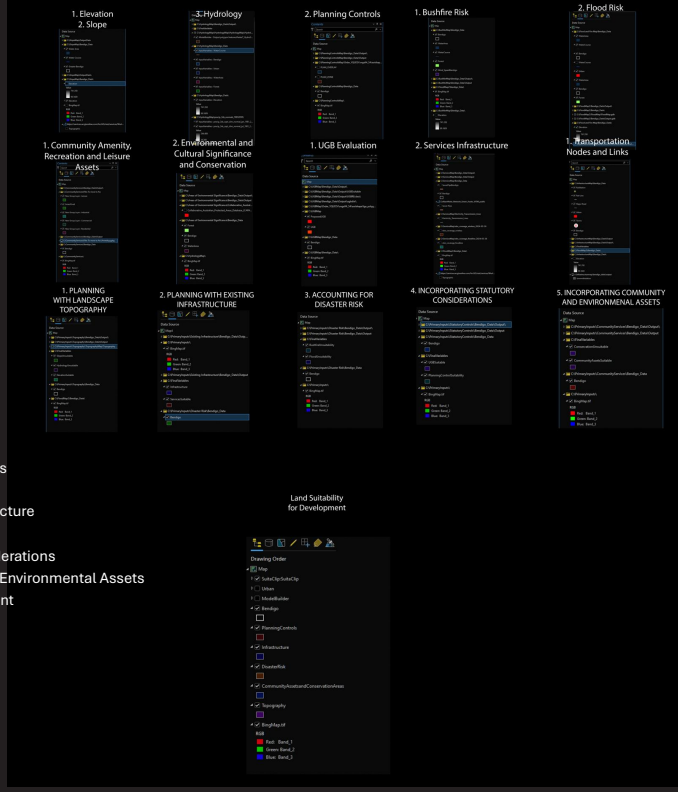
APPENDIX A.

Appendix Figure 1.

Data Used for each Map.

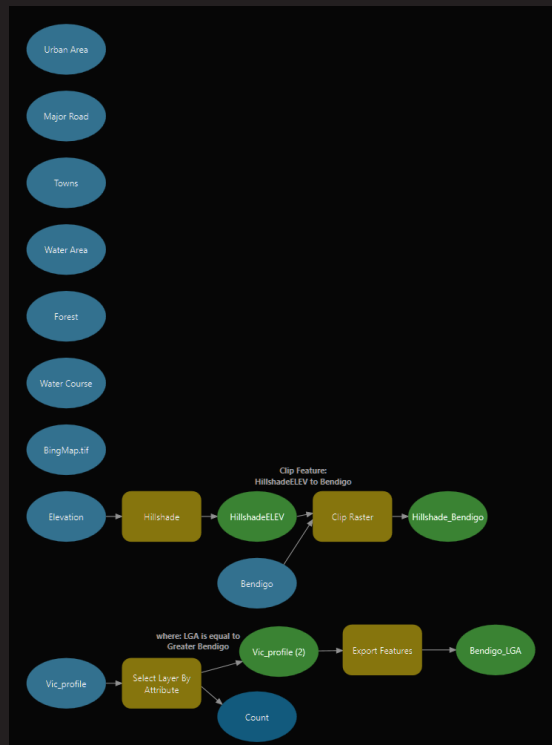
1. Elevation
2. Slope
3. Hydrology
4. Planning Controls
5. Bushfire Risk
6. Flood Risk
7. Community Amenity
8. Environmental and Cultural
9. UGB Evaluation
10. Service Infrastructure
11. Transportation Nodes and Links
12. Planning with Topography
13. Planning with Existing Infrastructure
14. Accounting for Disaster
15. Incorporating Statutory Considerations
16. Incorporating Community and Environmental Assets
17. Land Suitability for Development



Appendix Figure 2.

Basemap Model corresponding to Figure 3.

This map does not include a great deal of processing, simply a hillshade of the provided DEM.



GREEN AXES MELBOURNE:

ADAPTING NATURE-BASED SOLUTIONS FROM BARCELONA, SPAIN

Individual Assessment Report 3



Urban Environmental Policy and Planning ABPL_90341
Graham Inglert 1493308

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1.0 Executive Summary

CONTEXT: Addressing Climate Risk in Melbourne CBD

Melbourne, Victoria is a city that in recent years has been exposed to new challenges as result of climate change. Pertinent issues such as protracted periods of extreme temperatures, inclement precipitation patterns such as droughts and floods, and ecological degradation among many others have emerged. This report proposes adapting the green axes approach utilised in Barcelona as an opportunity for Melbourne to address these emerging climate risks.

Purpose

The purpose of the green axes Melbourne plan is to propose a nature-based solution to address increased climate risks associated with the Melbourne CBD. This plan adapts the Barcelona green axes Superilla plan as a method to address increased risk for urban heatwaves, air quality concerns, urban biodiversity and resident physical and mental health concerns.

Key Objectives

Key objectives for the green axes Melbourne plan includes the amelioration of climate risk through nature-based solutions as informed by the international case of Barcelona, Spain. The green axes superilla plan from Barcelona offers opportunities for Melbourne to address climate risks while also improving street vibrancy, urban biodiversity, urban air quality and mental and physical health for residents.

Scope

This report discusses the plans implementation within three major parts:

- Integrated Environmental Sustainability Approach
- Strategy
- Barriers, Potential, and Opportunities

Implementation

The implementation for the green axes Melbourne plan occurs over the course of 10 years with an extensive community engagement process, a rolling-implementation style where the axes is constructed in pieces, and then an evaluation and monitoring process that is engaged in after each step of implementation with the intention of amending the process when shortcomings arise.

2.0 Introduction

Climate change in the 21st century presents the world with new urban challenges such as the urban heat island effect, air pollution, destabilised precipitation systems and increased risk for climate disasters. Cities face many of the extreme challenges resulting from these climate-driven catastrophes. Melbourne, Victoria is one of these cities.

Melbourne as a city struggles with not only new challenges resulting from climate change but also rapid urbanisation, affordability concerns, the relationship between public institutions and private interests, representation of marginalised communities among many other threats to its urban realm.

This report discusses utilising interventions informed by Barcelona's Green Axes Superilla project as a model of nature-based solutions (NBS) to address pressing climate related objectives within Melbourne's CBD including the urban heat-island effect, a reduction in air pollution, urban noise and public engagement in outdoor physical activity.

This report recognises the challenges associated with the implementation of the green axes plan within Melbourne, citing concerns of gentrification within Barcelona. Nevertheless, the intervention called for in this strategy proposes that the green axes strategy offers Melbourne a competent method of mitigating climate related risks and improving the quality of life for those living, working, and playing in Melbourne, Victoria.

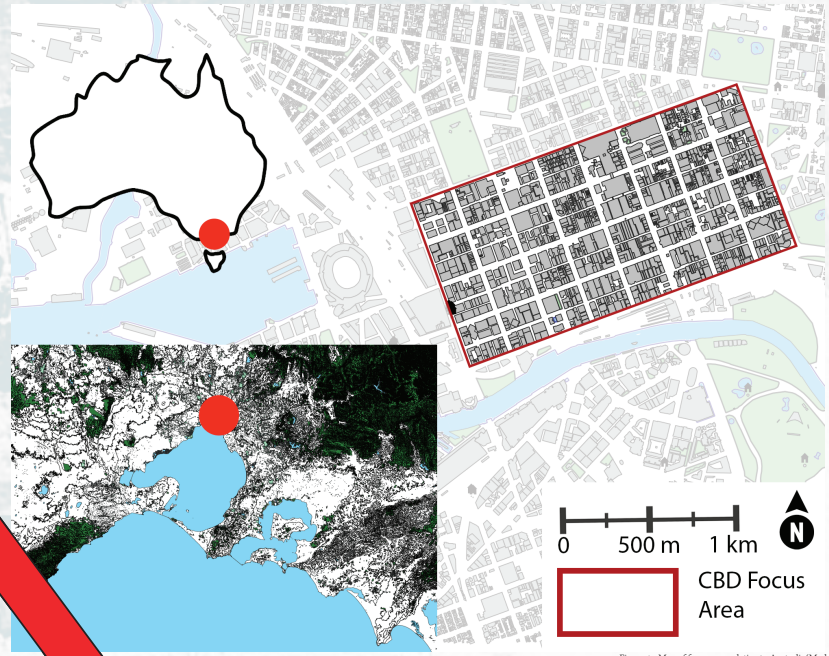

Figure 1: Map of focus area relative to Australia(Made using QGIS and Adobe Photoshop)

3.0 Integrated Environmental Sustainability Approach

3.1 Adapting Barcelona's Superilla Green Axes Project:

Barcelona, Spain has an extended history of aggressive urban design intervention to address environmental challenges present within the city. The superilla design dates back over a hundred years and has been adjusted on numerous occasions to better suit modern contexts. Extending back to the original 1855 design of the Eixample district by Ildefons Cerdà, Barcelona's superilla attempted to rectify the perceived unsanitary conditions provided by many late 19th century European cities through wide boulevards, aesthetic uniformity in streetscapes, and large concessions of urban open space (Urbano, 2016). The Eixample blueprint established identically measured, 113 m^2 blocks with 20m bevelled edges at each vertex (Moreno and Bairan 2012). These blocks included significant semi-public open green space with only the periphery dedicated to building mass (Urbano, 2016).

According to Nieuwenhuijsen et al. (2024), by the 1920s, these spaces became canvassed with infill constructions such as garages, informal residences and others (Fig. 2). By the 1970s, the surrounding open streets that had been designed by Cerdà to promote clean air flow, became inundated with motor vehicle traffic leading to increased urban noise, air pollution, urban heat and decreased pedestrian opportunities in favour of motor vehicle dependency.

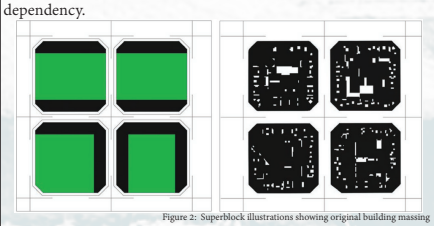

Figure 2: Superblock illustrations showing original building massing (left) and subsequent private expansions (right) (Urbano, 2016)

To address the poor urban land use that these legacy forms had divulged into, Barcelona implemented periodic policy prescriptions targeting environmental urban interventions to alleviate the urban realm. The major policy prescriptions driving the environmental urbanism taking place within Barcelona's Eixample district include:

- Eixample Model (2002, Urban Ecology Agency of Barcelona) (Rueda, Sanz, and Bohigas 2021)
- Urban Mobility Plan of Barcelona PMU 2018-2013 (Ajuntament De Barcelona, 2014).
- Barcelona Green Infrastructure and Biodiversity Plan (Ajuntament de Barcelona, 2020)

These strategies each contribute a piece towards the superilla green axes implementation within Barcelona. Together, these policy documents and their implementation by the city council of Barcelona (Ajuntament De Barcelona) have produced a strong urban response to the challenges presented by climate change. The project culminates in the superblock model whereby Barcelona's unique geometric urban design and a novel method of targeted, every third street pacification where most motor-vehicle traffic is prohibited, urban vegetation is elevated and pedestrian opportunities prioritised. A critical component to the success of this campaign is the green axes that occur when two pacified streets intersect at their tangents. In these spaces, Barcelona creates green plazas, which are a model for high-encounter public amenity (Fig. 3).

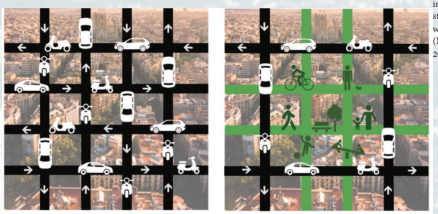

Figure 3: Superblock interventions for street pacification within Barcelona (Nieuwenhuijsen et al. 2024).

Barcelona's competency in design as yielding a reduction in the urban heat island effect (Pérez et al., 2025), improvement in mental health outcomes of young children (Sanz-Mas et al., 2024) (Opbroek et al., 2024), the activation in pedestrian activity (Fig. 4), air quality, liveability (Ajuntament De Barcelona, 2014) and many other indicators.

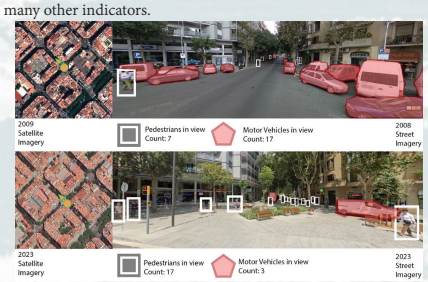

Figure 4: Street level comparison after green axes implementation in Barcelona (Made in Adobe Photoshop using google maps). (Google Maps, 2025)

Major criticisms of the superilla project have materialised in recent literature as many have identified the effects of gentrification that have occurred within the Eixample district. Citizen equity (Anguelovski et al., 2023), gentrification (Nieuwenhuijsen et al., 2024), tourism's "quasi-colonial effect of pleasure and play" (Tesfahuney, M., Ek, R. 2024) and local displacement of school aged families (Anguelovski et al., 2023) have all been identified as adverse effects of the environmental revitalisation efforts the city has made. Balancing social justice with environmental justice remains the most difficult process for Barcelona as the city looks to make new strides for climate urbanism.

3.2 Urban Context: Melbourne, Victoria

Similar to Barcelona, Melbourne's grid also displays a uniform consistency in block size and street uniformity (Fig 5). Melbourne's CBD exhibits 32 identically measured 200x200 metre blocks. This geographic organisation is canonically known as the 'Hoddle Grid' (Hil, Lawrence, and Smith 2020).

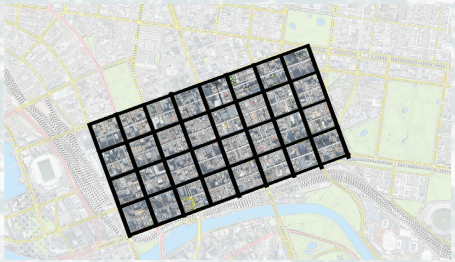

Figure 5: Street diagram overlayed over map of Melbourne CBD (Made using QGIS and edited using Adobe Photoshop).

The Hoddle grid is built in defiance of the natural land and water systems to the region (Dingle and Rasmussen 1991). And without incorporation of the knowledge of the indigenous Aboriginal people (Presland 2008). This disregard for environmental site conditions and knowledge has led to many urban challenges that more investigative methods of planning may have otherwise avoided. Among these challenges include the historical lack of drainage systems (Lane & Gilchrist, 2019), utopian redirection of the Yarra river (Doyle et al. 2012, p.39), and a predisposition to climate change-related risks such as the proliferation of the urban heat island and flooding (SGS Economic and Planning, 2018).

Given the necessity to address climate risk and the unique urban design within Melbourne's CBD, there appears an opportunity for the city to utilise its morphology and the lessons learned from Barcelona to produce a climate-resilient urban realm that may also achieve co-benefits through Nature-Based Solutions (NBS), low carbon futures and urban biodiversity.

Melbourne has a history of green infrastructure strategic plans. 'Green Our City, 2017-2021' (City of Melbourne, 2018), 'Cooling and greening Melbourne' (Department of Transport and Planning, 2023) and Outcome 6: 'Melbourne is a sustainable and resilient city as part of Plan Melbourne 2017-2050' (Victoria State Government, 2023). (Fig 6)



Figure 6: Covers of urban greening policy plans currently in use by the city of Melbourne. (City of Melbourne, 2018), (Department of Transport and Planning, 2023), (Victoria State Government, 2023)

These plans however have been criticised in recent literature for financial impediments, inadequate regulatory frameworks, low political prioritisation, and governance challenges (Chau et al., 2025).

Green axes as informed by Barcelona may provide distinct implementation in Melbourne from the aforementioned strategic greening plans already implemented by the city of Melbourne. Green axes, unlike the other plans does not encourage ad-hoc private-public partnership development, instead this plan would introduce concrete plans for fundamental changes to Melbourne's streetscape and its urban passageways.

The Melbourne green axes project would preside over similar interventions that have already taken place in select sites within the CBD including Bourke Street Mall and Swanston Street whereby pedestrianisation efforts have promoted increased street activation (Fig 7).

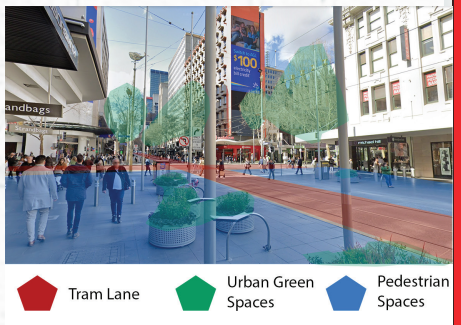

Figure 7: Spatial analysis of Bourke Street x Swanston Street intersection's surface area. (Made using Google Maps data in Adobe Photoshop).

4.0 Strategy

4.1 Green Corridor Interventions across the CBD

Community Engagement

Community engagement is a critical part of ensuring equitable and just outcomes for planning interventions. Literature has identified much of the social shortcomings of Green Axes Superilla to be partially due to poor community engagement strategies (Anguelovski et al., 2023) (Nieuwenhuijsen et al., 2024).

For Melbourne's Green Axes, a process of community engagement will be implemented to ensure similar mistakes are avoided when compared to Barcelona. Similar to the urban forestry plans (Participate Melbourne, 2025), an extensive pre-planning community engagement process will be implemented that will last approximately a year prior to any planning or construction taking place.

Intervention Strategy

For Melbourne, the CBD consists of 32 equally measured 200x200 metre blocks with uniform straight streets. The intersections of each of these streets are tangentially arranged creating opportunities for urban design interventions.

Green Axes Melbourne proposes 6 motor-vehicle pacified streets and 8 thru-traffic streets to allow access to the CBD for motor vehicles. The pacified streets that contain public transit and cycle access will be retained for these uses.

At the intersection points of two pacified streets, new green plazas will be constructed aimed at creating cosmopolitan appeal and improving liveability for the pedestrians of Melbourne CBD. At intersections between one pacified and one thru-traffic street, the thru-traffic will be retained through the intersection as to prevent no-outlet streets and unexpected dead-ends. The corridors of the following streets will see large scale urban forest interventions:

North-South:
- Exhibition Street
- Swanston Street
- Queen Street
- King Street

East-West:
- Flinders Street
- Bourke Street

Along these corridors, appropriate drought-resilient and canopy providing plants and trees are prioritised and implemented consistent with the city of Melbourne's current urban forest strategy (City of Melbourne, 2024). This intervention targets 70% canopy cover and green surface within the green corridors. A diagram of the complete plan is available below (Fig 8).

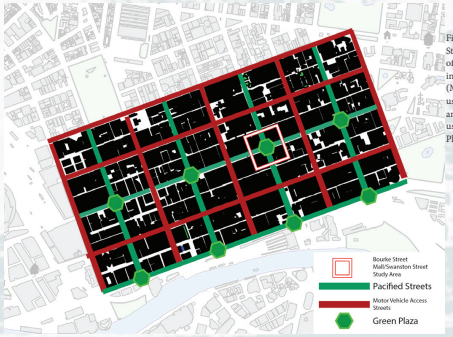

Figure 8: Street diagram of street interventions (Made using QGIS and edited using Adobe Photoshop).

The intervention of Green Axes Melbourne will take place over the course of ten years with two street pacifications and green interventions achieved every 40 months. The intervention schedule is below:

First pacifications month 40:
- Bourke Street
- Swanston Street

Second Pacifications month 80:
- Flinders Street
- Exhibition Street

Third Pacifications month 120:
- Queen Street
- King Street

Monitoring and Evaluation

As to ensure appropriate outcomes over the course of implementation, evaluation and monitoring consistent with the *Urban Greening and Monitoring Strategy* (National Environmental Sciences Programme, 2019). This evaluation includes the monitoring of the following indicators over the lifecycle of the project with key check-in periods every 40 months of the intervention period (Figure 9).

Domain	Elements	Indicators
Biophysical	Biodiversity	Species counts (plants, birds, pollinators, bats, frogs) Threatened species counts Native vegetation cover/habitat area Ecological corridors connections
	Urban forest	Tree canopy cover Age- and size-class distributions Taxonomic (Species/Genus/Family) diversity Structural complexity (mid-story vegetation) Useful life expectancy Above ground visual assessments of health and risk
	Stormwater management	Runoff quantity Runoff quality
	Thermal effects	Building energy use Precinct temperature
Management	Planting	Numbers of plants and different species planted
	Retention and protection	Numbers of plants removed vs planted
	Plant health; planting success	Survival, health, form Maintenance activities
	Green space quantity	Amount of open space (area; area/population) Distance to park and park size
	Green space quality	Green space features Satisfaction with maintenance of green spaces
	Budget	Cost of management activities and interventions Lifecycle assessments
Social	Knowledge and engagement	Volunteer hours on site Number of volunteers Diversity of volunteers (age, cultural background) Length of volunteer engagement over time Awareness of greening among adjacent businesses, residents and industries Number, type and range of community events held in the space Budget for social or community engagement Social media
	Food production	Quantity and range (including local native) of food harvested
	Aesthetics	Satisfaction (and delight) with site's features
	Visitation	Number of visitors Frequency of visitation Diversity of visitors Duration of visits
	Health	Mental and physical health and wellbeing indicators

Figure 9: List of monitoring indicators (National Environmental Sciences Programme, 2019)

4.2 Green Corridor: Bourke Street and Swanston Street

To illustrate the intended spatial outcomes within the CBD, the interaction of Bourke Street and Swanston Street has been selected.

Presently, Swanston Street does have a generous distribution of trees distributed along the footpath edges. These trees are from the genus *Platanus x acerifolia* or 'London plane' trees that provide a large amount of amenity for the streets users, offering shade and reducing urban heat. London plane trees are widely used in greater Melbourne, making up approximately 70% of the trees within the inner city. These trees have been the subject of recent scrutiny, being linked to eye and skin irritation (Davey, 2019) and also a lower resilience to heat intensity (Sanusi & Livesley, 2020).

In many cases these trees are already being replaced with other trees such as spotted gums, camphour laurels, Port Jackson figs, red ironbarks and others (Davey, 2019). Crucial to the intervention seen within Green Axes Melbourne, is a diversity of trees and accompanying vegetation to provide a veritable urban forest along the street corridor.

Swanston Street is already one of the more successfully greened streets within the Melbourne CBD, with dozens of trees dotting the street between its intersection with Flinders Street in the south and with La Trobe Street in the north. To compliment the frequency of already existing trees, a greenway will be installed beneath the tramway. Green tramways have been identified as a socially acceptable and often times, low-maintenance method of urban greening (Barnes et al., 2018) (Sikorski et al., 2018). These surfaces also have been linked to noise and heatwave reduction (Jakubcová & Horváthová, 2020) (Van Renterghem et al., 2015), increased rainwater retention (Tapia Silva et al., 2006), improved biodiversity (Säumel et al., 2016) and other benefits within urban centres.

For Swanston Street, the green tramway will be the major installation as part of the Green Axes Melbourne strategy. These structures will provide benefits associated with green tramways to Swanston street and expand the green space already provided by the London plane trees.

The specific vegetation chosen for tramways such as in case studies in Warsaw, Poland have seen success using *Sedum* due to its low-maintenance, low-growing tendencies and drought-resistance (Sikorski et al., 2018). For Melbourne, Sedum may be useful, but endemic Australian plants may also be favourable. *Lomandra* has been identified as competent alternative to low-maintenance vegetation such as Sedum. Lomandra has been used extensively in Australia as a low-maintenance and high water-retention solution for green roofing on buildings (Layt, 2025). As an endemic Australian genus, and its success already in use on green roofs, its inclusion could be beneficial for the tramways. However, Lomandra is not as low-growing as Sedum, for the area directly adjacent to the tracks, Sedum will be used and with the green tramway closer to the pedestrian footpaths, the longer Lomandra will be used.

For Bourke Street, the distribution of vegetation is uneven. Along the street there are London plane trees but within Bourke Street Mall, there are no large trees but there are small planter boxes containing flowers and saplings (City of Melbourne, 2025). Expanding the green spaces on this route is crucial to the success of the Green Axes Melbourne intervention. A wide variety of new plant species will be introduced including a mix of the drought-resistant trees already replacing many of the London plane trees in Melbourne such as the spotted gums, camphour laurels, and Port Jackson figs among others. the tramway along Bourke Street will also see intervention of the greening introduced on Swanston Street. The intended outcomes can be seen within Figure 10 below.

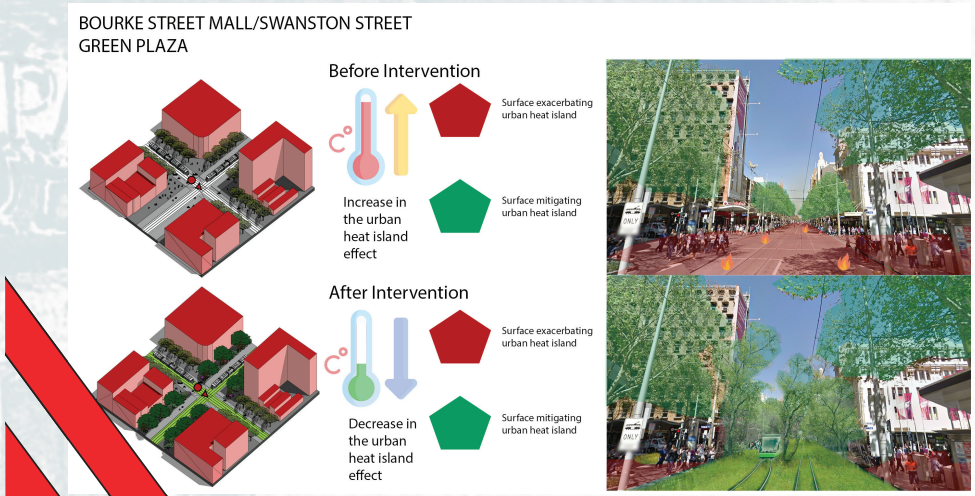

Figure 10: Proposed intervention in Bourke Street Mall/ Swanston Street. (Made using Sketchup, Adobe Photoshop).

5.0 Barriers, Potential, and Opportunities

5.1 Barriers

In Barcelona, the major barriers that faced the green axes' implementation did centre around social equity concerns. According to Isabelle Anguelovski et al. (2023), the construction of green axes in Barcelona disproportionately impacted lower and middle income areas with excessive noise and air pollution. Following implementation, many areas in the Eixample district experienced the negative effects of overtourism, including over-appropriation of city assets such as housing or amenity areas to target higher-paying tourists over local residents (Tesfahuney, M., Ek, R. 2024). These perceived incursions by tourists and businesses targeting tourists have resulted in displacement of school-aged families (Anguelovski et al., 2023).

For Melbourne, lessons from previous pedestrianisation interventions in the CBD may inform Green Axes Melbourne's emerging barriers. At the time of the pedestrianisation of Swanston Street in 2009, there were concerns by local business owners over their access to delivered stock and by motorists who feared difficulty in access and aggravated congestion (Parajuli & Pojani, 2017).

5.2 Potential

The potential implications of the green axes Melbourne intervention offer benefits not only in environmental and sustainability advances for the city, but also citizen amenity, pedestrianisation, and city vibrance.

In Barcelona, the green axes intervention has been associated in with increased social and health behaviour in children (Sanz-Mas et al., 2024) (Opbroek et al., 2024). There have also been improvements in environmental indicators including air quality measures and reduction in urban heatwave frequency (Pérez et al., 2025). The city council has recognised a myriad of environmental and co-beneifts offered by the green axes model (Fig 11)

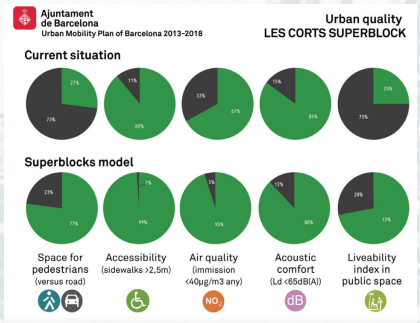

Figure 11: Indicators comparing the Barcelona superblock model and the previous status quo. (Ajuntament De Barcelona, 2014).)

greening interventions also has the potential to improve drought resistance through increased rainwater retention (Tapia Silva et al., 2006), improved urban biodiversity with increased space allocated to flora and fauna (Säumel et al., 2016).

5.3 Opportunities

For opportunities, Melbourne is in a unique position to welcome the green axes plan. Its unique Hoddle grid and reliance on trams for public transit makes the demarcation of pedestrianised streets and application of green tramways possible. As discussed in case studies in Warsaw, Poland, green tramways are a competent method of utilising green infrastructure to address climate-related goals in urban regions (Sikorski et al., 2018).

The city's population is also among the most interested in Australia for green interventions to address climate and social objectives. The city of Melbourne has already implemented 'Green Our City, 2017-2021' (City of Melbourne, 2018), 'Cooling and greening Melbourne' (Department of Transport and Planning, 2023) and Outcome 6: 'Melbourne is a sustainable and resilient city as part of Plan Melbourne 2017-2050' (Victoria State Government, 2023) meaning that given the policy interest in the city of Melbourne, the city has an opportunity at leveraging existing policy infrastructure for large scale green interventions in the Melbourne CBD.

6.0 Conclusion

This report has discussed the proposed green axes Melbourne plan as influenced by the green axes Barcelona plan. Green axes Melbourne has the potential to transform the CBD into a more sustainable and climate change-resilient urban realm that may welcome a street vibrancy and pedestrian activation that improves upon the current situation. Through leveraging existing policy plans such as 'Green Our City, 2017-2021' (City of Melbourne, 2018), 'Cooling and greening Melbourne' (Department of Transport and Planning, 2023) and Outcome 6: 'Melbourne is a sustainable and resilient city as part of Plan Melbourne -2050 2017' (Victoria State Government, 2023) the city of Melbourne can implement green corridors and plazas in targeted areas of the city that may further activate the urban realm.

Challenges however do exist in the form of equity concerns and a prioritisation of opportunities for tourists over local residents as has been identified in Barcelona. A critical responsibility of green axes Melbourne is implementing a stringent process of monitoring, evaluation and citizen engagement over a protracted period of implementation as to ensure equitable outcomes for local citizenry.

Green axes Melbourne has the potential to implement nature-based solutions of urban greening within the Melbourne CBD that not only increase climate risk resilience, urban sustainability, air quality improvements but also offer co-benefits of increased street activation, urban vibrancy and mental and physical health improvements for those working, living and playing within the Melbourne CBD.

7.0 Figures List

Figure 1: Map of focus area relative to Australia(Made using QGIS and Adobe Photoshop)

Figure 2: Superblock illustrations showing original building massing (left) and subsequent private expansions (right) (Urbano, 2016)

Figure 3: Superblock interventions for street pacification within Barcelona (Nieuwenhuijsen et al. 2024).

Figure 4: Street level comparison after green axes implementation in Barcelona (Made in Adobe Photoshop using google maps). (Google Maps, 2025)

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Introduction

The following documents demonstrate my proficiency in design and projection. They showcase site analyses and policy analyses as well as the proficiency I have using technical software in arranging these design projects.

Knox Central Precinct Existing Conditions
ABPL90131 - STRATEGIC PLAN MAKING

This design project was completed to analyze the existing conditions within a site located in the eastern Metropolitan Melbourne region that will be experiencing significant development. The purpose of this project was understanding existing site assets in order to conduct strategic recommendations.

Brunswick Urban Design Code Interventions
ABPL90132 - URBAN CODING AND DESIGN

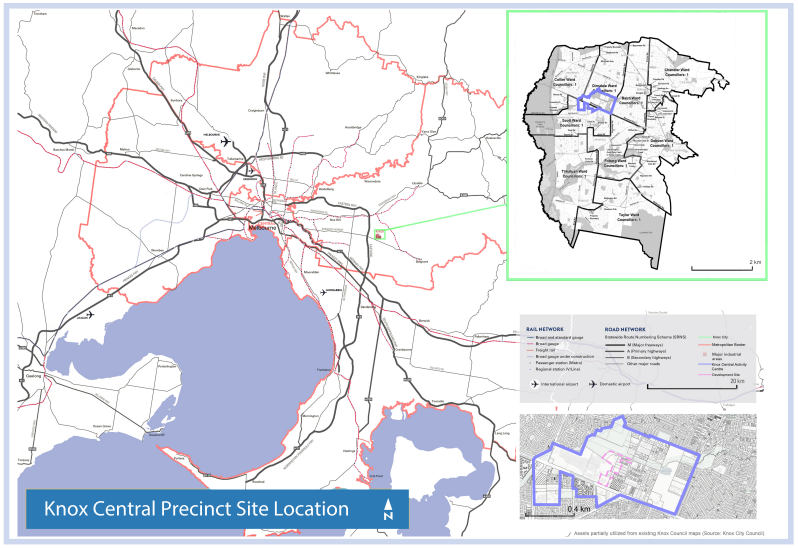
This project reflects a standard site analysis and design intervention strategies at mobilizing a further cosmopolitan appeal of the region in North Melbourne known as Brunswick. This project demonstrates my use of GIS, Sketchup and the Adobe creative suite.

Plan For Victoria - Policy Analysis
ABPL90064 - CLIMATE CHANGE & SUSTAINABILITY PLANNING

This policy analysis was prepared to evaluate the state of Victoria's 'Plan Victoria' and specifically how well this document proscribes urban planning interventions at achieving lower green house gas emissions. Using an infographical preojection method, this brief demonstrates my analytical skills.

Ulaanbaatar, Mongolia Urban Design Analysis
ABPL90017 - URBAN DESIGN THEORY

This report was prepared to evaluate the urban design profile of Ulaanbaatar, the capital city of Mongolia through three urban design lenses: density, mix and access. This report demonstrates design expertise and analytical proficiency.

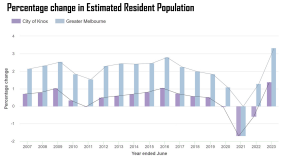


Knox Central Precinct

511 Burwood Highway Site Analysis



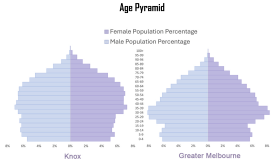
Percentage change in Estimated Resident Population



Sources: Australian Bureau of Statistics, Regional Population Growth, Australia (3218.0).

Long-term trend: Greater Melbourne's population growth rate was generally higher than that of the City of Knox throughout the observation period, which is related to the higher attractiveness of Melbourne as one of Australia's major cities, including employment opportunities, educational resources and lifestyle factors.
Impact of the COVID-19 pandemic: It had a significant negative impact on population growth, but as the pandemic eased, population growth in both regions rebounded quickly. Greater Melbourne is growing faster and more resilient.

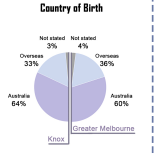
Age Pyramid



Source: Australian Bureau of Statistics, Knox & Greater Melbourne, 2021 Census Community Profiles

Knox has a lower proportion of children and youth than Greater Melbourne, and a higher proportion of elderly than Greater Melbourne.
Overall, the age structure of knox is more aged, while Greater Melbourne is younger, indicating that Knox has a lower birth rate, and young people may have emigrated, because the city is not as attractive as the latter in terms of education, employment and other conditions.

Country of Birth



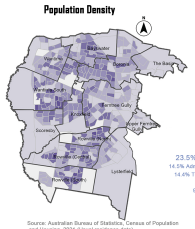
Source: Australian Bureau of Statistics, Knox & Greater Melbourne, 2021 Census Community Profiles

Knox has slightly more local residents, while Greater Melbourne has a larger overseas population. This indicates that Knox is not as cosmopolitan as some other areas in Greater Melbourne.

Demographics

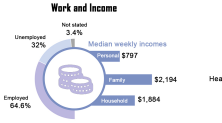
Konx was settled by Europeans in 1838, mostly in Rowwille and Lysterfield. Until the 1860s, population growth was concentrated in Bayswater and Ferntree Gully. In 1889, the Ferntree Gully railway line was opened, which made transportation more convenient and the population increased more significantly. Areas away from the railway line, such as Wantirna, Scoresby and Knoxfield, developed later. From the 1960s, residential areas developed rapidly, and from the 1970s, commercial and industrial development also began. Rowwille and Lysterfield experienced significant growth only in the 1980s and 1990s, respectively. The graph on the right shows the population density distribution of Knox in 2021, and it can be seen that the population is mainly concentrated in individual regions in the north and south central.

Population Density

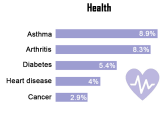


Source: Australian Bureau of Statistics, Census of Population and Housing, 2021 (Usual residence data).

Work and Income



Health

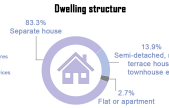


Occupation and Industry

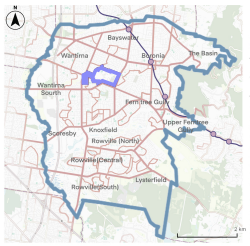


Source: Australian Bureau of Statistics, Knox & Greater Melbourne, 2021 Census Community Profiles

Dwelling structure



Transportation



Source: OpenStreetMap

The City of Knox is served by Eastlink, Burwood Highway, Mountain Highway, Stud Road, Wellington Road and the Belgrave railway line.

The picture on the left shows the bus network in the city. Rowwille has a well-developed bus network, with several bus lines running through and connecting various parts of Rowville. Some areas on The edge of the city has poor bus accessibility, such as The Basin, Lysterfield and other destinations with relatively few bus routes. Only a small number of bus lines in the southwest pass through the site, which may affect the accessibility of transportation in this area.

In the whole city only one railway line crosses the northeast, coverage is limited, only including Bayswater, Boronia, Ferntree Gully and Upper Ferntree Gully, etc. Rail network expansion should be prioritised to address these shortcomings.

Current Burwood Hwy



Source: Street Mix

Recommended Future Burwood Hwy



Source: Street Mix

Street Mix

Burwood Highway is a major obstacle in encouraging resident engagement with public open space in the Knox Activity Centre. High speeds, large volume of traffic and low pedestrian connectivity all impede connection along Burwood Highway. A redesign of the arterial road is necessary to achieve objectives of increasing public connection and engagement in open space.

Open Spaces



1



2



3



4



5



6



7



Source: CADMapper

Parking Facilities:
Low utilisation rate (picture 3)
The multi-level parking facility in picture 3 is located directly opposite to the surface parking lots, there was a

Parking Facilities:
High utilisation rate (picture 1, picture 2)
This site contains many parking facilities, the parking lots in picture 1 and picture 2 provide the convenience for the region's residents and visitors parking choice, however also reinforce spatial limitation in encouraging car usage that diminishes sustainability and neighbourhood amenity.

The open spaces in shopping centres (picture 4)
are located within the Westfield shopping centre, providing residents with places to rest and socialise. However, the development of this site involves inconsistencies in development of both large indoor traditional shopping malls, and outdoor shopping regions that could reinforce barriers and prevent pedestrian interaction with site.

Open park (picture 5)
The park in picture 5 is an open green space, is the site of the residents for sports such as playing football. This space provides residents with good outdoor sports and leisure places.

Mixed-use bike and pedestrian paths (picture 6)
The road shown in picture 6 represents the shared pathways of bicycles and pedestrians. Due to a lack of separation, there is the possibility of collision between people and vehicles, which has certain safety risks. Further design improvements may be needed to improve safety for pedestrians and cyclists.

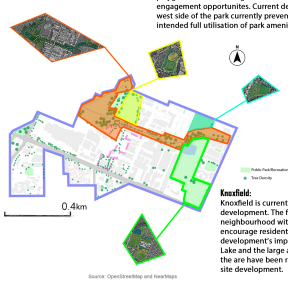
Planned wetland reserve (picture 7)
The public space in picture 7 is not yet open, it is planned to be transformed into an ecological reserve in the future. The plan shows the government attaches great importance to the ecological environment.

Challenges and Opportunities

Blind Creek:
Blind Creek is a recreational area for people to ride bicycles, walk-and enjoy site amenity, but there are safety risks and spatial limitations at present. Implementation of further signage, demarcation lines and an expansion of trails without reducing ecological or heritage areas can better accompany cyclists and pedestrians in recreation improvement.

Urban open space is an important place for residents' daily life leisure and recreation, which has positive social significance for improving residents' living environment, protecting urban ecology and promoting regional sustainable development.

The site has a variety of open spaces and facilities, but there are still challenges in the use of parking lots, the diversity of public spaces, the safety of paths and development concerns involving key landscape features and local ecology.



Source: OpenStreetMap and NearMaps

Lewis Park:
Lewis Park includes a diverse provision of large sporting grounds, playgrounds and walking trails to accompany a large array of engagement opportunities. Current development of the wetlands on the west side of the park currently prevents pedestrian permeability and intended full utilisation of park amenities.

Community Garden:
The Knox community garden offers many opportunities for community involvement in local resource management. While the garden currently involves a diverse production of local goods, connectivity in the form of footpaths and accessibility concerns currently hinder provided amenity.

Knoxfield:
Knoxfield is currently planned as a new neighbourhood development. The future development aims to deliver a vibrant neighbourhood with significant areas for public open space to encourage resident recreation. Concerns involving the development's impact on current site features such as the Knox Lake and the large and diverse array of local wildlife that utilise the are have been raised and should be considered further in the site development.

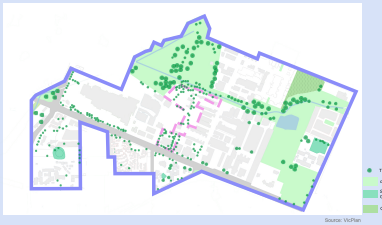
Activity Centre



Environment

There are larger, more continuous green Spaces to the north and east of the area, and these green Spaces can provide good habitat for a variety of wildlife.

Although the overall green area of the area is well distributed, some areas especially the central and southern areas have low trees coverage rate. More plants can be planted in these areas to improve the environment.

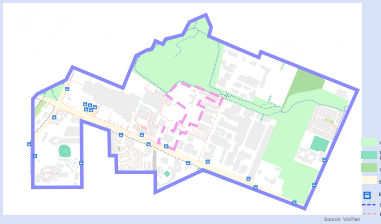


Source: VicPlan

Accessibility

Public transportation is mainly concentrated on one main road, and the rest of the region is mainly dependent on walking or car.

The path is not coherent and scattered, which requires better road planning. They can consider extending bus routes and increasing bus stops to facilitate the travel of residents.



Source: VicPlan

Functional Mix

The area is mainly a work area, while the visiting area and the living area are separated in another area, and this division of the three areas may lead to limited interaction between the residential, commercial and work Spaces.

They can introduce more mixed-use buildings to reduce the number of residents commuting time, increase daily activities in all areas, and

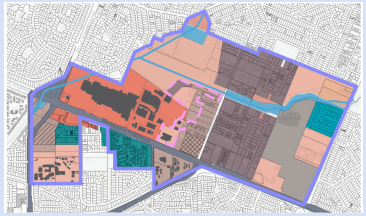


Source: VicPlan

Land use

The area contains industrial areas, schools and residential areas, the industrial area provides local employment opportunities, and the school provides education services for surrounding families.

Industrial areas should pay attention to industrial pollution and noise to reduce the impact on residents' living conditions.

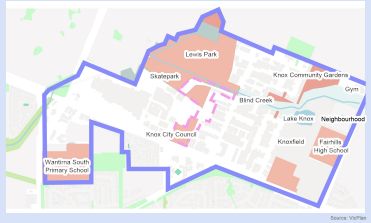


Source: VicPlan

Public and Semi-Public Areas

The Knox Central Activity Centre hosts several public and semi-public areas from Lewis Park sporting area, Blind Creek Cycleway and others. Each area represents significant amenity and opportunity for the site to better embrace public open space in pursuing strategies of increased community involvement in open space and better connection with the spatial features of the site.

Limitations involving permeability concerns associated with Peestrian/car interaction and prevalence of car-parking presents challenges in increasing utilisation and expansion of existing public spaces.



Source: VicPlan

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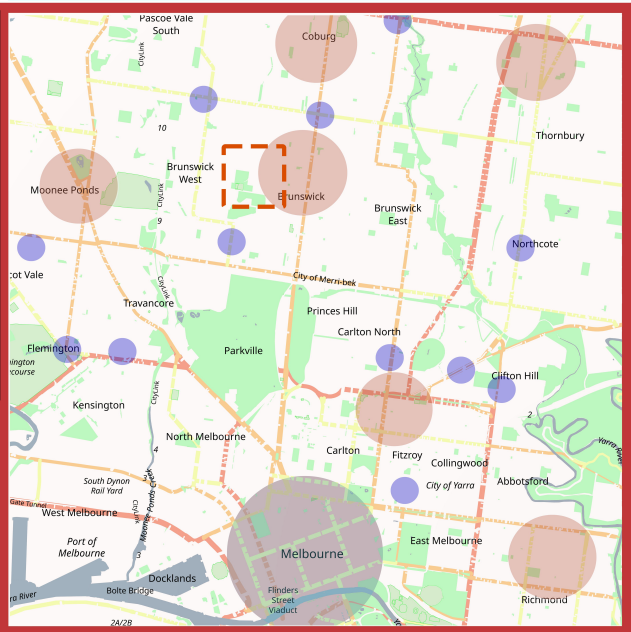
BRUNSWICK: THROUGH THE LOOKING GLASS

10kmx10km

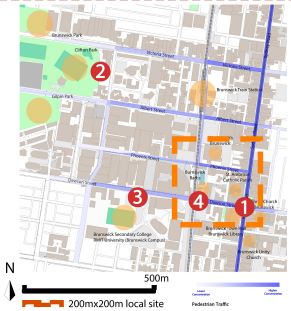


Activity Centres
Inner Melbourne

N 2.2km
1kmx1km Brunswick site

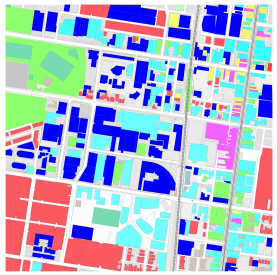
Central Business District
Major Activity Centre
Smaller Activity Nodes

1kmx1km



Pedestrian Movement

Brunswick along Sydney Road is a hub for pedestrianism. Hosting major social centres such as the University of the Third Age: Brunswick, Brunswick Library, Brunswick Town Hall, RMIT University: Brunswick Campus and the parks, churches and commercial opportunities to compliment these centres, Brunswick is a bustling centre for activity.
(Data gathered using Google street view observation)



Functional Mix

Brunswick hosts a high level of diversity among land uses with the potential to attract people with a plethora of needs and desires. With high levels of commercial, mixed use, civic, educational and industrial typographies, Brunswick accommodates myriad populations in neighbourhood attractions. limitations in functional diversity include large regions of single-use detached residential housing on the periphery of the site and a large barrier of industrial purposes that intersect the major public park's on the site's west and the Sydney road commercial centre. (Data gathered using VicPlan) (Methodology inspired by Dovey and Pafka's Functional Mix (Dovey & Pafka, 2017)).



Land Use

A key challenge Brunswick faces are land uses that may not be conducive to the future that Brunswick imagines for itself. While the commercial centre along Sydney road is potentially the most exciting piece of this site's typography, the disparity exhibited along the adjacent corridors of Dawson, Phoenix and Albert Street result in a swift diminishment of activity. much of this diminishment could be attributed to large swathes of industrial zoning and neighbourhood residential zoning that inhibit diversity in activity. (Data gathered using VicPlan)



'Publicness'

The significance of public space in catalysing cosmopolitan activity can not be understated. From the State Library in Melbourne, the Dome in Cologne, Grant Park in Chicago and many more sites across the world, the public features of the site are the quintessence to their cosmopolitan allure. Brunswick has all the trappings of this allure in Clifton Park, Brunswick Baths or St. Ambrose Parish without the pedestrianisation or the full utilisation of periphery urban areas that would reveal the cosmopolitan potential these public places have. (Data gathered using OpenStreetMaps)

Major Destinations On-Site

1 Brunswick Town Hall



Brunswick town hall hosts a number of civic functions. Being the site of civic administration, adjacent to the Brunswick Library and the University of the Third Age Brunswick, Brunswick town hall is a cornerstone of the urban form of Brunswick.

2 Clifton Park



Clifton Park is the largest element of Brunswick's three-pronged public recreation region also including Gilpin Park and Brunswick Park. Clifton Park hosts major sporting grounds, bike paths, green space and recreation areas. Its use in encouraging active participation in Brunswick's urban form can only be matched in its aforementioned sister parks.

3 RMIT University: Brunswick



RMIT University's Brunswick campus is one of Brunswick's major education centres. Hosting a diverse avant-garde intelligentsia, the university campus provides huge public utility in serving as a major employment structure of students, faculty and aiding in the flourishing of adjacent commercial and creative centres of Brunswick.

4 Brunswick Bathhouse



The Brunswick bathhouse is a historic public entity distinct in function. Bathhouses are seldom recognised in their utility to urban concern and Brunswick is fortunate to have such a significant piece in their urban form. Located adjacent to Sydney Road and the cultural centres of St. Ambrose Catholic Parish and The Brunswick Town Hall, The Brunswick bathhouse is among the most significant features of Brunswick.

How Can Cosmopolitanism Interact with Brunswick's Public Space?

Cosmopolitanism in contemporary discourses is defined by the convergence of local and global influences on governmentalities and policy priorities. At its heart, cosmopolitanism is an urban focus on **identity** (Raco, 2016). Brunswick's storied legacy as a place shaped by global migration forms a distinct urban identity. It is therefore necessary that Brunswick's public spaces provide cosmopolitan opportunities for Brunswick's people to express that global identity.

Through a spatial analysis of the selected 200x200m area, and the introduction of new urban codes within this area, this site analysis outlines strategies of promoting invigourated cosmopolitan activity in Brunswick, Victoria, Australia focusing on four major strategic goals.

A Cosmopolitan Vision of Brunswick:

" The provision of equitable and accessible transport networks, enhancing social services, improving passive and active recreation spaces, and creating local jobs that match the skills of local people. (Merri-bek City Council, 2010) "

Strategic Goals:

1 A Diverse and Attractive Urban Design Environment

A major goal for Brunswick is to create attractive and diverse urban environments that not only are inspired by the people of Brunswick, but can inspire a future for Brunswick that expands upon the present.

2 A Safe and Inclusive Public Realm For All

Brunswick's legacy is one of a global identity. A Key to ensuring this global diversity can be respected, urban design principles must ensure the safety and inclusivity of all of Brunswick's diverse peoples.

3 A Prosperous and Animated Network of Connected Streets

Creating integrated streets is critical to fully realising the activity potential of Brunswick. By encouraging pedestrian permeability and site accessibility, the many destinations of Brunswick will become quickly and easily traversable.

4 A Place that Welcomes Growth and Prioritises Local People

The northern metropolitan region of Melbourne is expecting 800,000 new residents by 2051(Planning Victoria 2024). To accommodate this growth, Brunswick must prepare urban solutions to accommodate this growth. At the same time Brunswick must provide opportunities that priorities the current residents of Brunswick.

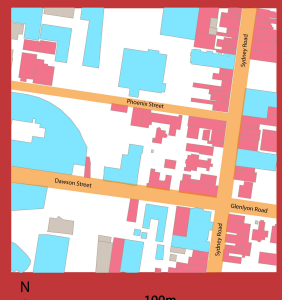
200mx200m



Urban Permeability

Brunswick exhibits a fabric of high density that developed along historical tram lines. These urban networks contain a myriad of higher capacity arterials, lower capacity residential and minor streets, lane ways and dedicated footpaths making urban permeability a feature that compliments the movement between the typographies exhibited within Brunswick. Limitations of existing features impacting permeability do include a lack of defined hierarchy which does raise safety or connection concerns that could disenfranchise a higher site permeability. (Data gathered using Google maps)

Wider than 12 metres
Between 6 and 12 metres
Narrower than 6 metres



Dwelling Density

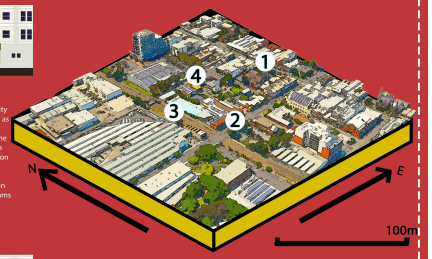
Brunswick particularly the historical development paths along Sydney Road and Phoenix and Dawson street do contain higher densities in dwellings per hectare contributing to higher concentrations of amenities and diversities in urban use. However there are patchworks of industrial and commercial land uses that exhibit larger urban footprints that while contributing utility in the form of large employment centres, encompass large swathes of urban land that may find better utilisation in subdivision and increased density in development.
(Data gathered using Google Maps).

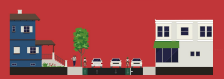
Higher than 23 Dwellings per Hectare
Lower than 23 Dwellings per Hectare
Major Connections



1 Sydney Road

Serving as the main arterial of the city of Merri-bek, Sydney Road has the unique responsibility as the activity centre of Brunswick, including major destinations such as The Brunswick town Hall and Library, University of the Third age and major commercial and retail locations. The arterial is served by Tram line 19 with direct connection to the Central Business district and Flinders Street Station along Sydney road, Royal Parade and Elizabeth street . Sydney Road while exhibiting a diverse selection of connectivity options, hierarchy is not well defined, often cyclists, pedestrians, private automobile drivers and trams must vie for their share of Sydney Road.





2 Dawson Street

Branching from Sydney road, Dawson street features a narrower 13 metre street width in comparison to Sydney road. containing major destinations such as RMIT Brunswick University Campus, Brunswick baths and First Church Brunswick, the role of Dawson as a subsidiary to Sydney is underpinned. While the proximity with Sydney aids in the cosmopolitan amenities available, Dawson Steet appreciates a noticeable decline in pedestrian destinations in comparison to the proximal Sydney Road.

The Streets of Brunswick:

"The street is the river of life of the city, the place where we come together, the pathway to the center."
-William H. Whyte (1980)

The streets of Brunswick host a range of differing typographies, all exhibiting their own spatial effects on urban use. From the mixed use and high connectivity of Sydney road creating a bustling commercial pulmonary artery, to the concealed Upfield shared path creating an inconspicuous pedestrian hepatic vein. While concerns of street hierarchy, spatial concession and discourse of desired futures slow development, the streets of Brunswick have the potential to invite the diverse residents of Brunswick in creating active and engaging public space while avoiding the alienation of these populations. (Imagery generated using StreetMix and Google Earth)



3 Upfield Shared Path

Upfield shared path is the largest dedicated grade-separate pedestrian and cyclist shared path on the site. This pathway follows the Upfield train line that services the Brunswick train station. While exhibiting excellent spatial prerogative in creating pedestrian connectivity along narrower and more permeable urban pathways, with only 4 metres in width and without clear separation in modal hierarchy between cyclists and pedestrians, the usefulness and attractiveness of Upfield shared path as a higher utility pedestrian walkway is diminished.



4 Phoenix Street

Similar to Dawson Street, Phoenix street is a narrower width connection adjacent to Sydney Road. Phoenix includes major destination centres such as Woolworth's Brunswick and proximity with St. Ambrose Catholic Parish. Unlike Dawson street, Phoenix exhibits a lower density in both larger footprint developments with increased concessions of lot space dedicated to surface parking.

URBAN CODES

Code 1: Street-Parking Integration

Expected Outcomes

Strategic Objective:
To better integrate Brunswick's accessibility infrastructure with a consistent and cohesive streetscape while reducing the associated negative externalities of large parking concessions.

Participants:
- Private Developers
- Local Councils
- Land Owners
- Vehicle Users

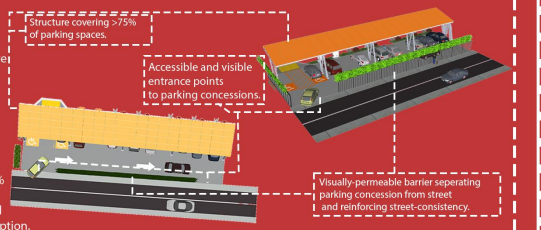
In Brunswick, this provision would apply to developments including dedicated surface level parking. This provision would enable the integration of surface parking with consistent street patterns with natural or complementary building materials to street character. This amendment would also lead to increasing of canopy space within Brunswick lowering sun exposure to heat absorbing materials.

Code Definition

1. Street-level parking concessions must conceal atleast 75% of street level view of parking concession from street or sidewalk with visually-permeable structure or vegetated wall complying with street character in complementary style and building materials.

2. Constructed concealment must elevate above the ground to atleast 50% of street-wall height or when street wall height not provided: 2.5 metres.

3. Parking Concession may not expose greater than 75% of parking area to sun. Concealment may include vegetated canopy cover or solid: non-reflecting material or photovoltaic array that adequetly reduces heat absorption.



Code 2: Parklet Street Edges

Strategic Objective:
To expand private commercial spaces into the street interfaces. Expanding pedestrian walking spaces while encouraging employment and productivity opportunities.

Participants:
- Private Developers
- Business Owners
- Land Owners
- Pedestrian Shoppers

In Brunswick, this provision would apply to developments with access to the street interface. This provision would allow underutilised at-street parking concession to be converted into outdoor commercial venues. This code would be targeted towards food and drink Premises, however could also be utilised by other commercial Premises such as retail stores for exhibition space. This provision would activate underutilised street space, redirect current outdoor venues off increasingly utilised footpaths and generate increased street utilisation.

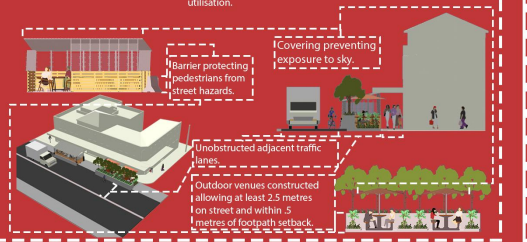
Code Definition

1. Businesses may consume at most 50% of total on-street parking provision spaces to construct well-built and ventilated outdoor venue that provides a consistent built form with commercial premesis.

2. Constructed outdoor venue must adequetly cover 100% of all seating from sky. Must also adequetly ensure safety of customers from street vehicles.

3. Outdoor commercial venue may not obstruct adjacent pedestrian footpath nor street vehicle traffic.

4. Outdoor venue may not exceed 0.5 metres of setback from footpath edge and may extend at maximum of 2.5 metres from footpath.



Code 3: Pedestrian Passageways

Strategic Objective:
To increase pedestrian permeability and site access while providing more recreation space shielded from street traffic.

Participants:
- Private Developers
- Residents
- Land Owners
- Pedestrians

In Brunswick, a provision such as 'Pedestrian Passageways' would enable a greater connectivity between developments and the adjacent sites of Brunswick. By creating passageways that prioritise pedestrians, Brunswick could expand recreation space and travel networks that could stimulate greater walkability and pedestrian activity within Brunswick.

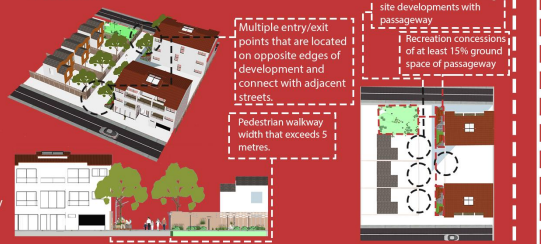
Code Definition

1. Passageways may not be constructed at narrower widths than 5 metres and must contain atleast two points of street entry and exit at divergent sides.

2. Passageways must be well designed and easily navigable with at least one access point with each adjacent development.

3. Passageways must provide active and passive surveillance and ensure sightlines of all points within passageway.

4. Passageways must ensure at least 15% of passageway area is dedicated to green recreation space that is well integrated with street character and design.

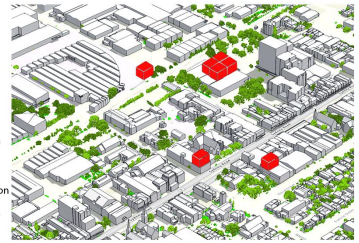


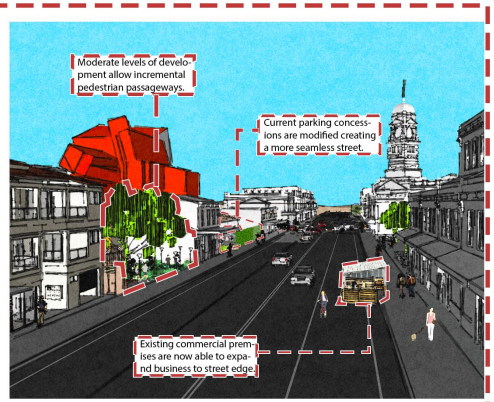
DESIGN SCENARIOS

Scenario 1: Brunswick's Status Quo

'Brunswick's Status Quo' is the current scenario representation of Brunswick's urban realm. Brunswick is experiencing an influx of private development that is regulated by the Merri-bek planning scheme preventing new developments from detracting from street character, building heights, street wall regulations and adhering to heritage regulation among a number of other controls. This scenario provides opportunities for developers to think of novel solutions that can provide growth opportunities within Brunswick while respecting neighbourhood character.

At the current trajectory that Brunswick is approaching, many argue that Brunswick is losing character. The implementation of these codes aims to provide a means to which measured and regulated growth can align with the principles and character of Brunswick. The requirement of pedestrian passageways ensures that informal gathering places that are well monitored can expand free from the hazards of vehicle traffic. Local businesses can expand venue space through street-level parklets without developing their site significantly. The further integration of surface parking allows limited vehicle accessibility that no longer adversely affects street consistency nor contributes as signifanctly to urban heat islands.





Strategic Goals: Code-Goal Performance Evaluation Matrix

Code:	A Diverse and Attractive Urban Design Environment	A Safe and Inclusive Public Realm For All	A Prosperous and Animated Network of Connected Streets	A Place that Welcomes Growth and Prioritises Local People
1	✓	✓	✗	✗
2	✓	✓	✓	✓
3	✓	✓	✓	✓

Scenario 2: Increased Private Investment

In this scenario, the need to accomodate growth comes at the cost of reducing development regulations within Merri-bek's planning scheme. The result is the creation of larger and more encompassing private devlopments that expand far beyond the previous height limitations and compromise existing street consistencies and neighbourhood character within Brunswick. New highrise towers begin populating Brunswick's streetscape and ushering in a new form for Brunswick completely alien to what had previously defined the neighbourhood.

The developer-friendly atmosphere leads to high levels of adoption for active-street parklets and pedestrian passageways, however low adoption for street-parking integration. The high demand for land leads many businesses to expand operation into adjacent parklets. Many new developments leads to a frenzy of pedestrian passageway provision. The demand for land has the effect of the swift reduction of surface parking and the lack of a need to cover that parking. Brunswick becomes a hub of pedestrian activity, although much of that pedestrianism no longer offers any resemblence to what Brunswick was.





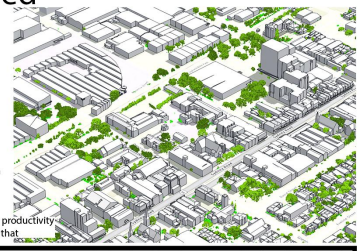
Strategic Goals: Code-Goal Performance Evaluation Matrix

Code:	A Diverse and Attractive Urban Design Environment	A Safe and Inclusive Public Realm For All	A Prosperous and Animated Network of Connected Streets	A Place that Welcomes Growth and Prioritises Local People
1	✗	✗	✗	✗
2	✗	✓	✓	✗
3	✓	✓	✓	✓

Scenario 3: Decreased Private Investment

Gentrification which has already impacted Brunswick so tremendously finally incites a reactionary response from those living in Brunswick. The people of Brunswick petition Merri-bek council to implement more encompassing development regulations that discourage large development projects within Brunswick. All future large equity injections in Brunswick cease and developments become relegated to small expansions by existing land owners or leesers on existing developments. The effect is a Brunswick that becomes completely a product of those who live and work within the area free from the venture capital that shrouds the inner suburbs of Melbourne in the existential threat of gentrification.

The reactionary stance on development does not stall economic productivity as many politicians and economists earn, instead the businesses that already inhabit Brunswick begin to flourish without the threat of foreign capital interference. Passageways cannot be implemented as new major development has stalled, however there becomes a zeitgeist of parklet constructions bringing new life to Brunswick's streets and local Businesses. Parking provisions now are seamlessly implemented within the streets of Brunswick and allow diverse site accessibility.





Strategic Goals: Code-Goal Performance Evaluation Matrix

Code:	A Diverse and Attractive Urban Design Environment	A Safe and Inclusive Public Realm For All	A Prosperous and Animated Network of Connected Streets	A Place that Welcomes Growth and Prioritises Local People
1	✓	✓	✗	✗
2	✓	✓	✓	✓
3	✗	✗	✗	✗

The Insufficiency of Suggestion

A Plan for Victoria and the critical need for prescriptive timebound greenhouse gas emission policy for Victorian climate justice.

Executive Summary

With the publishing of Plan for Vicrtoria (Victorian Government, Department of Transport and Planning., 2025), The Victorian government has expressed the acute need for climate action necessary for biosphere protection however has neglected to incorporate specific, timebound greenhosue gas (GHG) emission reduction targets. The publishing of this document has come at a critical time, when projected sea level rise is approaching 2 metres and average temperatures are forecasted to rise by upwards of 3.2°C by 2100 if high emission levels are maintained (United Nations, 2015). As argued by critics, plan Victoria in its current form is incapable of addressing the climate justice goals necessary in protecting Earth's biosphere (Hurlimann et al., 2025).

While Victoria has made progress, reducing emission levels by 32.3% since 2005 (State Government of Victoria, 2022)(figure 2.), there remains a misalignment in policy prescriptions towards pathways for true climate justice. This inadequate policy approach risks *Plan for Victoria* being seen as placatory rhetoric rather than durable and transformative government strategy.

This brief aims to address some of the shortcomings present within a *Plan for Victoria* through the inclusion of:

- **A State-wide net zero GHG emissions target by 2045**
- **transitonal five-year reduction targets from 2005 levels of:**

1. -60% by 2030
2. -70% by 2035
3. -90% by 2040

- **Landuse and sector specific commitments to expand controls of GHG's beyond carbon dioxide to methane, nitrous oxide and fluorinated gasses with extreme global warming potentials.**

Through the implementation of timebound, ambitious and justice-centric mitigation strategies, Victoria may be able to align its planning frameworks with the Paris Agreement by protecting vulnerable communities and safeguarding long-term planetary climate security from the escalating risks posed by Anthropogenic climate change.

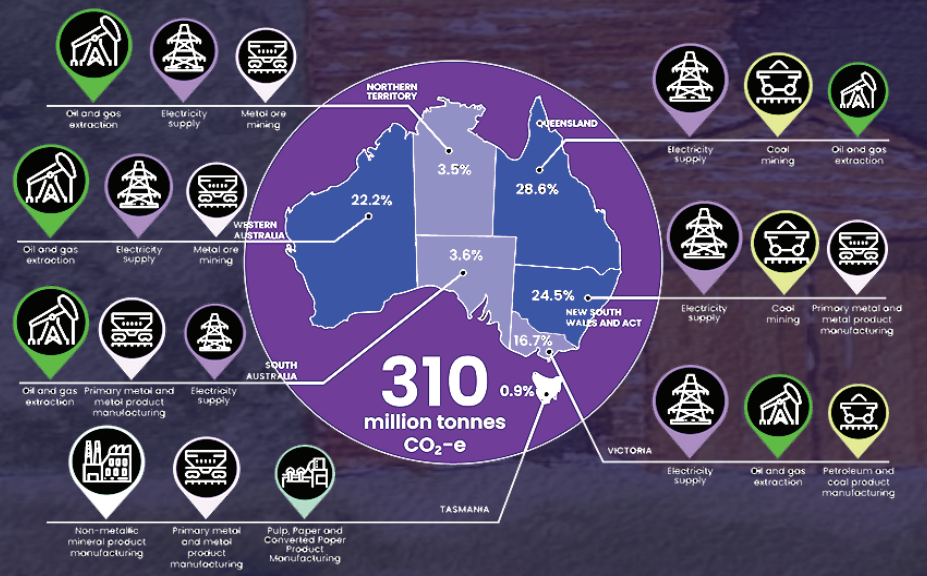


Figure 1. GHG emissions profile Australia 2022 (Clean Energy Regulator, A.G., 2021)

Background and Significance:
Victorian Climate Shortcomings

Victoria, Australia is the second most populous state in Australia, home to 7 million people or one-fifth of Australia's total population (Australian Bureau of Statistics 2020) and the nation's second most populated metropolitan area: Melbourne contributing 16.7% of Australia's total emissions or 84.16 megatons of CO_2 emissions in 2025 (DCCEEW, 2025). With this significant carbon footprint, the state of Victoria has a responsibility in light of destructive climate projections to take convincing climate action.

However, while successive governments have recognised the urgency to reduce climate emissions (figure 2.), Victorian planning instruments lack enforceable GHG emission reduction targets. Academic literature has found that "Not one of the policy instruments sets a mitigation target that addresses climate justice" despite widespread acknowledgement of the necessity to do so (Hurlimann et al., 2025).

The omission of discrete, measurable commitments jeopardises both Victoria's climate sincerity and the state's leadership role in Australia's wider transition to global climate justice leadership.

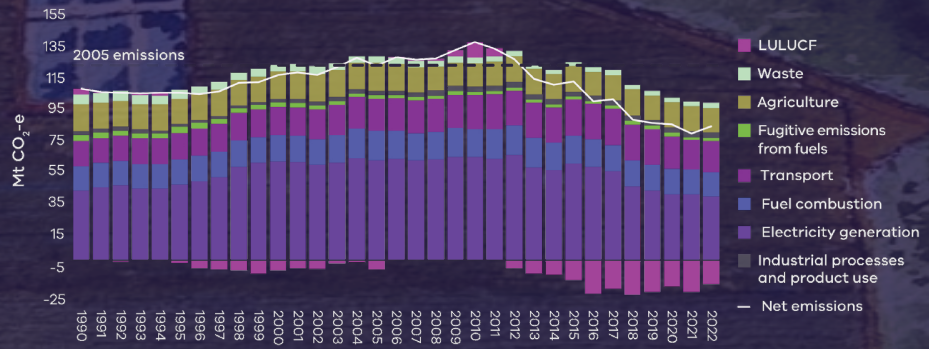


Figure 2. carbon dioxide emissions over time summarised by industry, Victoria, 2023 (DCCEW, 2023).

A Failure to Meet the Moment:
The Elusive Cap on Greenhouse Gas Emissions in Victoria, Australia

Plan for Victoria: A Plan by Victorians for Victorians (Victorian Government, Department of Transport and Planning., 2025) claims to respond to community calls for "sustainable environments and climate action" (p.14). However, while doing so, only explicitly mentioning emissions 9 times across the 91 page document and mostly only within Appendix 2's transportation reform section in reference to electric vehicle uptake without specific timebound emission reduction figures.

This lack of integration exemplifies a kind of epideictic climate rehetoric, which can be seen as symbolic affirmations of climate action without meaningful structural pledges. Without ostencible climate mitigation targets, critics suggest that climate action cannot achieve long term mitigation goals (Zheng et al. 2024). This kind of soft government intervention also displays neoliberal policymaking strategies whereby market-driven, piecemeal strategies camoflauge the absence of systemic change. This framework of anemic government reliance on private market actors to satisfy public utility, in this case; climate justice through transport electrification is prevelont in contemporary "abundance theory" frameworks (Klein & Thompson, 2025). These frameorks however have already been retroactively debunked as a kind of superficial 'cosmopolitanism' whereby universal global human rights ultimately fail to materialise into better outcomes at local levels and instead a pluralistic 'multipolarism' of local level movements focusing on local communities, local peoples and local solutions to the social failings of a global system of neoliberalism commands greater power to address local social issues (Mouffe, 2005, pp. 90–103) and may in this case approach climate justice.

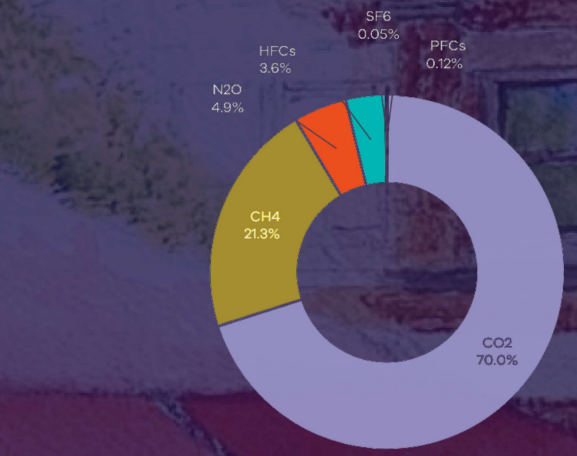
While Victoria's 32.3% reduction in total GHG emissions from 2005 to 2021 display genuine progress (figure 2), these reductions still remain insufficient in achieving a 1.5°C temperature rise cap. Both the IPCC and UNFCCC discuss that no less than 45% reductions below 2010 levels are required globally to avoid continued adverse temperature rise (IPCC, 2018. p. 33) (United Nations, 2015). Victoria's current trajectory and approach falls short.

Beyond CO_2:
The Ancillary Threat of High-GWP Gases

Victoria's GHG emissions profile encompasses more than just carbon dioxide which is typically the only figure to be cited within Victorian planning policy documents. And in many cases these other GHG's can pose far more danger to global biosphere climate stability. Collectively these gasses each pose individual climate risks. For example, while the concentration of carbon dioxide in Earth's atmosphere is highest, its potential warming effect is lowest among most major Anthropogenic greenhouse gasses. This relationship is known as global warming potential (GWP) and is applied within the Kyoto Protocol (Akorede et al. 2012). The GWP of prominant Victorian emissions compared to a single molocule of carbon dioxide is as follows according to DCCEEW (2023) and (Greenhouse Gas Protocol 2024):

- CO_2 (energy & transport),
- Methane (CH_4) (agriculture, waste) GWP: 27 × CO_2,
- Nitrous Oxide (N_2O) (fertiliser use) GWP: 273 × CO_2,
- Hydrofluorocarbons (HFCs) GWP: up to 14,600 × CO_2,
- Perfluorocarbons (PFCs) GWP: up to 12,400 × CO_2,
- Sulfur Hexafluoride (SF_6) GWP: 24,300 × CO_2.

Even at low concentrations, the inclusion of these ancillary GHG's in Victoria's GHG profile can wreak potentially catastrophic climate effects. The concentrations of these gasses are available within figure 3. and suggest that even in the seamingly banal quantities displayed within Victoria's emissons profile, the existence of fluorinated gasses should be featured further within *A Plan for Victoria* among other state policymaking initatives to respect the potential extreme danger posed.



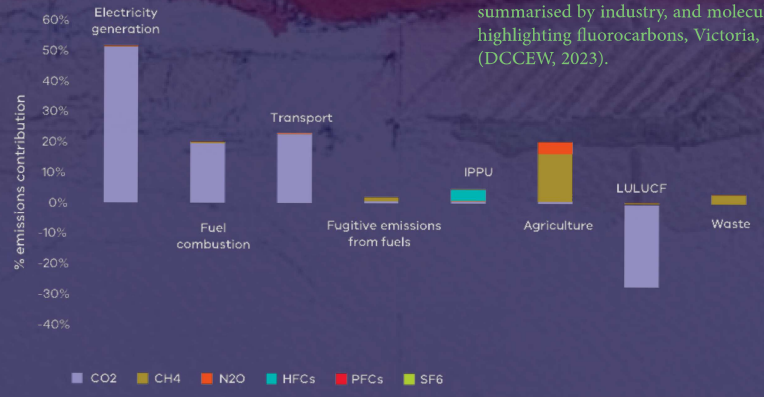


Figure 3. GHG emissions over time summarised by industry, and molecule highlighting fluorocarbons, Victoria, 2023 (DCCEW, 2023).

Policy Considerations

1. To Adopt Specific Timebound Targets

Victoria must enthrone interim GHG emission target caps supported by necessary calls from the IPCC and UNFCCC such as ambitious short term emission reduction targets of:

- 60% by 2030,
- 75% by 2035,
- 90% by 2040,
- net-zero by 2045,

2. To Seek Sector-Contingent Mitigation Strategies

Energy and Transport

To make further inroads and electrify public transport and reduce GHG emitting functions.

Agriculture

To reduce methane through improvements in livestock feed and use incentives for regenerative processes

Industry:

To regulate and further prevent HFCs, PFC's, and SF_6 similar to F-gas regulations in the EU (Regulations (EU), 2024).

3. To Implant Climate Justice in Planning Policy

To guarantee that GHG emission reductions are included with social equity considerations including affordable and climate resilient transportation and housing and subsidised energy transition for households.

Policy Recommendations

To address the criticisms of Victoria's insufficient response to achieving climate justice goals, Victoria should amend *A Plan for Victoria* (2025) to include binding justice-centric, timebound GHG emissions targets such as those recommended within this policy brief.

Through the implementation of the recommendations within this policy brief, Victoria can not only recognise the necessary interventions called for by the UNFCCC's Paris Agreement (2015), but also demonstrate climate leadership within Australia ensuring a livable, just, and climate resilient future.

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Figure 1. GHG emissions profile Australia 2022 (Clean Energy Regulator, A.G., 2021)

Figure 2. carbon dioxide emissions over time summarised by industry, Victoria, 2023 (DCCEW, 2023).

Figure 3. GHG emissions over time summarised by industry, and molecule highlighting fluorocarbons, Victoria, 2023 (DCCEW, 2023).

ULAANBAATAR, MONGOLIA

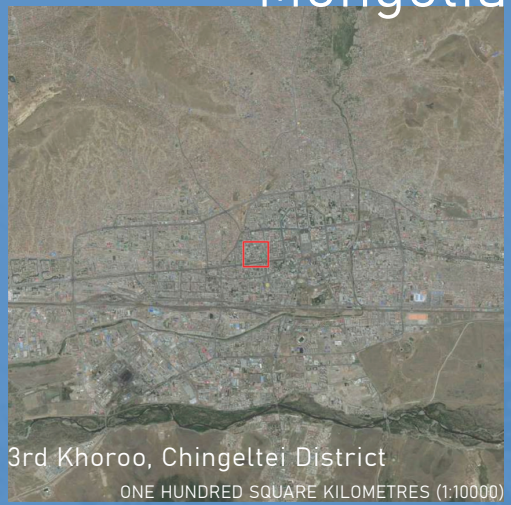


ONE HECTARE 1:500

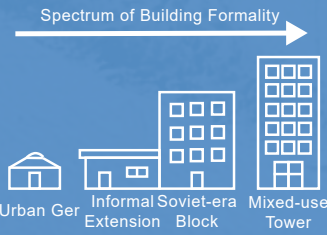


TWENTY-FIVE HECTARES 1:2500

Ulaanbaatar Mongolia density



This 25 hectare tile of Ulaanbaatar captures the 3rd Khoroo of the Chingeltei District, a neighboorhood on the edge of the city's formal urban core. This makes for a rather unique area for Density, Mix and Access analysis (Dovey & Pafka, 2019), as the rapid post-Socialist urbanisation of Ulaanbaatar has led to a pattern of informality through vlow-density extensions within the setbacks of modernist Soviet-era housing blocks.

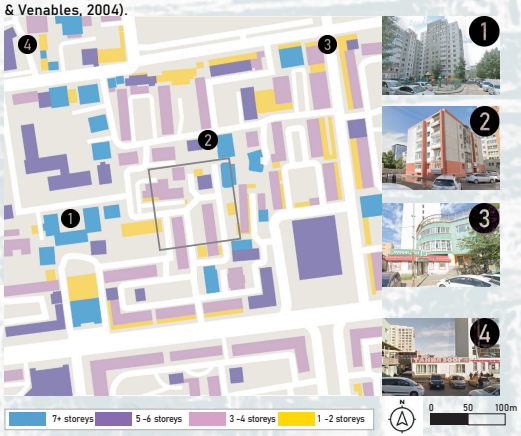




Ulaanbaatar skyline from a 'Ger' neighbourhood (Source: New York Times, 2024).

Building Heights (25ha)

Building heights are generally considered a sort of 'starting point' to understanding an area's 'density' since it can inform both measurable density and perceived density (Pafka, 2023). At the 25 hectare scale, the 3 rd Khoroo is mostly defined by 'sparsely-spaced' 3 to 4 storey Soviet-era housing blocks (pink) which and the occasional 5 to 6 or even taller Soviet-era towers (purple and blue). While these modernist spatial patterns typically produce a partially false perception of density, a defining feature of the 3 rd Khoroo are the post-Socialist one storey informal extensions that have utilised the modernist setbacks for additional commercial and residential space which creates a sort of 'buzz' effect (Pafka, 2023; Storper & Venables, 2004).



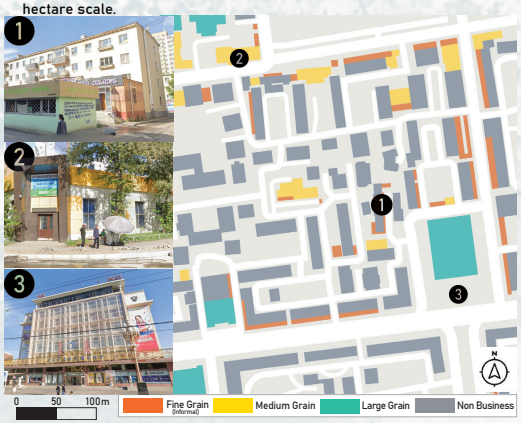
Vehicle Density (25ha)

Through plotting-by-observation of satellite imagery (Whyte & Bemiss, 1979), it becomes apparent that parked cars have a significant spatial footprint on the area. At the 25-hectare scale, plotting reveals the 3 rd Khoroo to be a highly car-dominated environment, creating a perception of high density that, in the absence of data at this scale, may not reflect actual population figures. Typically, this perceived density can diminish street-vitality, as cars often obstruct and deter pedestrian activity (Gehl, 2010; Jacobs, 1961), however, Ulaanbaatar isn't directly comparable to the Global North (Hamiduddin, 2023).



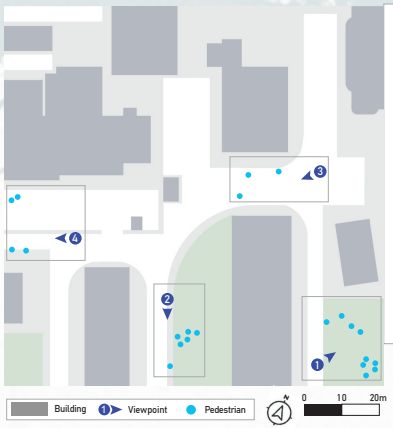
Business Density (25ha)

By separating single-use commercial buildings by grain size (small informal, medium and large), the concept of commercial 'buzz' or 'clustering' becomes more apparent (Storper & Venables, 2004; Pafka, 2023). It is clear that most single-use commercial activity clusters around the primary and secondary roads of the 3 rd Khoroo, especially in the form of the small-grain informal extensions (orange) mentioned previously. There is, to a far lesser extent, a number of more formally constructed medium grain businesses (yellow), as well as large-grain purpose built shopping centres (green) like the State Department Store (3). It should be noted that this does not capture the mixed-use businesses at the 25-hectare scale.



Street Intensity (1ha)

At the 1-hectare scale, it appears that despite the omnipresence of parked cars there is a degree of street-level intensity observable through Google Street View. Although observable interactions may lack the full context, it is clear that the area's streetscape has a palpable intensity – with residents and visitors interacting, socialising and crossing paths (Pafka, 2023). Street View also offers a means of understanding the seasonal rhythm of street intensity, with noticeably more recreational intensity during the summer months, and a quieter, more utilitarian intensity in the winter – demonstrating that despite being the coldest capital city in the world, this is of little deterrence to those living Ulaanbaatar (Hamiduddin, 2023). This noticeable level of pedestrian activity year-round should be understood as a sign that the area is not only high density by measurable or perceivable standards.







Formality and Coverage (1ha)

At the 1-hectare scale, the built form more reflects the original Soviet-era modernist spatial pattern with a relatively low coverage and a lesser degree of informality due to the area's more strictly residential purpose (Pafka, 2023). The setbacks at the scale serve a more formal public function, mostly in the form of parks, playgrounds and plazas, and while informal fine grain structures still exist they complement the more residential area such as a fruit shop and pharmacy, but as will be observed in the mix analysis, ground-floor mixed-use is far more common here through adaptive re-use (Hamiduddin & Plueckhahn, 2021). This reflects the idea that the clustering of informal and semi-informal commercial structures is more likely to occur where there is high demand such as along primary and secondary streets (Storper & Venables, 2004), leading to more open space for public functions.

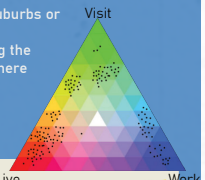


DATA SOURCES:
Satellite Imagery - Google Earth, 2025.
Street View (Summer) - Google, August 2023.
Street View (Winter) - Google, November 2014.

ABPL90017 - URBAN DESIGN THEORY
Mira Lechner-Scott, Graham Inglert, Angelo Bautista and Tom Dickinson

Ulaanbaatar Mongolia mix + access

The current uses of Ulaanbaatar's inner city suburbs or "microdistricts" have evolved greatly since the beginning. We decided to analyse the site using the mix of synergies concept outlined by Dovey, where Mix is made up of the interrelations of form, function and social mix (2016).



Functional Mix (25ha)



The Third Khoroo presents an active functional mix that encompasses several uses across the shells of former soviet and modern housing stock. Using Dovey and Pafka's Live-Work-Visit triangle we see a very diverse mix of uses across the 25ha area (Dovey et al., 2017). As is evidenced in the Formal Mix map, the Khoroo is a soviet-era planning invention, based off the socialist planning model of the "micro-rayon" which sought to totally encapsulate the community within walking distance, while large roads with public transit cris-crossed the city (Ward, 2012). Modern buildings seem to add the much needed density, as the city soaks up massive growth since the fall of communism in 1998 (Singh, 2017).

Formal Mix (25ha)



Social Mix (25ha)





The extensive presence of tourism infrastructure and shopping areas suggests a relatively wealthy area, potentially targeting tourists, as seen in the tourism map. Comparing the building typology of the 3rd Khoroo to the 16th, as seen from Google Maps, we can see both precincts are completely different in terms of their building types with one being more historic, and informal and the other, more commercial and modern. The presence of three department stores, the number of hotels and the area directly connecting to Peace Avenue leads us to assume that the cost of living within the area would be high. This would mean that people living there could be classified as the upper middle to lower upper class amongst the residents in Ulaanbaatar - making the area have a relatively homogenous social class mix across the neighbourhood.



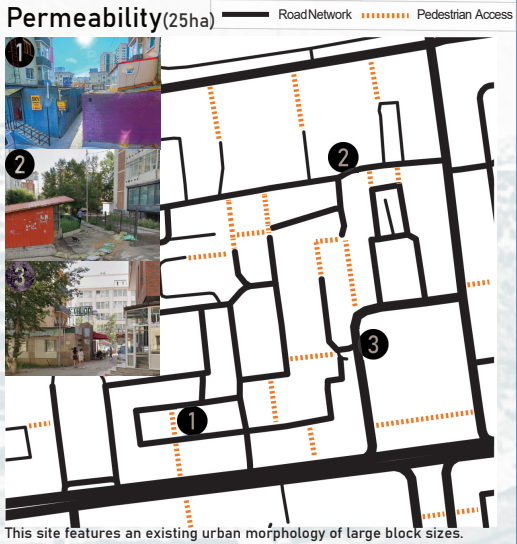




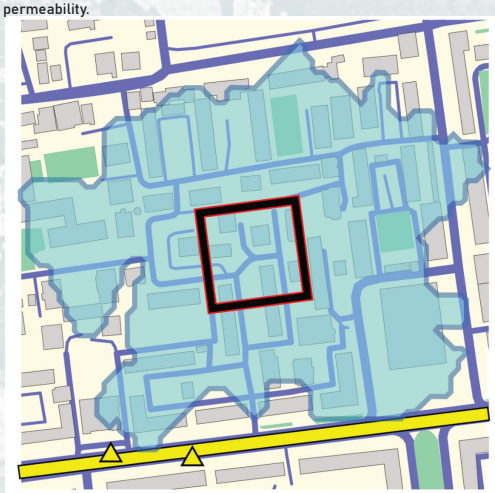
Formal Mix cont'd

Picture 1 depicts the informal shopfronts that develop as the area expands. Picture 2 presents a standard soviet era apartment that has been retrofitted to include business on the ground floor. Hotel Mandukhai presents the benefits of an extremely lax approach to use planning (Pictures depicted under 3). It has a variety of uses over the two timestamps available on google maps, including a karaoke bar, a fashion store and an adult entertainment centre (Google Maps, 2013, 2014).

Permeability (25ha)



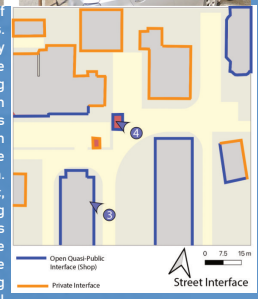
This site features an existing urban morphology of large block sizes. Normatively understood as associating with low site permeability, the 1-hectare site in Ulaanbaatar challenges theoretical understandings provided by Jacobs (1961, pp. 178–186) that small blocks produce more permeable urban form compared to large block sizes. Ulaanbaatar's heterogenous street widths, morphologies and destination frequencies also influence site permeability, producing a large block region with high permeability.



Transit Access Paths

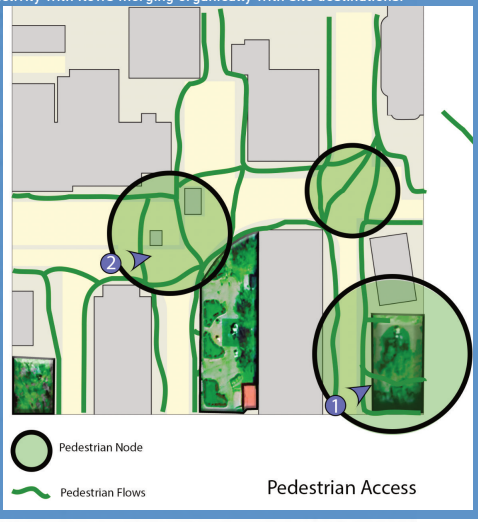
Street-interfaces play a significant role in welcoming pedestrian activity on site. With a repurposing of public housing project developments to mixed-use developments, the site features a diverse and invitational street interface. According to Pafka and Dovey (2017), a sustained mix of public and private street interfaces is a determining factor in developing perceived city life. With our 1-hectare site's myriad of diverse and mixed street interfaces, pedestrian activity and street spontaneity is well-maintained.





A major determining element of site permeability is transit access. The site contains high accessibility for motor vehicles and large street-side allotment for parking provision. AlongPeace Avenue in the 25-hectare site's south contains a major public transportation corridor with a bus route and one stop present in either direction. High motor vehicle traffic, availability of streets at varying densities and pedestrian footpaths work together to produce a large approximately circular 5-minute pedestrian catchment area aiding in transit and pedestrian traversal through site.

Present on the one-hectare site, pedestrian flows follow the defined street routes and pocket parks available. According to Ghamsary et al.(2023), land use such as the emergence of pocket parks play a major role in the presence of people in space. With three major pocket parks each located in the site's south, there is a large partition of recreational space featuring benches, green space and children's play spaces. Pedestrian flows follow the private and public interfaces on site and mesh with the pocket park partitions. With residences, commercial and recreational destinations present, the site experiences high pedestrian activity with flows merging organically with site destinations.



Pedestrian Access

Ulaanbaatar Mongolia synthesis

Density

In summary, through analysis of the 3rd Khoroo at both the 25-hectare and 1-hectare scale, a complex urban environment is revealed, shaped by layers of Soviet-era planning, post-Socialist adaptative re-use, and ongoing informal setback extensions. While the area's built form is initially defined by sparse mid-rise blocks and the occasional high-rise tower, perceived density is significantly shaped by informal single-storey extensions that contribute to a sense of commercial and social 'buzz'. Similarly, the spatial dominance of parked vehicles exaggerates perceptions of density and detracts from pedestrian vitality, although not to the extent that Global North standards of walkability might suggest. Commercial activity is clearly concentrated along major roads, primarily in small-grain informal forms that animate the streetscape. At the finer 1-hectare scale, street-level interactions remain intense despite climatic extremes, and seasonal rhythms of use are evident. Built form here returns to a more formal modernist pattern, with setbacks often functioning as public open space. Nevertheless, informal ground-floor uses remain present, reflecting the area's distinctive character of post-Soviet adaptive re-use. Together, these findings demonstrate that the 3rd Khoroo cannot be understood solely through formal planning metrics, as its lived intensity, informal adaptations, and socio-spatial complexity are crucial to its urban character.

Mix

Ulaanbaatar presents a fascinating case study of the independent adaptive reuse of modernist designed spaces by everyday people. Better still, due to the extensive provision of public space, much of the social utility of the Soviet "micro-rayon" remains. This neighbourhood seems to be thriving with an extensive mix of hotels, shops, schools and financial institutions. What is concerning however is the lack of social mix, with a stark disparity between this suburb and the neighbouring "Ger" districts (Singh, 2017).

In the maps presented on this page we can better see the social utility afforded by the informal adaptive reuse of public buildings. The ground floor of many of the old soviet apartment block seems to have been refitted to accommodate businesses, and the upper floors present opportunities for dense apartment living. Additionally, the affordance of this informality allows people to adapt their buildings over time as we saw with Hotel Mandhukai.

Access

The site at both 25-hectare and 1-hectare scale features high accessibility to both vehicles and pedestrians. Despite traditionally large block sizes, the site challenges theoretical assumptions provided by Jacobs (1961) regarding morphology's role in permeability. As informed by Pafka and Dovey's (2017) understanding of street-interfaces, the 1-hectare site's mix of sustained private and public interfaces produces high pedestrian accessibility. Following Ghamsary et al.'s (2023) research on the mechanisms to which pedestrian access is produced, the use of land on site in the form of diverse mixed-use developments and the presence of pocket parks may play a role in the high pedestrian usage on site. The unique morphology, diversity of street interfaces combined with generous transit access and diversity of land uses dedicated for residential, commercial and recreational use provides myriad opportunities to pedestrians and results in an area of high urban access.







Conclusion

The 3rd Khoroo district presents a complex built environment heavily influenced by Soviet planning overlaid by a mix of post-Socialist informality. Post-Socialist retrofitting reshaped the streets through informal extensions and adaptive reuse, transforming the planned open streets into a commercially active zone. These informal changes increased perceived density and street-level interactions, leading to a more active morphology observed on the street level. The retrofitted ground floors have integrated informality into the more formal Soviet blocks by introducing these commercial businesses, improving economic vibrancy. Furthermore, the diversity of public and private interfaces and the more varied land use has improved pedestrian access, challenging Soviet planning's aspect of permeability and further adding a touch of informality into the mix. In conclusion, the historical layers of planned and unplanned formality have molded Ulaanbaatar's urban fabric, creating a unique sense of urban morphology where socio-spatial richness has emerged from people's everyday lives.

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Introduction

Each of the following samples demonstrate my proficiency in large document preparation as well as exhibiting my proficiency in both professional placement as is the case with my Urbis, Melbourne Vocational Placement Report as well as academic achievement as is available within my Master's Thesis.

Urbis, Melbourne Professional Placement Report
ABPL90307 - MSD VOCATIONAL PLACEMENT

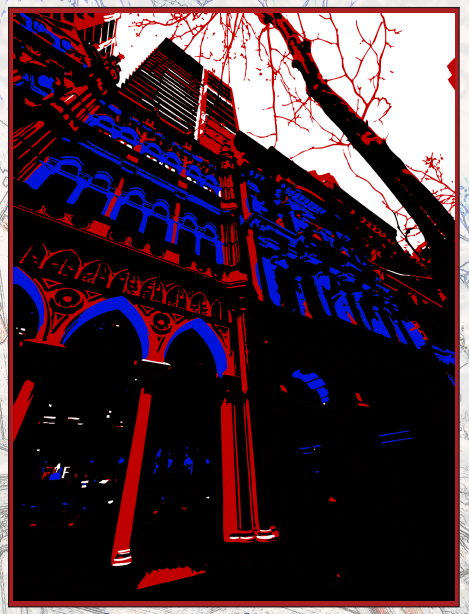
This report was completed following the conclusion of my vocational placement with the built-environment consultancy: Urbis, Melbourne. The report details my own proficiencies developed through my role at Urbis as well as exhibiting my report preparation skills.

Master's Thesis
ABPL90396 & ABPL90397 - MSD MINOR THESIS

At the University of Melbourne, each masters student is proscribed to complete a masters thesis where we develop our own hypothesis and test that hypothesis using our own research method. I decided to conduct my research within the realm of digital planning, specifically in software usage in professional planning arenas. My research analyzed the potential for open-source software and open-access data to challenge proprietary software, which are dissimilar to proprietary software offerings that have normatively dominated digital professional planning. This thesis encapsulates a year of research and a 10,000 word document conducted with the Unviersity of Melbourne. The completion of this research resulted in the awarding of my masters degree.

URBIS

Vocational Placement Final Report



Graham Inglert_1493308
ABPL90307_2025_S2X_PAR_2

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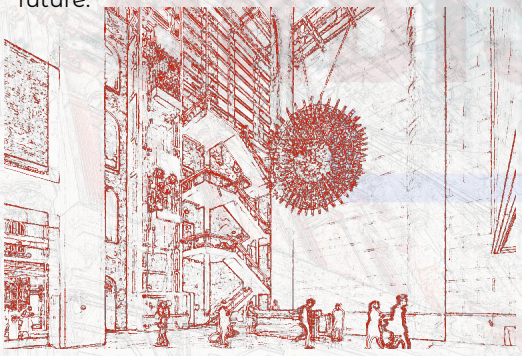
Executive Summary

This report discusses my vocational placement experience at Urbis: Melbourne. This experience was undertaken in conjunction with Melbourne University and Urbis over the course of 13 weeks bertween July and October of 2025.

Within this report, I discuss Urbis' role and my responsibility within this organisation. Through a recounting of weekly performance within a journal, a portfolio of projects I assisted in the completion of and a reflective piece of writing where I connect my own personal goals and the value I derived from this experience with academic scholarship on work integrated learning within university education, this report serves as a meterial inscription of my experience as an assistant planning professional at Urbis, Melbourne.

Following each of these contrbtutions within this report, I provide a brief reflection on the future of professional planning practice and the role that Urbis may play within this future.



Introduction

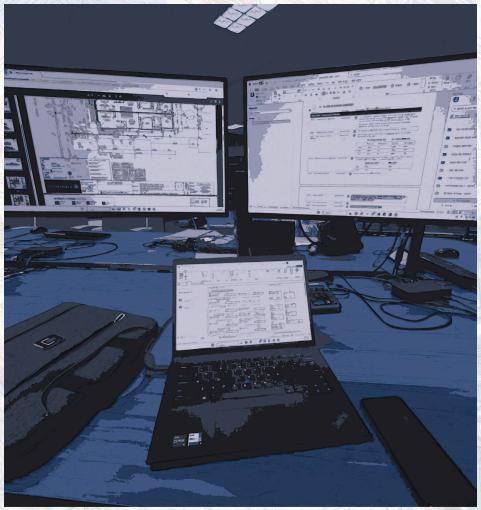
Urbis Melbourne is located on level 10 of the Overfleet building at 477 Collins Street, Melbourne Victoria, Australia. With offices in Melbourne, Sydney, Adelaide, Geelong, Brisbane, Gold Coast, Sydney, Parramatta, Perth and a partnership with Singaporean company: Cistri. Urbis is among the largest built-enironment professional consultancies in Australia. As a Master of Urban Planning Student at Melbourne University, I felt compelled to pursue a role at a private consultancy while completing my studies. Prior to Urbis I had landed an interview at Cogency, another planning consultancy in Melbourne, allbeit smaller, however unfortunately was not selected as an assistant planner.

In receiving this opportunity at Urbis, I felt it was a necessary first step in building my own personal professonal repour while at the same time expanding my planning competencies.

Student vocational placements or what are more commonly referred to as work-integrated learning opportunities have been documented within literature to provide students myriad personal and professional values (Crebert et al. 2004; Dempsey et al. 2023; Reddan & Rauchle 2017). This report discusses through a recounting of daily tasks within a journal, a portfolio and a reflecion supported by academic scholarship, my experience at Urbis and the value this placement provided me in my studies at Melbourne University and beyond.

5

Chapter I: Weekly Tasks Journal



This section comprises the weekly tasks journal, it is an iterative account of my daily responsibilities and processes at Urbis. Within this section I discuss my role at Urbis, the people I meet and work alongside as well as the challenges, learning opportunities or achievements that I encountered each day throughout the vocational experience.

6

URBIS

date 28 / 7 / 2025
m t w t f s s

title **I.1: Week 1 : First Day on the Job**

My first week at Urbis was a handful. I was informed to arrive at 9:00 Monday morning and signed in awaiting introduction to my supervisors at the front desk. Urbis is located on the 10th floor of the Olderfleet building (477 Collins Street, Melbourne). The building is an adaptive reuse of three late 19th century office buildings amalgamated into a contemporary set-back office space. Once I arrived on level 10, I was asked to sit at an adjacent booth. After waiting for about 5 minutes, I was greeted by one of my supervisors: Fidel Freijah. Fidel welcomed me immediately and invited me for coffee at one of the neighbouring coffee shops of which there are many on Collins Street. We spoke about his time studying at RMIT and his background with Boroondara City Council as well as his time being a student planner at Urbis before council work. I spoke to him about Melbourne Uni and what I was completing as part of my master's studies. Afterwards, I had my meeting with IT who introduced me to my laptop, helped me sign into my email and ensured that I was properly enrolled in the digital infrastructure of Urbis. Following this, I met with Irene who was head of HR and she informed me of the expectations for good practice at Urbis as well as verified that I was comfortable and all my needs were met. For the remainder of my time, I met the other student planner who was present that day: Mitch. I also got started on my first task which included modifying an existing spreadsheet from 2017 of locations for our partner: McDonald's, Victoria with updated details on location and opening hours for 2025.

URBIS

date 5 / 8 / 2025
m t w t f s s

title **I.2: Week 2 : Fitting In**

My second week was a little different than my first, I arrived earlier, now at 8:30 as was the expected starting time at Urbis. Now arriving on Tuesday instead of Monday, I was introduced to several new faces: Matthew, Hayden, Tom and Jack who were the other student planners. My goal today was to learn the protocols of report preparation at Urbis. This preparation included understanding the Microsoft Teams channels, the different templates that we used as part of our responsibilities and how best to correspond with senior consultants who I would be aiding as a student planner. Today, I also had my tour of Urbis' offices as well as received my locker in case I needed to store anything. The tour went well, and I was exposed to many of the amenities offered to me including the basement bicycle parking and the upcoming gym membership. This took me to the end of the day.

7

URBIS

date 12 / 8 / 2025
m t w t f s s

title **I.3: Week 3 : Freshman Steps**

This week was my first week where the onboarding tasks were completed and I was ready to participate as a student planner alongside other student planners at the direction of senior consultants. Fidel, my supervisor asked if I would like to start on a project for one of his clients: Housing First, Victoria who were interested in developing a site in St. Kilda. This project was called a Site Kit and is among the most common tasks that students produce. The site is located on Balluk William Court in St. Kilda and encompassed many controls including both a heritage overlay and an aboriginal cultural heritage plan pertaining to its adjacency to Albert Park. This site was challenging although simultaneously stimulating and I was aided along the way by both Matt and Tom who helped clear up any questions I had or roadblocks I encountered. This task was primarily statutory in nature with most of my time spent within the Port Phillip Bay planning scheme, although it provided a great opportunity to familiarise myself with Albert Park and the capacity of maximising housing in a highly controlled region of Victoria. As a result of my novice experience in this role, the report took me until the end of the day and required the other student planners to clean it up the next day. That being said, it was an excellent first real project!

URBIS

date 19 / 8 / 2025
m t w t f s s

title **I.4: Week 2 : Refining my Workflow**

Week 4 saw me engage in another site kit. This time, the site kit was for another consultant: Vicky, the site was located at 90 Willowbank Road in Gisborne in the Macedon Ranges LGA. Unlike the previous site which was investigating the potential for a multi-dwelling housing development in a region of high controls, the site kit this week approached instead a residential subdivision on the border of the Urban Growth Boundary with comparably few controls. The site was a good opportunity to practice and improve my proficiency at investigating the planning scheme in a more efficient manner. This week I was also assigned a special project just for me, to keep myself busy while I was between engaged consultant tasks. This was a mock clause 55 assessment which is the townhouse residential code that has been altered earlier in 2025. The task was one where I was given the town planning and landscape drawings for a site and I had to review clause 55 of the planning scheme to determine if that met the parameters of the clause. This task was in conjunction with Jacob who is the most proficient person at Urbis when it comes to evaluating the residential codes and comparing them to the scheme and he would help me through the process for evaluating this residential code assessment.

8

URBIS

date 26 / 8 / 2025
m t w t f s s

title **I.5: Week 5 : An Exciting Outing**

During Week 5, I had the great opportunity to do a site visit for one of Urbis' completed sites. The name of the development was the Lansell in Toorak. This was a comprehensive event for me as for the first time I could see just how rigorous the development process was. The site had been acquired in 2017 and was not completed until 2025. During this period, the developers who were an independent architectural firm had to contend with a myriad of difficulties including very unhappy neighbours who had exhausted every power they had to disrupt the Lansell's completion. While I was there I was able to see the apartments and the amenities offered by the development including the courtyards, and some of the actions taken by the neighbours including their hanging of dirty laundry purposefully on the side of the Lansell to dissuade those considering moving in from wanting to live there. It was unfortunate but illuminative of the ways in which developments unfold within Melbourne.

URBIS

date 2 / 9 / 2025
m t w t f s s

title **I.6: Week 6. Another Site Kit**

Week 6 included another site kit, this one was for a location at 1-3 Newcomen Road, Springvale. This site was for a development in Springvale, Greater Dandenong. The intention of this engagement was to assist the senior consultant: Mick in identifying whether there was potential for a rezoning of the land from the existing commercial zone to something that would be more conducive to residential development. During this week, I was also invited to join a video conference with the team from Housing First Victoria who were meeting to discuss the proposal that I helped complete the site kit for during week 3. This was an excellent opportunity for me as I was able to communicate my findings and hear how the project was progressing and whether Urbis would be engaged in to continue the project.

9

date 9 / 9 / 2025
m t w t f s s

title **I.7: Week 7 : Breaking Through**

During week 7, I worked on a site kit for the consultant: Laura which was for the site of the Royal Oak Hotel, Bridge Road, Richmond, City of Yarra. This site is currently occupied by a historic pub however the owners were interested in the possibility of creating residential levels above the pub. This site was tricky as the location within City of Yarra contained a high degree of controls within multiple heritage areas and a design and development overlay. This site was therefore restrictive when it came to the potential for staggered residential development on the upper levels of the heritage hotel. However, I did encounter a planning scheme amendment that had been advanced and was expected to be implemented called C291yarra- Bridge Road and Victoria Street. This amendment would alter the existing design and development overlay: DDO21 with a new plan that would support residential development of up to eight storeys on Bridge Road and Palmer Street where the Royal Oak was located. This was a huge boon for this site kit as that could potentially be the key to expediting growth.

URBIS

date 16/ 9 / 2025
m t w t f s s

title **I.8: Week 8 : Research into Data Centres**

Week 8 exhibited a new task, instead of doing a site kit, I completed research for two consultants: Anna and Eleni. This task was interesting however provided me with my first internal conflict. The research task was overviewing the newly proposed data centre projects being completed in Melbourne's western suburbs in Hume and Brimbank. This tasked was delegated as there was an ABC article that was published (Wong & Chwasta, 2025) discussing the stress that these massive capital investments would place on the municipal water supplies. Likely this research project was delegated so that Urbis may potentially assist either one of these projects receiving planning permits or to engage potential future firms interested in constructing these sites. As someone who is sceptical and in many ways hostile to these kinds of projects, I was conflicted with respect to this task. This task also educated me on really how much wealth was being injected into these projects. I was aware that most of the attention in the world was going to AI at any cost, but these projects were seldom represented by less than $500 million in development costs. Not only was this cost tremendous, but the stress these objects place on municipal water supplies and the socialised costs, i.e. that ordinary people would pay more for their water at a disproportionate cost compared to the owners of these centres which would consume a massive share of fresh water is unacceptable to me.

11

date 7 / 10/ 2025
m t w t f s s

title **I.11: Week 11 : Ad-Hoc Tasks**

Week 11 included doing another research task, this one was for Vicky. She was interested in examining all of the general residential zones across metropolitan Melbourne to find any from any councils that would allow for the construction of three or more storeys or 11 metres. This was an iterative task but it did yield many zones across a myriad of councils who accepted denser development within the GRZ. After completing this task I also looked for Vicky for any documents within the incorporated documents within all planning schemes of metropolitan Melbourne that discussed signage requirements. These tasks were investigative in nature and illuminated what barriers faced both signage requirements and the development of upwards of three storey developments.

URBIS

date 14 / 10 / 2025
m t w t f s s

title **I.12: Week 12 : A Mis-Step**

Week 12 saw one of my most challenging tasks yet and actually one that didn't go quite as well as I had hoped. I had engaged with this task from Clare but misunderstood exactly what she had asked for. She was wanting research into Oakleigh central and the capacity for that shopping mall to possibly include residential development, I began a standard site kit but didn't realise that she only wanted brief bullet points, the result was unfortunately far too expansive for her use. This was embarrassing and I apologised for the misunderstanding, with the help of the consultant: Laura, we were able to complete Clare's task, but it was unfortunate that I had made that mistake. One of the other student planners saw that it had bothered me and he was kind enough to offer me words of encouragement, but it remains rather embarrassing for me. For the remainder of the day I helped other students: Emma and Vy with calling councils and asking what days there would be an extended planning application advertising period for the summer holiday. Those days where the advertising period for planning applications is longer than the standard 14 days.

10

date 23 / 9 / 2025
m t w t f s s

title **I.9: Week 9 : Another Something New**

Week 9 included a Project Sheet, which was another new task. These project sheets were far less work compared to the site kits that I had previously worked on. This sheet was for a site on the Mornington Peninsula for a research and education field station which was constructed in partnership with Monash University and Melbourne University. Project Sheets are simply overviews of a previous project that Urbis has worked on overviewing the purpose of the project and what took place. This project was rather interesting; it was a marine monitoring station equipped for research purposes that would aid researchers from Monash and Melbourne in gathering data related to ecosystem health within Port Phillip Bay.

URBIS

date 30/ 9 / 2025
m t w t f s s

title **I.10: Week 10 : Inner Confliction**

During Week 10, I worked on a site kit for Ewan. This site was very complicated and large comprising 67.4 hectares. The site was in Greater Shepparton and accounted for a moment of personal trepidation as the proposal by the developer and their purpose for engaging Urbis was to inquire at the feasibility of rezoning an urban floodway zone into a zone that would allow for low-density residential development. This is another conflicting moment for me as given what I have learned at Melbourne Uni regarding Shepparton and the increased risk the regional city has at flooding, this kind of project seems to perpetuate poor contemporary practice. I was able to find examples of other firms successfully advocating for rezoning in areas adjacent to this site and therefore there were pathways to achieve this goal. However unfortunately I was not given any agency to interject my personal concerns at the nature of thsi development.

12

date 21 / 10/ 2025
m t w t f s s

title **I.13: Week 13 : Swan Song**

Week 13 was my last week at Urbis, the experience was a very important one to me overall and I am so happy that I was given the opportunity to take part. Arriving at the office, I was happy to receive an email that was sent to everyone in the office by the student supervisor: Christina who was notifying everybody that today was my last day and wishing me all the best. For my last day we had a catchup coffee with all of the students including myself. It was a great opportunity to thank everyone for the generosity they showed me. After the coffee, I began work on a few smaller tasks, things that I may be able to complete in a relatively short period of time. These tasks included two smaller site kits, called desktop site kits for Jamie. Both developments were for residential buildings within the inner suburbs. One was in Camberwell Junction, and the other was in North Melbourne. One of these kits was completed with the assistance of Matthew and the other was completed with the assistance of Emma, another student planner. In the afternoon I met with Irene from HR again to discuss the outcome of my placement I answered her questions affirming that I was satisfied with the outcome of this experience and thanked her for all of her help along the way. At the end of the day I returned my laptop and joined the other student planners at the Pub: The Mitre to celebrate!

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Journal Conclusion

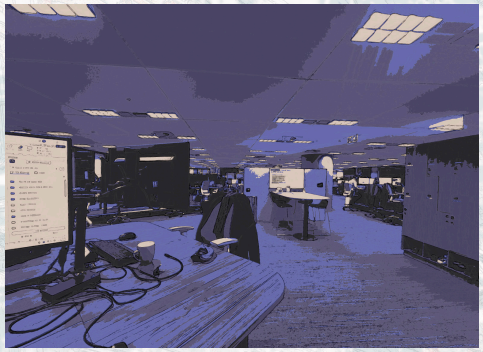
Each week was something new, at Urbis I felt perpetually engaged while simultaneously expanding my personal and professional capabilities. This Journal documents my day-to-day activities and some of the initial thoughts that the projects I engaged with had on me

Chapter II: Folio

The folio section comprises an archive of the projects that I engaged in the completion of while participating within my voational placement at Urbis. This section gives a detailed account of the purpose of each task and what elements comprise each of these tasks. The major task categories that I took part in the completion of are as follows:

1. **Site Kits**
2. **Research Tasks**
3. **Mock Clause 55 Assessment**
4. **Project Sheets**
5. **Site Visits**

Because these tasks were dispersed mostly at the discretion of senior consultants, they do not represent a multi-week process, rather a collection of ad-hoc assignments primarily focused on providing senior consultants with an array of information to aid in their engagement with potential development clients.



II.1: Site Kits

Site Kits are among the most common tasks that I completed at Urbis. These tasks provide the senior consultant with a birds-eye view of a site's relevant controls, context and ameliorability for development. There are 13 key parts that comprise a site kit including:

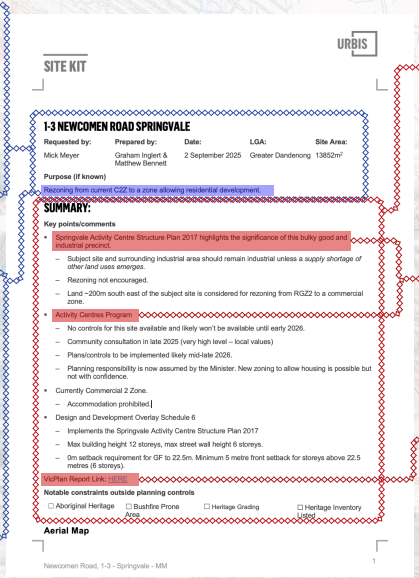
1. **Summary**
2. **Site Details**
3. **Surrounding Context**
4. **Existing Zoning**
5. **Existing Overlays**
6. **General and Particular Provisions**
7. **Local Planning Policy**
8. **Reference and Strategic Documents**
9. **Planning Scheme Amendments**
10. **Aboriginal Cultural Heritage and Heritage Inventory**
11. **Nearby Development Proposals / Approvals**
12. **Nearby VCAT Decisions**
13. **Maps and Photos**

These kits also come in two main flavours: **Regular Site Kits** and **Desktop Site Kits** (Shortened). Desktop site kits differ from the Regular Kits insofar as the Desktop Site Kits do not include **Local Planning Policy, Reference and Strategic Documents** nor **Planning Scheme Amendments** sections.

II.1.i: Components Overview: Site Kits

The first item included in a site kit is the location of the site, including address, LGA (Local Governing Area), site area, who prepared the report, who requested the report and the desired purpose on behalf of the developers whom we are providing advice to on feasibility of development.

One of the most important pieces for the report drafter (in this case me) is the purpose of development. This is essentially the guiding statement for our investigation. We are to dedicate our traversal of the relevant planning documents including the planning scheme and local planning policy documents with regard to the purpose of development and omit any information that does not directly correspond to this statement.


SITE KIT

1-3 NEWCOMEN ROAD SPRINGVALE

Requested by:	Prepared by:	Date:	LGA:	Site Area:
Mick Meyer	Graham Inglert & Matthew Bennett	2 September 2025	Greater Dandenong	13852m²

Purpose (if known)

Rezoning from current C2Z to a zone allowing residential development.

SUMMARY:

Key points/comments

- Springvale Activity Centre Structure Plan 2017 highlights the significance of this bulky good and industrial precinct.
  - Subject site and surrounding industrial area should remain industrial unless a *supply shortage of other land uses emerges.*
  - Rezoning not encouraged.
  - Land ~200m south east of the subject site is considered for rezoning from RGZ2 to a commercial zone.
- Activity Centres Program
  - No controls for this site available and likely won't be available until early 2026.
  - Community consultation in late 2025 (very high level – local values)
  - Plans/controls to be implemented likely mid-late 2026.
  - Planning responsibility is now assumed by the Minister. New zoning to allow housing is possible but not with confidence.
- Currently Commercial 2 Zone.
  - Accommodation prohibited.
- Design and Development Overlay Schedule 6
  - Implements the Springvale Activity Centre Structure Plan 2017
  - Max building height 12 storeys, max street wall height 6 storeys.
  - 0m setback requirement for GF to 22.5m. Minimum 5 metre front setback for storeys above 22.5 metres (6 storeys).

VicPlan Report Link: HERE

Notable constraints outside planning controls

☐ Aboriginal Heritage ☐ Bushfire Prone ☐ Heritage Grading ☐ Heritage Inventory Listed

Aerial Map

Newcomen Road, 1-3 - Springvale - MM 1

The Summary is the next section of the Site Kit. This is where the drafter places all of the most important findings, those outcomes that could either make or break the prospect of development for a site. In this section it is common to place setback, height and building mass or other prescriptive planning requirements. The relevant zones, overlays, heritage and bushfire management information is also included here.

The Summary is also an excellent place to insert planning scheme amendments or precinct structure plans that encourage the relevant planning intervention as a way for the consultant to be immediately aware of the alignment between development prospect and strategic implementations pursued by the relevant planning authority.

For ease of access, we also place a direct link to the VicPlan report for the consultant so that they can easily access that documnt including site maps showing relevant planning zones, overlays and heritage areas.

After the cover page, we include an aerial map for the consultant taken from Nearmap, this is used to discern the physical boundaries of the site as well as the physical structures that surround the site. In some Site Kits, the aerial map is included on the cover page, however when there are many planning controls to be included within the summary, the aerial map must be placed on the second page where space allows.

Underneath the aerial map is the final part of the Summary: the specific pieces that are included within the Site Kit. In most Site Kits, we include a review of local policy, the planning scheme and reference and strategic documents. In others, we may review the title of a site, I never had the chance to review title when I was with Urbis.


SITE KIT

This Site Kit Includes:

☒ Desktop site review ☐ Review of Title ☒ Review of Local Policy ☒ Review of Planning Scheme Amendments ☒ Review of Reference and Strategic Documents

SITE ANALYSIS:

CATEGORY	DETAILS
Site Details Streetview photos are provided here	• Location: Corner of Newcomen Road and Parsons Avenue, Springvale • Area: 13852m² • Frontages: Primary frontage: 135.5m to Newcomen Road, Secondary frontage: 95.9m to Parsons Avenue • Vehicle Access: One vehicle crossover along Newcomen Road, one vehicle crossover along Parsons Avenue. • Vegetation: Significant vegetation including trees along the perimeter of the site along Newcomen Road and Parson Road. Along the nature strip and within the private site area.

Newcomen Road, 1-3 - Springvale - MM 2

Following the Summary Section, is the Site Analysis section, within this section is where the meat of the report is located. This is where the primary controls are included as well as indepth information into the feasibility of development for the intended development purpose.

The first component of the Site Analysis are the Site Details. Within the Site details we include an expanded description of the site's location, the site area, what streets or roads the site fronts, vegetation, and vehicle access points. This is useful as many of the controls facing development concern some of these structurally unique pieces of a site.

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SITE KIT

Next is our surrounding context. Whereas the previous section of the Site Analysis entailed the site's specific context, the Surrounding Context provides an advanced description of the areas around the subject site.

There are two brief pieces of the Surrounding Context: the direct frontages (Those areas that abut the site) and the broader context (neighbourhood level).

Within each component that references the planning scheme, we hyperlink the specific section so the consultant may easily navigate to the specific place where the piece that we found is located for future application whether with the client or in a presentation.

	• Other important features:
Surrounding Context An aerial map is provided here	The site direct fronts Newcomen Road in the south and Parsons Avenue in the north. The immediate interfaces south of the site are commercial developments, west is St Athanasios Greek Orthodox Parish. North of the site north is a commercial strip mall fronting Boulton street and east are commercial developments that front Springvale Road. The broader surrounding area includes vehicle access to Springvale Road 100m east of the site, the Springvale train station 223m southeast of the site and Springvale Reserve 270m west of the site. The surrounding character of the site is defined by commercial and industrial business areas and significant religious sites. There is an Environmental Audit Overlay within the vicinity of the site directly across Newcomen Road, however is not within the boundaries of the site.
Existing Zoning A zoning map is provided here	• Commercial areas for offices, appropriate manufacturing and industries, bulky goods retailing, other retail uses, and associated business and commercial services. **Land use information:** Section 1 – Permit not required: • Food and drink premises • Industry (conditions apply) • Office • Restricted retail • Supermarket (max LFA 1800sqm) • Warehouse Section 2 – Permit required: • Leisure and recreation • Place of assembly • Retail premises Section 3 – Prohibited: • Accommodation • Hospital A permit is required for: • Subdivision • Buildings and works associated with section 2 uses. Key considerations/requirements include: • Use of Land – Proposed future use must not detrimentally affect the amenity of surrounding area through building appearance, transport of materials or emission of noise and or artificial light. Zone is in Core Industry | Commercial | None

The next step of the Site Analysis is providing an overview of the Existing Zones. If the site is large enough there may be two or more zones, typically within the zones and the overalys are where the vast majority of the Site Kit's information is located. Zones are where intended land use requirements are located as well as permissable development information. Typically we scour this section for information regarding planning permit requirements, often the intended use of the land for the development has permit requirement information as well as buildings and works and sometimes sign requirements.

Within this step there is a tendency for students, particularly myself to be bogged down in the minutia of the Planning Scheme. It was a key difficulty when I first began completing these site kits, discerning what information was pertinent and what information to omit, because brevity is a key concern for the reviewing senior coonsultant. If a piece of information is irrelevant to the development, then we should not include it, however particularly when you are a green planner, the vernacular of the planning scheme often obscures the relevancy of information.

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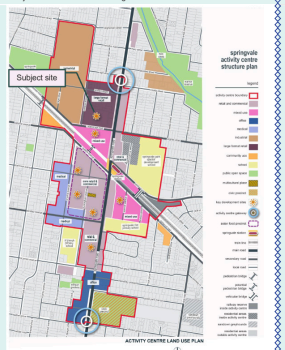
Local Planning Policy	Relevant local policies: • Clause 21.03-3 Strategic Framework Map – Site identified as a Commercial 2 Zone-Encourage Integrated Industrial/Commercial use/Limited Stand Alone Offices • Clause 22.03 Urban Design in Commercial and Industrial Areas – Found here – Contains some vague objectives around urban design. – Setbacks should match the surrounding buildings if these are typical. – Buildings should complement the scale of nearby buildings. – Site is designated as being within Area 2, specific requirements: • All buildings at least 9 metres from land in a Road Zone. • Minimum 3m wide garden strip along frontage. Minimum 1.8m wide garden strip along sideage.

Local Planning Policy follows Overlays, and while not necessarily difficult, it can be increasingly nebulous to discern what to include. Unlike the requirements within Overalys or in Zones, the information located within LPPFs are typically rather performative and lack concrete requirements for development. Generally, this section includes the outcomes council is interested in fomenting while ensuring they do not interrupt development proposals.

After local planning policy, there are the reference and strategic documents. These often include precinct structure plans (PSPs) or activity centre plans which are more common now that activity centres are being more actively pursued by metropolitan Melbourne.

Reference and Strategic Documents	Relevant documents: • Springvale Activity Centre Structure Plan 2017 – Subject site is listed as a key development site. – Subject site located within a "large format retail" area. – Identified potential to rezone land 150m southeast of the subject site from RGZ to commercial. Shown as grey striped hatch in the above figure. – Identified opportunity to retain the bulky goods precinct and industrial area, north of the rail corridor. (bulky goods precinct covers the subject site) – *"North of the railway line are areas of both Industrial and Commercial 2 Zoned properties on larger sites. It is considered that there may be some long term opportunities for a higher utilisation and activation of land particularly fronting the railway line."* – *"The recent Industrial and Commercial Change and Demand Strategy, 2016 (SGS Economics and Planning) concluded that if the centre has a sufficient supply of land to cater for housing and retailing it would be prudent for the area north of the railway line to remain an industrial area until a supply shortage of other land uses emerges."*



• Activity Centres Program
– Community consultation in late 2025 (very high level – local values)
– Plans/controls to be implemented likely mid-late 2026.
– Planning responsibility is now assumed by the Minister. Hence, local council strategies such as the above Springvale Structure Plan will be superseded. New controls may align with the general housing reform strategy and allow further accommodation uses. However, new existing activity centre plans such as at Camberwell have kept the land use outcomes as described in its previous structure plan.
• Greater Dandenong Housing Strategy 2014-2024
– "Zoning for land supply" listed as a tool to improve housing affordability (Theme D)
– No reference to specific sites.
• Plan for Victoria
– Housing target of 52,500 for Greater Dandenong.

Often many of the reports included within this section will include those produced by other planning consultancies. These adjacent reports can be very helpful in revealing what potential development opportunities may lie within each site that potentially we had not yet located.

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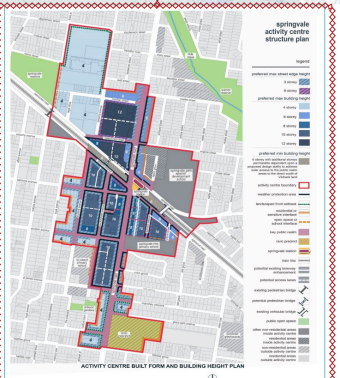
Existing Overlays Overlay map/s are provided here	Clause 43.02 – Design and Development Overlay – Schedule 6 – Springvale Activity Centre – DDO6 Details/purpose of Zone • *To implement the Springvale Activity Centre Structure Plan (2017) and the Springvale Activity Centre Building Heights and Setbacks Study (2016) to maintain and create a strong and distinct image of the Springvale Major Activity Centre.* A permit is required for: • A permit is required to construct a fence which is more than 1.5 metres above ground level. Key considerations/ built form requirements include: • Located Precinct 10: Large Format Retail/Commercial – Max street edge height of 6 storeys and **building height of 12 storeys** (44.1m) – Setbacks: • Development up to 22.5 metres (6 storeys) for properties fronting onto Newcomen Road, Parsons Avenue and Boulton Street: – Zero front, side and rear setbacks. • Development over 22.5m (storeys): – Provide a minimum 5 metre front setback for storeys above 22.5 metres (6 storeys). – For 1-3 Newcomen Road and 144-152 Springvale Road, development that: • Provides a publicly accessible north-south and east-west pedestrian link through the site that is publicly accessible and fronted with active uses.

The Overlay section immediately follows the zoning section. In the Overlay section, similar to the zones, there is an abundance of information. This section often overwhelms the report draftsperson, or perhaps I am just speaking for myself. In this section there are often multiple overlays and multiform planning controls including permit requirements, prescriptive and performative development rules.

The most complex overlays include items such as DDOs: Design and Development Overlays, Heritage Overalys can also be rather labrynthine insofar as reviewing this overlay also typically necessitates reviewing the often times, non-standardised heritage indexes provided by councils. When preparing Site Kits, overlays are a major obstacle where much of the preparation time is deposited.

Often, the maps provided by councils within the incorporated documents of the planning scheme are also very useful for us, these maps are typically extracted from ancillary precinct structure plans or other strategic documents produced by council.



Also refer to discussion on the Springvale Activity Centre Structure Plan 2017 in the Strategic Documents section of this site kit.

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Planning Scheme Amendments	None relevant.
Aboriginal Cultural Heritage and Heritage Inventory	Site is not in an area of aboriginal cultural sensitivity, and is not listed in the Heritage Inventory.
Nearby Development Proposals/ Approvals	Relevant developments/proposals: • 191-195 Springvale Road SPRINGVALE VIC 3171 – 6 storey mixed used building comprising apartments and ground floor retail within a Commercial 1 Zone. – Project has been abandoned. – Application PLN21/0538.
Nearby VCAT Decisions	Relevant VCAT decisions:

Following the relevant strategic documents, we include planning scheme amendments, sometimes these can be very relevant however other times, there are no amendments that concern the site or potential development. Locating these amendments can sometimes be a cumbersome process as it requires perusing the planning scheme and reading amendments individually.

Next is the Aboriginal Cultural Heritage and Heritage Inventory. This section is highly dependent on whether the site is incuded within or adjacent to an area of Aboriginal Cultural Heritage or if there is a Heritage Overlay for a site of significance. This can add an extra step because typically when these protections do exist, the documents accounting these protections are located outside of the planning scheme, typically in strategic documentation with council.

Similar to nearby developments, nearby VCAT decisions can be relevant when inquiring about potential challenges that previous developments have received when commencing the application process. These can be gathered by also using Cordell Data to locate the location of the challenged site and the corresponding VCAT decision ID and then investigating further on Austlii.

Afterwards, we then recount the nearby developments/ proposals these are useful as a way to justify to the responsible authority on behalf of the client for the feasibility of development based on similar projects having taken place. We use Urbis Projects which is an internal data repository GIS service that locates nearby projects, developments or VCAT decisions. For Nearby developments, there is typically a corresponding Cordell Cordell ID. Cordell Data which is an online repository provides details on developments including total cost, information on the scale and use of developments along with the progress on the development. We use Cordell to give an indication of what potential development processes can look like to provide developers of an indication of the rigour associated with a site or a location.

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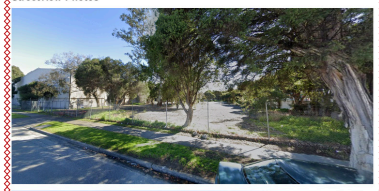
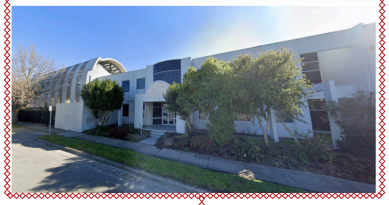
SITE KIT

MAPS AND PHOTOS

Streetview Photos





Following the written contributions of the Site Kit, we attach photos of the outside context of the site. These photos are obtained from Google Streetview and are meant to provide an overview of existing vegetation or structures on Site as well as provide an indication of what we are working with.

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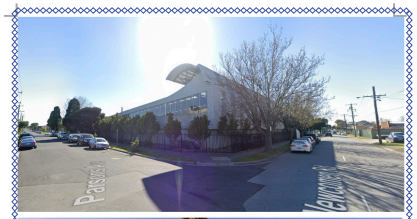
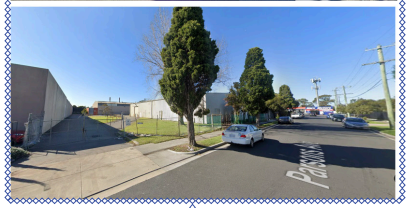
SITE KIT





We try to obtain a complete picture of the surrounding context, that includes as many view points as we can obtain containing vehicle crossovers and/or abutting streets.

Newcomen Road, 1-3 - Springvale - MM

10

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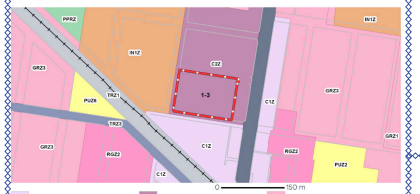
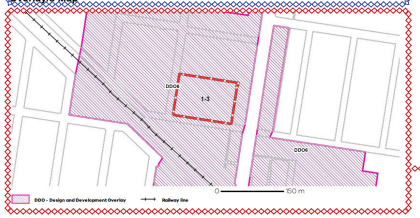
SITE KIT

Zoning Map



Overlay/s Map



Newcomen Road, 1-3 - Springvale - MM

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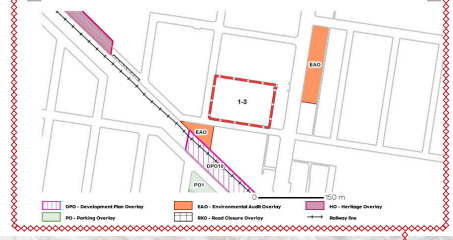
URBIS

SITE KIT



After the site photos, we attach many of the site maps. These maps are obtained from VicPlan.

These are useful not only to further explain the boundaries of the Zones and Overalys but also expand on the site context that explains the surrounding Zones and Overlays .

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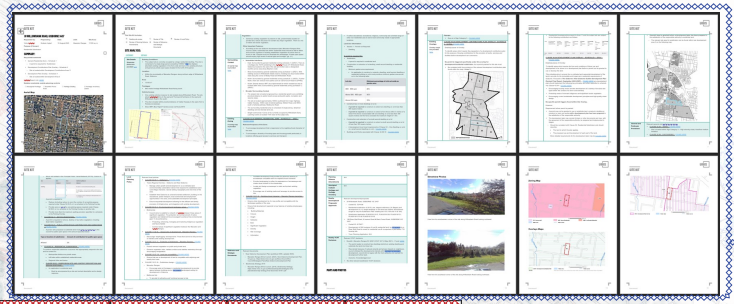
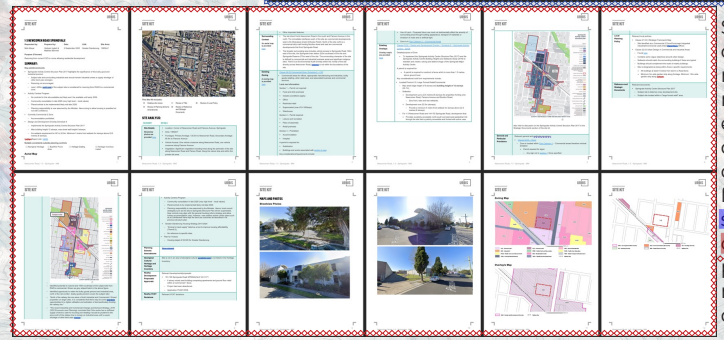
Completed Site Kits

Over the course of 13 weeks, I completed a number of site kits,. These were the most common task that I completed as prt of my role at Urbis. I completed a total of seven Site Kits, although only have copies of five.





Some were longer than others. Typically, they ranged from 12 pages at minimum. These Site Kits encompassed many different uses and development propositions, from residential subdivisions to commercial developments, these projects encompassed a myriad of different development typologies.

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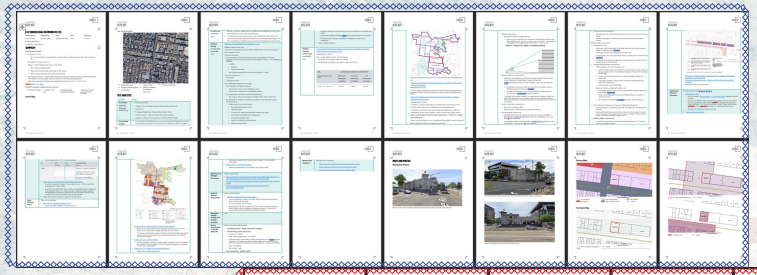
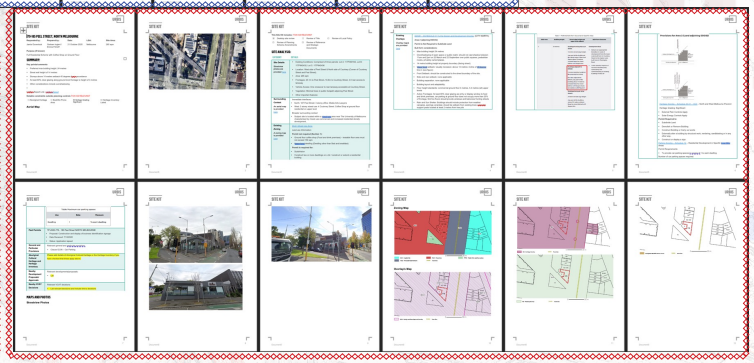


Other common development proposals attempted within these Site Kits included residential development. With such a focus by municipal governments, there are myriad opportunities for residential developments

Allbeit, many of these developments included luxury residential dwellings which I have found during my studies at Melbourne Uni, may not be the appropriate solution to the major challenges of rapid urbanisation that the housing crisis emanates from.



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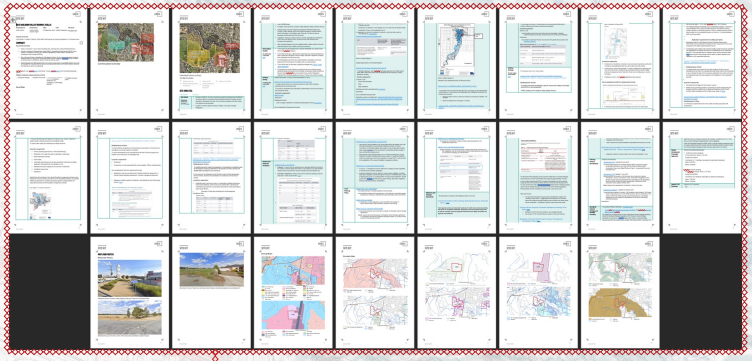
As mentioned within my journal, these Site Kits often provided me with moments of personal reflection where I had to contend with many of my personal conflictions with the development proposal as to conform to the professional requirements available to me while completing these projects.



This particular Site Kit for a development proposal in Greater Shepparton was the greatest example of my own disappointment in a development proposal. As this site was looking to rezone an Urban Floodway Zone into a low-density residential Zone to allow for the creation of a large suburban housing development. Given my studies at Melbourne University, the dangers that this development posed for the people who may move here is astronomical given that Shepparton is among the most disaster-prone areas in Victoria. In an area where greater than 80% of homes are uninsurable because of flood risk, building more homes in the same manner would be a poor decision.

Overall, theser Site Kits were enjoyable and challenging tasks. They provided an engaging opportunity at familiarisation with the Planning Scheme and a snapshot into what developments were being sought-after by built-environment practitioners within Victoria.

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II.2: Research Tasks

Following Site Kits, research tasks were also among the major tasks I completed as part of my vocational placement at Urbis. These tasks were less structured compared to Site Kits, often without standardised templates. These could range from several different focus points and included for me:

1. **Data Centre Research**
2. **Holiday Signage Periods of Councils**
3. **General Residential Zones Building Heights**
4. **Signage Attached Documentation**

With these tasks I typically had to read through documents found online and it was not uncommon to have to claim on the task that some of the relevant documentation was simply not able to be located. These tasks were often times tricky because of their unstructured nature and therefore required my own clarification on key points from senior consultants.

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II.2.i: Research Task: Data Centres Research

Due to the differing nature of research tasks, no two tasks look the same. Often these projects respond to the specific requests at hand and are therefore composed to reflect that.

For this specific research task, I investigated the new data centres being constructed in the western suburbs. There were a total of five of these that I could find development information regarding.

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Article of interest: https://www.abc.net.au/news/2025-08-26/hume-council-votes-on-data-centres-energy-water-management-plan/105694556

Overview:

- **Address and LGA**: Located within or proximal to HUME Local Governing Area
- **Developer**: A number of different developers, international and domestic
- **Planning Permit Application Number and Description**
- **Cost of Development:** these data centre sites represent a significant economic investment averaging over $100 million dollars in development costs. For this reason, some of these sites have been prioritised for development through ministerial approval.
- **Status:** Many of these plans have been approved for development through ministerially approved permits.
- **Responsible Authority:** The Responsible authorities for these sites include both Hume local council and the Minister for Planning within DFP (development facilitation program) assessment reports disseminated by DTP.
- **Known Objectors:** I have corresponded with both Hume local Council and DTP for further information regarding objectors and am awaiting response.
- **Links:** Links have been provided within the following table to developer websites, permit applications and DFP assessment reports with the intent of providing further information regarding these developments.

Address and LGA	Developer	Planning permit Application Number and description	Cost (Development Value)	Status (e.g. proposed, in construction, operational)	Responsible Authority and Approval Pathway (e.g. council. DFP)	Known Objectors	Links
95A Amaroo Road, Craigieburn, HUME	Goodman Australia	**P26624** - Use and development of the land for a data centre and display of signage.	$515,000,000	Past- Amended Plans Required. Lodged 1/05/2025	RA: Hume Council Council-Application - HERE **Approval Pathway:**		Developer: HERE Council Application: HERE
80 Kinloch Court, Craigieburn, HUME	Originally **Cadence Property Group** (2020/2021) Current **Frasers Property Industrial** (2023)	**PA2403014** – Use and development of the land for a utility installation (data centre) including ancillary office and substation and direction signage.	$ 250,000,000	Permit application lodged 29/06/2024 Permit Issued (17/9/2024)	RA: Minster for Planning DFP Report - HERE **Approval Pathway**: In accordance with the schedule to Clause 72.01 of the Planning Scheme, the Minister for		Developer - HERE Ministerial Permits Register: HERE DFP Officer assessment

Document2

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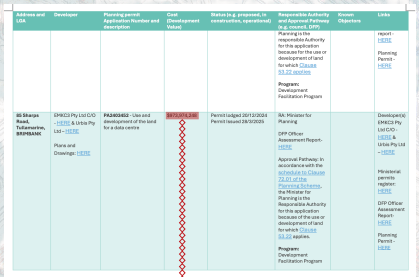

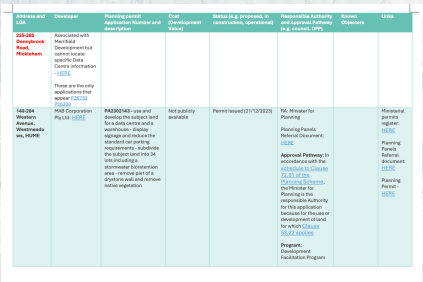

Address and LGA	Developer	Planning permit Application Number and description	Cost (Development Value)	Status (e.g. proposed, in construction, operational)	Responsible Authority and Approval Pathway (e.g. council. DFP)	Known Objectors	Links
70-90 Garden Drive, Tullamarine (x2 centres), HUME	Microsoft - BESIX Watpac (Builder) - HERE	**P24399** - Use of the land and associated buildings and works for the purpose of two data centre facilities (over two stages). **P24399.01** - Use of the land and associated buildings and works for the purpose of two data centre facilities (over two stages).	$71,437,744.00	P24399- Amended Plans Endorsed (22/06/2022) P24399.01 - Application being Assessed (11/07/2025)	RA: Hume Council - Amendment to Planning Permit		Developer(s) Microsoft - BESIX Watpac (Builder) - HERE Council Register - P24399 – HERE, P24399.01 – HERE

This task illuminated the extent of power that these developments have within modern built-environment planning. The dollar figures that these developments exhibited was quite frankly, overwhelming. For structures that produce as few jobs as Data Centres, it makes me wonder how much public utility could be created if this much money was invested into housing, commercial areas or public transportation.

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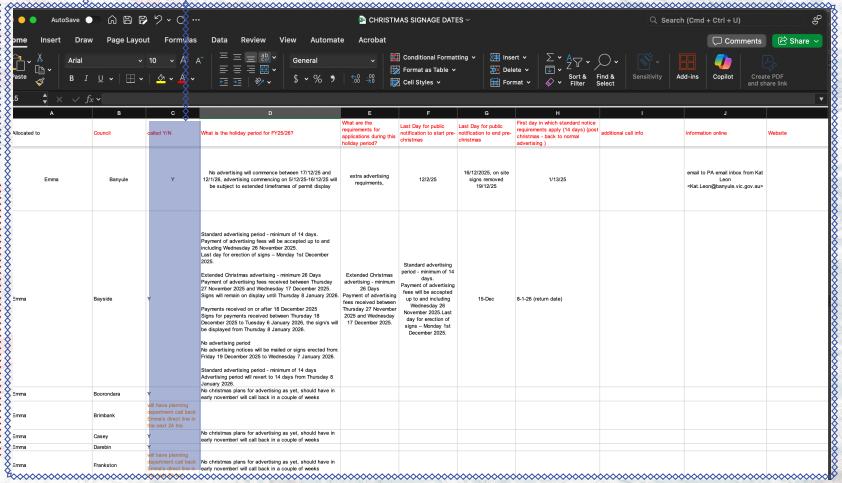
II.2.ii: Research Task: Holiday Permit Advertising Requirements for Councils

Another research task that I completed was inquiring with councils about the schedule for their end of the year schedule for advertising sign requirements. I completed this task along with two other student planners.

This specific task required me to call each council and inquire directly about their holiday signage requirements.

Ordinarily, councils have a requirement to advertise recently approved planning permits for a period of 14 days. During the holiday period when there are fewer people working at council, this advertising period is often extended.



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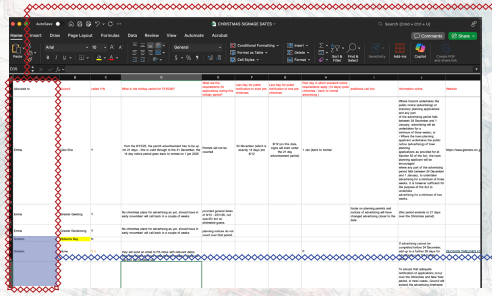
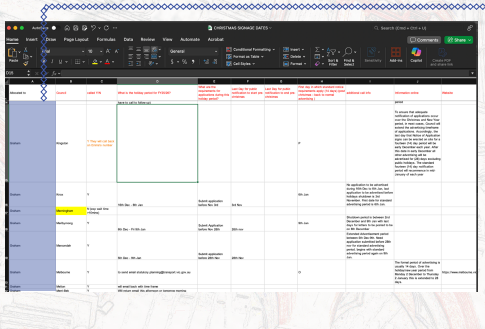
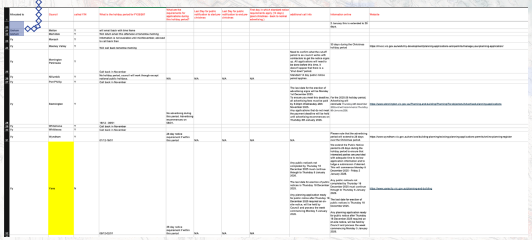


We split this task into three parts, as to call each of the 32 councils would be more efficiently conducted that way. This was a very iterative process however, ultimately we were able to find an abundance of information and help the senior consultants with this research task.

The councils that I was tasked with corresponding with can be found from lines 13-22: Hobsons Bay to Merri-bek.





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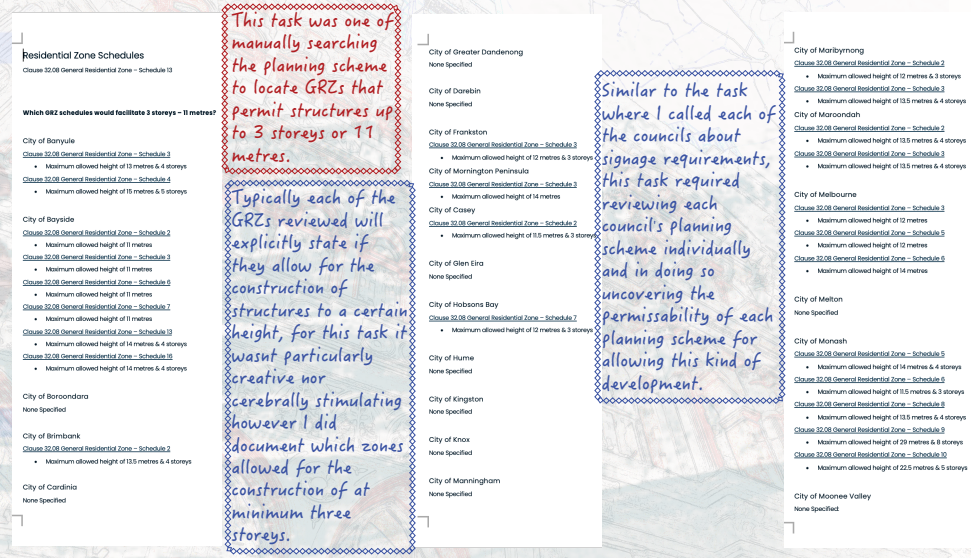
II.2.iii: Research Task: General Residential Zone's Height Requirements

This task was one of manually searching the planning scheme to locate GRZs that permit structures up to 3 storeys or 11 metres.

Typically each of the GRZs reviewed will explicitly state if they allow for the construction of structures to a certain height, for this task it wasnt particularly creative nor cerebrally stimulating however I did document which zones allowed for the construction of at minimum three storeys.

Similar to the task where I called each of the councils about signage requirements, this task required reviewing each council's planning scheme individually and in doing so uncovering the permissability of each planning scheme for allowing this kind of development.



Residential Zone Schedules

Clause 32.08 General Residential Zone – Schedule 13

Which GRZ schedules would facilitate 3 storeys – 11 metres?

City of Banyule
Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 13 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 4
- Maximum allowed height of 15 metres & 5 storeys

City of Bayside
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 11 metres

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 11 metres

Clause 32.08 General Residential Zone – Schedule 6
- Maximum allowed height of 11 metres

Clause 32.08 General Residential Zone – Schedule 7
- Maximum allowed height of 11 metres

Clause 32.08 General Residential Zone – Schedule 13
- Maximum allowed height of 14 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 16
- Maximum allowed height of 14 metres & 4 storeys

City of Boroondara
None Specified

City of Brimbank
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 13.5 metres & 4 storeys

City of Cardinia
None Specified

City of Greater Dandenong
None Specified

City of Darebin
None Specified

City of Frankston
Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 12 metres & 3 storeys

City of Mornington Peninsula
Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 14 metres

City of Casey
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 11.5 metres & 3 storeys

City of Glen Eira
None Specified

City of Hobsons Bay
Clause 32.08 General Residential Zone – Schedule 7
- Maximum allowed height of 12 metres & 3 storeys

City of Hume
None Specified

City of Kingston
None Specified

City of Knox
None Specified

City of Manningham
None Specified

City of Maribyrnong
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 12 metres & 3 storeys

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 13.5 metres & 4 storeys

City of Maroondah
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 13.5 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 13.5 metres & 4 storeys

City of Melbourne
Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 12 metres

Clause 32.08 General Residential Zone – Schedule 5
- Maximum allowed height of 12 metres

Clause 32.08 General Residential Zone – Schedule 6
- Maximum allowed height of 14 metres

City of Melton
None Specified

City of Monash
Clause 32.08 General Residential Zone – Schedule 5
- Maximum allowed height of 14 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 6
- Maximum allowed height of 11.5 metres & 3 storeys

Clause 32.08 General Residential Zone – Schedule 8
- Maximum allowed height of 13.5 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 9
- Maximum allowed height of 29 metres & 8 storeys

Clause 32.08 General Residential Zone – Schedule 10
- Maximum allowed height of 22.5 metres & 5 storeys

City of Moonee Valley
None Specified

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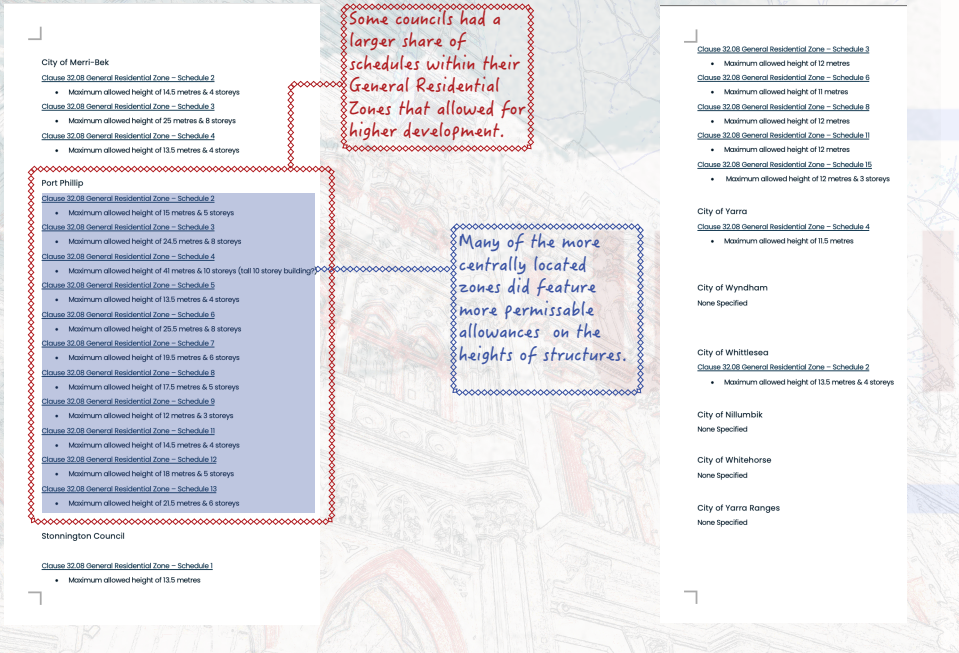
Some councils had a larger share of schedules within their General Residential Zones that allowed for higher development.

Many of the more centrally located zones did feature more permissable allowances on the heights of structures.



City of Merri-Bek
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 14.5 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 25 metres & 8 storeys

Clause 32.08 General Residential Zone – Schedule 4
- Maximum allowed height of 13.5 metres & 4 storeys

Port Phillip
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 15 metres & 5 storeys

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 24.5 metres & 8 storeys

Clause 32.08 General Residential Zone – Schedule 4
- Maximum allowed height of 41 metres & 10 storeys (tall 10 storey building)

Clause 32.08 General Residential Zone – Schedule 5
- Maximum allowed height of 13.5 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 6
- Maximum allowed height of 25.5 metres & 8 storeys

Clause 32.08 General Residential Zone – Schedule 7
- Maximum allowed height of 19.5 metres & 6 storeys

Clause 32.08 General Residential Zone – Schedule 8
- Maximum allowed height of 17.5 metres & 5 storeys

Clause 32.08 General Residential Zone – Schedule 9
- Maximum allowed height of 12 metres & 3 storeys

Clause 32.08 General Residential Zone – Schedule 11
- Maximum allowed height of 14.5 metres & 4 storeys

Clause 32.08 General Residential Zone – Schedule 12
- Maximum allowed height of 18 metres & 5 storeys

Clause 32.08 General Residential Zone – Schedule 13
- Maximum allowed height of 21.5 metres & 6 storeys

Stonnington Council
Clause 32.08 General Residential Zone – Schedule 1
- Maximum allowed height of 13.5 metres

Clause 32.08 General Residential Zone – Schedule 3
- Maximum allowed height of 12 metres

Clause 32.08 General Residential Zone – Schedule 6
- Maximum allowed height of 11 metres

Clause 32.08 General Residential Zone – Schedule 8
- Maximum allowed height of 12 metres

Clause 32.08 General Residential Zone – Schedule 11
- Maximum allowed height of 12 metres

Clause 32.08 General Residential Zone – Schedule 15
- Maximum allowed height of 12 metres & 3 storeys

City of Yarra
Clause 32.08 General Residential Zone – Schedule 4
- Maximum allowed height of 11.5 metres

City of Wyndham
None Specified

City of Whittlesea
Clause 32.08 General Residential Zone – Schedule 2
- Maximum allowed height of 13.5 metres & 4 storeys

City of Nillumbik
None Specified

City of Whitehorse
None Specified

City of Yarra Ranges
None Specified

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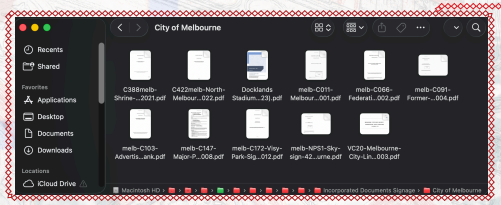
II.2.iv: Research Task: Incorporated Signage Documents

Following the research into General Residential Zones, Vicky also was looking to amalgamate the incorporated documents relating to signs from the planning schemes.

Similar to the last task, this one did not require a great deal of critical analysis, as it was msotly browsing each of the local council's incorporated documents pertaining to signage.





I organised the documents according to councils, some councils such as City of Melbourne, the most economically productive council within Greater Melbounre had a myriad of signage example documentation whereas others such as City of Casey had comparably few sign documents.



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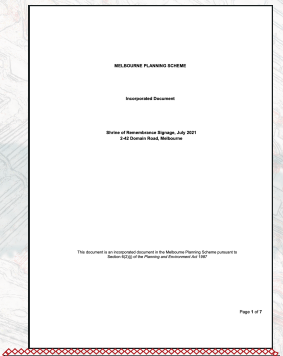

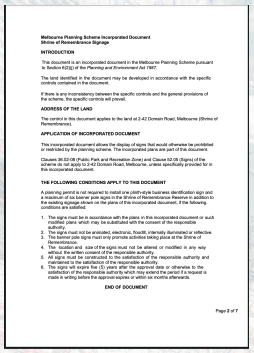

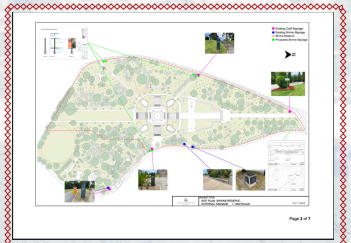



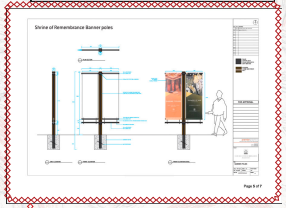

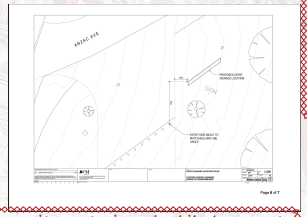

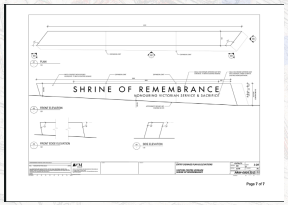

Many of these documents were quite esoteric and while I was not given explicit explanation of why Vicky had requested these documents, likely they would be used as examples for how council's document signage data. This document pertaining to the Shrine of Rememberence documents sign location, scale and content.

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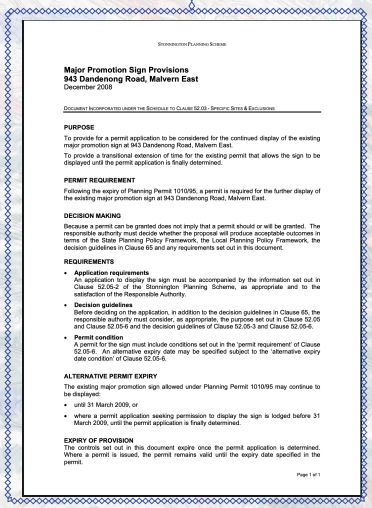
Other documents, particularly those from outlying councils were less explicit in signage descriptions, often times only including text-based information. These documents could be quite old as well, sometimes dating back to 1999.



Major Promotion Sign Provisions
943 Dandenong Road, Malvern East
December 2008

PURPOSE

To provide for a permit application to be considered for the continued display of the existing major promotion sign at 943 Dandenong Road, Malvern East.

To provide a transitional extension of time for the existing permit that allows the sign to be displayed until the permit application is finally determined.

PERMIT REQUIREMENT

Following the expiry of Planning Permit 1010/95, a permit is required for the further display of the existing major promotion sign at 943 Dandenong Road, Malvern East.

DECISION MAKING

Because a permit can be granted does not imply that a permit should or will be granted. The responsible authority must decide whether the proposal will produce acceptable outcomes in terms of the State Planning Policy Framework, the Local Planning Policy Framework, the decision guidelines in Clause 65 and any requirements set out in this document.

REQUIREMENTS

- **Application requirements**
  An application to display the sign must be accompanied by the information set out in Clause 52.05-2 of the Stonnington Planning Scheme, as appropriate and to the satisfaction of the Responsible Authority.
- **Decision guidelines**
  Before deciding on the application, in addition to the decision guidelines in Clause 65, the responsible authority must consider, as appropriate, the purpose set out in Clause 52.05 and Clause 52.05-6 and the decision guidelines of Clause 52.05-3 and Clause 52.05-6.
- **Permit condition**
  A permit for the sign must include conditions set out in the 'permit requirement' of Clause 52.05-6. An alternative expiry date may be specified subject to the 'alternative expiry date condition' of Clause 52.05-6.

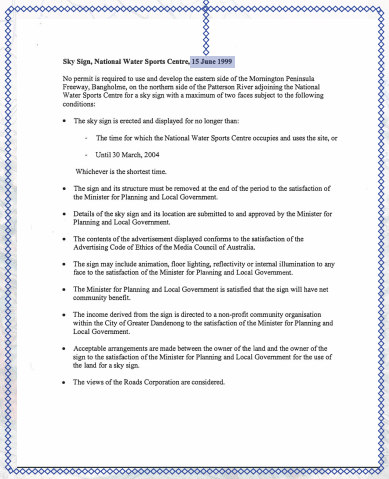
ALTERNATIVE PERMIT EXPIRY

The existing major promotion sign allowed under Planning Permit 1010/95 may continue to be displayed:

- until 31 March 2009, or
- where a permit application seeking permission to display the sign is lodged before 31 March 2009, until the permit application is finally determined.

EXPIRY OF PROVISION

The controls set out in this document expire once the permit application is determined. Where a permit is issued, the permit remains valid until the expiry date specified in the permit.



Sky Sign, National Water Sports Centre, 15 June 1999

No permit is required to use and develop the eastern side of the Mornington Peninsula Freeway, Bangholme, on the northern side of the Patterson River adjoining the National Water Sports Centre for a sky sign with a maximum of two faces subject to the following conditions:

- The sky sign is erected and displayed for no longer than:
  - The time for which the National Water Sports Centre occupies and uses the site, or
  - Until 30 March, 2004

  Whichever is the shortest time.
- The sign and its structure must be removed at the end of the period to the satisfaction of the Minister for Planning and Local Government.
- Details of the sky sign and its location are submitted to and approved by the Minister for Planning and Local Government.
- The contents of the advertisement displayed conforms to the satisfaction of the Advertising Code of Ethics of the Media Council of Australia.
- The sign may include animation, floor lighting, reflectivity or internal illumination to any face to the satisfaction of the Minister for Planning and Local Government.
- The Minister for Planning and Local Government is satisfied that the sign will have net community benefit.
- The income derived from the sign is directed to a non-profit community organisation within the City of Greater Dandenong to the satisfaction of the Minister for Planning and Local Government.
- Acceptable arrangements are made between the owner of the land and the owner of the sign to the satisfaction of the Minister for Planning and Local Government for the use of the land for a sky sign.
- The views of the Roads Corporation are considered.

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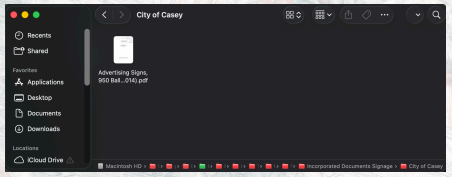
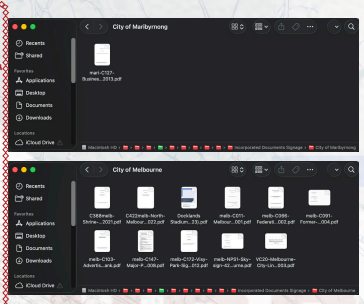
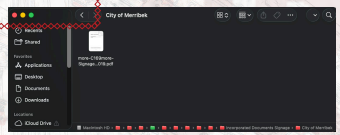
Overall there were 20 of these documents of which documenting all of them would infringe upon the brevity of this report. However within Greater Melbourne, I found incorporated sign documents from the following councils:
City of:

- Casey · 1 Document
- Kingston · 1 Document
- Maribyrnong · 1 Document
- Melbourne · 11 Documents
- Merri-bek · 1 Document
- Stonnington · 1 Document
- Yarra · 1 Document
- Greater Dandenong · 2 Documents
- Port Phillip · 1 Document

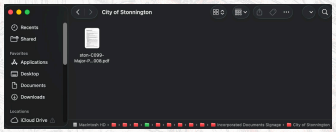




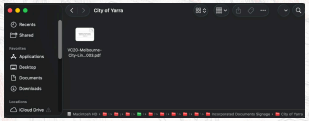












II.3: Mock Clause 55 Assessment

After the research tasks, the next major project that I worked on and the only project that was unique to myself was a mock clause 55 assessment. The purpose of this task was to keep me engaged while I was experiencing downtime between senior consultant requested tasks. This project was given to me by Fidel during week 4 and was to be assessed with Jacob who was the resident Vicsmart expert at Urbis (the mechanism to which the standard of development proposals is assessed to see if they are permissable under the prescriptive or the performative planning controls).

This task was to be completed by me over the course of the vocational placement and I was to reach out to Jacob when I ws halfway through sort of for a check-up and then when I was complete to assess how well I was able to evaluate the proposal.

The assessment was title "Mock" as this site had already been evaluated by Urbis therefore the outcome had already been determined.

This project was compelling for me as it appeared to be a progression from the more foundational statutory planning training that I had undertaken throughout the statutory planning subject at Melbourne Uni, however was much more practical and reflected how planning consultancies themselves undergo development evaluations.

I was provided with a number of relevant documents to complete this task, these documents included:

- The Clause 55 Assessment Urbis Template
- The Town Planning Documents which included the architectural drawings of the site
- The Landscape drawings which included the landscape architectural drafts of the site
- The Rescode calculator: which is a commonly dispersed excel document that calculates specific prescriptive requirements such as staggered heights or setback requirements etc
- The Arborist report for the site
- The Townhouse and Low-Rise Code Guidelines document

II.3.i: Mock Clause 55 Assessment: Clause 55 Urbis Template

Using the Urbis template, I was able to document how well the development met the standard of the planning scheme Clause 55.

For those sections that met the standard, we marked them with a green check mark 'Complete', for those sections that did not meet the standard, we instead marked those with a yellow 'V' for Variation 'Required'.

One thing that Jacob had not noticed before giving me the mock assessment that we were able to pick up on once I began assessing the development was an infringement of the vehicle crossover into the Tree Protection Zone or TPZ on the northern side, this was one of only a couple variations that would be sought during the assessment period of this development.



4.2 CLAUSE 55 RESCODE ASSESMENT

Objectives | Standard | Assessment — Complies / Variation Required

Clause 55.02 – Neighbourhood Character

55.02-1 – Street setback objectives — Standard B2-1 — The development is setback a minimum of 6.0 metres from the Arundel Street boundary, less than the minimum of the adjoining lots specified (7.5m) and greater than the minimum allowance within table B2-1 of Clause 55.02-1 (6.0m).

The proposed setback provides adequate space for genuine landscaping opportunities, including canopy tree planting.

55.02-2 – Building height objective — Standard B2-2 — The maximum building height does not exceed 9 metres (8.165 metres).

55.02-3 – Side and rear setbacks objective — Standard B2-3 — Both dwellings meet the ground-level and upper level setback requirements stipulated by the Standard.

	MIN. SETBACK GROUND LEVEL		MIN. SETBACK UPPER LEVEL	
	Proposed	Requirement	Proposed	Requirement
North	6.460m	6m	8.160m	3.24m
East	1.305m	1m	1.805m	1.7065m
West	1.305m	1m	1.805m	1.6975m

55.02-4 – Walls on boundaries objectives — Standard B2-4 — The proposed walls on boundaries do not exceed a length of more than 10 metres, an average height of 3.2 metres, or a maximum height of 3.6 metres.

	AVERAGE WALL HEIGHT	WALL LENGTH
East	3.07m	6.36m
West	3.04m	6.36m

55.02-5 – Site coverage objective — Standard B2-5 — The site coverage does not exceed 60% (51.411%).

55.02-6 – Access objective — Standard B2-6 — Total width do not exceed 40% (39.5% based on site width <20m). Arundel Ave does not front TRZ1 or TRZ2.

Seeking a variation in the standard for encroachment into tree protection zone (TPZ). Would need to justify.

A new 2.7m wide crossover is proposed to provide access to the garage of Unit 1 on the east side of the street frontage. The existing crossover is to be shortened to 2.7m provide access to Unit 2 to the west.

55.02-7 – Tree canopy objectives — Standard B2-7 — The proposed development of four new trees with a total tree canopy cover of 57.5m² exceeds the minimum required of 54.7 m².

55.02-8 – Front fences objective — Standard B2-8 — The development does not propose a front fence.

Clause 55.03: Liveability

55.03-1 – Dwelling diversity objective — Standard B3-1 — N/A — Not Applicable: Proposed < 10 dwellings

Less than 10 dwellings proposed. Each of the two proposed dwellings contain 3 bedrooms, a kitchen, 2 bathrooms, wash basin and toilet at ground level.

55.03-2 – Parking location objective — Standard B3-2 — The development includes a single car garage to each dwelling, conveniently located to allow direct access to each dwelling.

An additional tandem car parking space is also provided for occupants in the driveways.

55.03-3 – Street integration objective — Standard B3-3 — The dwellings are oriented towards Arundel Avenue in a side-by-side formation. The development has been designed to integrate with the street and provide appropriate pedestrian and vehicular access.

Passive surveillance is provided by habitable room windows on level 1.

Lighting is provided to external accessways and paths.



55.03-4 – Entry objectives — Standard B3-4 — Each dwelling has incorporated its own sense of address through a distinct entry way.

Each entry door has access to street and is not garage. Entry points have covered area of at least 1.44 metres

55.03-5 – Private open space objectives — Standard B3-5 — Each dwelling incorporates one part of the secluded private open space to the rear of each dwelling with a minimum area of 25 square metres and a minimum dimension of at least 3 metres, with convenient access from a living room.

In total, each dwelling will have a minimum of 25.04 m² of private open space with a minimum dimension of 3.65m

55.03-6 – Solar access to open space objective — Standard B3-6 — Noting the orientation of the site, the private open space to the rear will receive adequate solar access.

Secluded private space is located in the south, southern max wall height is 5.860m in height, the minimum 7.940m of setback exceeds the minimum of 7.274m required.

55.03-7 – Functional layout objective — Standard B3-7 — Main bedroom (master suite) width of 3.38m exceeds minimum required of 3m width and depth 4.88m exceeds minimum of 3.4m, other bedrooms meet minimum width of 3m and depth of 3m.

The proposed living area minimum width of 4.625m meets the minimum of 3.6m

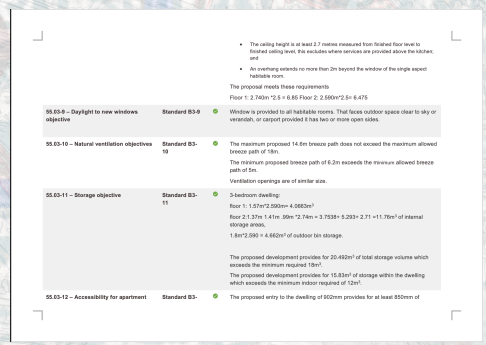
55.03-8 – Room depth objective — Standard B3-8 — The depth of a single aspect habitable room does not exceed 2.5 times ceiling height measured from external surface of the habitable room window to rear wall of the room.

Bed 2: Level 1: 3.520m does not exceed the maximum allowance of 6.475m

Guest: Ground Level: 3200 does not exceed 6.85m.

Living/Dining Room: 7000 does exceed maximum allowance of 6.85m however there can be an increased allowance of 9m if:

- The room combines the living area, dining area and kitchen; and
- The kitchen is located furthest from the window; and



- The ceiling height is at least 2.7 metres measured from finished floor level to finished ceiling level, this excludes where services are provided above the kitchen; and
- An overhang extends no more than 2m beyond the window of the single aspect habitable room.

The proposal meets these requirements

Floor 1: 2.740m *2.5 = 6.85 Floor 2: 2.590m*2.5= 6.475

55.03-9 – Daylight to new windows objective — Standard B3-9 — Window is provided to all habitable rooms. That faces outdoor space clear to sky or verandah, or carport provided it has two or more open sides.

55.03-10 – Natural ventilation objectives — Standard B3-10 — The maximum proposed 14.6m breeze path does not exceed the maximum allowed breeze path of 18m.

The minimum proposed breeze path of 6.2m exceeds the minimum allowed breeze path of 5m.

Ventilation openings are of similar size.

55.03-11 – Storage objective — Standard B3-11 — 3-bedroom dwelling:

floor 1: 1.57m^2.592m= 4.068m³

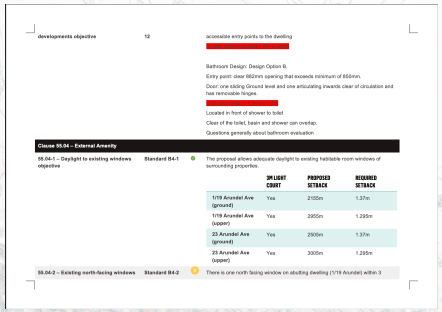
floor 2:1.37m 1.41m .99m *2.74m = 3.7538+ 5.293+ 2.71 =11.76m³ of internal storage areas.

1.8m^2.590 = 4.662m³ of outdoor bin storage.

The proposed development provides for 20.492m³ of total storage volume which exceeds the minimum required 18m³.

The proposed development provides for 15.83m³ of storage within the dwelling which exceeds the minimum indoor required of 12m³.

55.03-12 – Accessibility for apartment — Standard B3- — The proposed entry to the dwelling of 902mm provides for at least 850mm of



developments objective — 12 — accessible entry points to the dwelling

Bathroom Design: Design Option B.

Entry point: clear 882mm opening that exceeds minimum of 850mm.

Door: one sliding Ground level and one articulating inwards clear of circulation and has removable hinges.

Located in front of shower to toilet

Clear of the toilet, basin and shower can overlap.

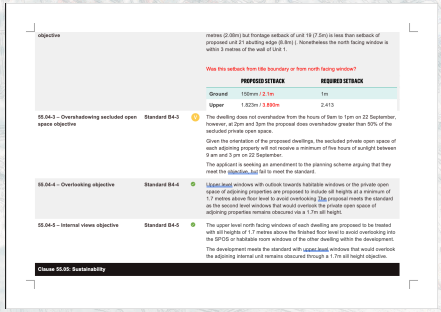
Questions generally about bathroom evaluation

Clause 55.04 – External Amenity

55.04-1 – Daylight to existing windows objective — Standard B4-1 — The proposal allows adequate daylight to existing habitable room windows of surrounding properties.

	SW LIGHT COURT	PROPOSED SETBACK	REQUIRED SETBACK
1/19 Arundel Ave (ground)	Yes	2100m	1.37m
1/19 Arundel Ave (upper)	Yes	2955m	1.295m
23 Arundel Ave (ground)	Yes	2935m	1.37m
23 Arundel Ave (upper)	Yes	3005m	1.295m

55.04-2 – Existing north-facing windows — Standard B4-2 — There is one north facing window on abutting dwelling (1/19 Arundel) within 3



objective — metres (2.08m) but frontage setback of unit 19 (7.5m) is less than setback of proposed unit 21 abutting edge (6.8m)). Nonetheless the north facing window is within 3 metres of the wall of Unit 1.

Was this setback from title boundary or from north facing window?

	PROPOSED SETBACK	REQUIRED SETBACK
Ground	150mm / 2.1m	1m
Upper	1.822m / 3.930m	2.413

55.04-3 – Overshadowing secluded open space objective — Standard B4-3 — The dwelling does not overshadow from the hours of 9am to 1pm on 22 September, however, at 2pm and 3pm the proposal does overshadow greater than 50% of the secluded private open space.

Given the orientation of the proposed dwellings, the secluded private open space of each adjoining property will not receive a minimum of five hours of sunlight between 9 am and 3 pm on 22 September.

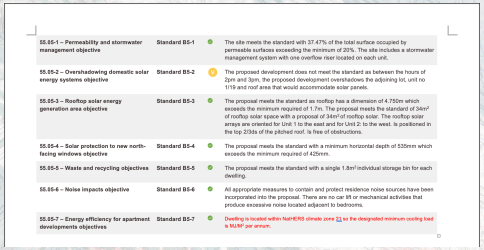
The applicant is seeking an amendment to the planning scheme arguing that they meet the objective, but fail to meet the standard.

55.04-4 – Overlooking objective — Standard B4-4 — Upper level windows with outlook towards habitable windows or the private open space of adjoining properties are proposed to include sill heights at a minimum of 1.7 metres above floor level to avoid overlooking. The proposal meets the standard as the second level windows that would overlook the private open space of adjoining properties remains obscured via a 1.7m sill height.

55.04-5 – Internal views objective — Standard B4-5 — The upper level north facing windows of each dwelling are proposed to be treated with sill heights of 1.7 metres above the finished floor level to avoid overlooking into the SPOS or habitable room windows of the other dwelling within the development.

The development meets the standard with upper level windows that would overlook the adjoining internal unit remains obscured through a 1.7m sill height objective.

Clause 55.05: Sustainability



55.05-1 – Permeability and stormwater management objective — Standard B5-1 — The site meets the standard with 37.47% of the total surface occupied by permeable surfaces exceeding the minimum of 20%. The site includes a stormwater management system with one overflow riser located on each unit.

55.05-2 – Overshadowing domestic solar energy systems objective — Standard B5-2 — The proposed development does not meet the standard as between the hours of 2pm and 3pm, the proposed development overshadows the adjoining lot, unit no 1/19 and roof area that would accommodate solar panels.

55.05-3 – Rooftop solar energy generation area objective — Standard B5-3 — The proposal meets the standard as rooftop has a dimension of 4.750m which exceeds the minimum required of 1.7m. The proposal meets the standard of 34m² of rooftop solar space with a proposal of 34m² of rooftop solar. The rooftop solar arrays are oriented for Unit 1 to the east and for Unit 2 to the west. Is positioned in the top 2/3rds of the pitched roof. Is free of obstructions.

55.05-4 – Solar protection to new north-facing windows objective — Standard B5-4 — The proposal meets the standard with a minimum horizontal depth of 535mm which exceeds the minimum required of 425mm.

55.05-5 – Waste and recycling objectives — Standard B5-5 — The proposal meets the standard with a single 1.8m³ individual storage bin for each dwelling.

55.05-6 – Noise impacts objective — Standard B5-6 — All appropriate measures to contain and protect residence noise sources have been incorporated into the proposal. There are no car lift or mechanical activities that produce excessive noise located adjacent to bedrooms.

55.05-7 – Energy efficiency for apartment developments objectives — Standard B5-7 — Dwelling is located within NatHERS climate zone 21 so the designated minimum cooling load is MJ/M² per annum.

The development required variations on a few of the subsections, notably on:
55.02-6 Access Objectives
The infringement of the TPZ previously discussed
55.04-2 Existing North Facing Windows
The proposed building within an existing north facing window on an adjoining property.
55.04-3 Overshadowning Secluded Open Spaces Objectives
The overshadowing of the secluded open spaces on adjoining properties as a result of this development's construction

Corresponding with Jacob, we reviewed many of the sections in the planning scheme. As he explained, there have been many adjustments made to Clause 55 in particular this year and he was helping to ellaborate on what the clauses were in the past referred to as and why these adjustments were made. As a result of the Victorian Government's push to build new housing, there have been fast track proposals put through that would streamline the obection process and alleviate the housing stress appreciated by the state of Victoria and Metropolitan Melbourne specifically.

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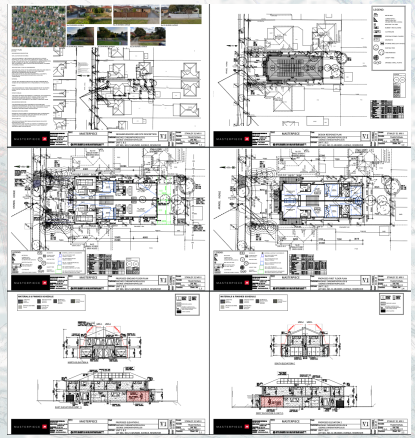
II.3.ii: Mock Clause 55 Assessment: Town Planning Documents

The site is located at number 21 Arundel Avenue, Reservoir and would propose a 2 unit and 2 storey townhouse development in an area of low-density single-family housing.





The major document that I was using to evaluate the proposed development was the town planning drawings. These documents demonstrated the extent to which the site would be developed and the proposed efffect on Neighbouring developments.

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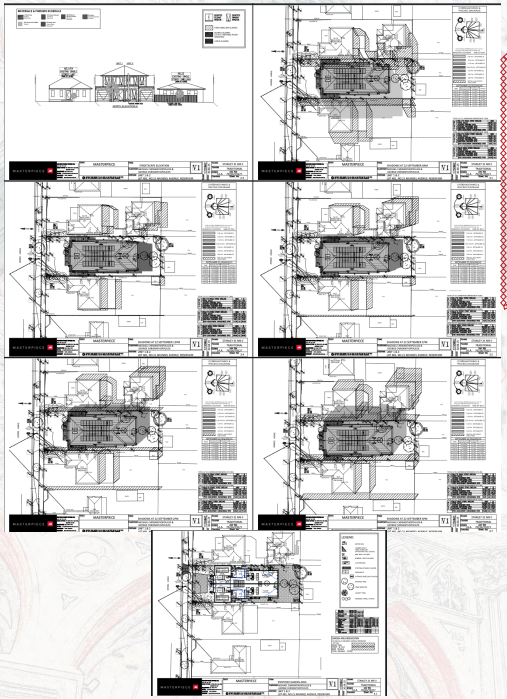

These drawings can often be difficult to navigate given the density of information contained within them and my own inexperience working with town planning documentation. Jacob was incredibly helpful in discernin what information was relevant to evaluating the scheme in relation to the proposed development. What was also fascinating to me was the level to which the scheme was discretionary, there are very few instances where something would be considered prohibited, rather the town planner and the developer are given a great degree of latitude in arguing for the variation of the planning scheme to allow for development to occur.

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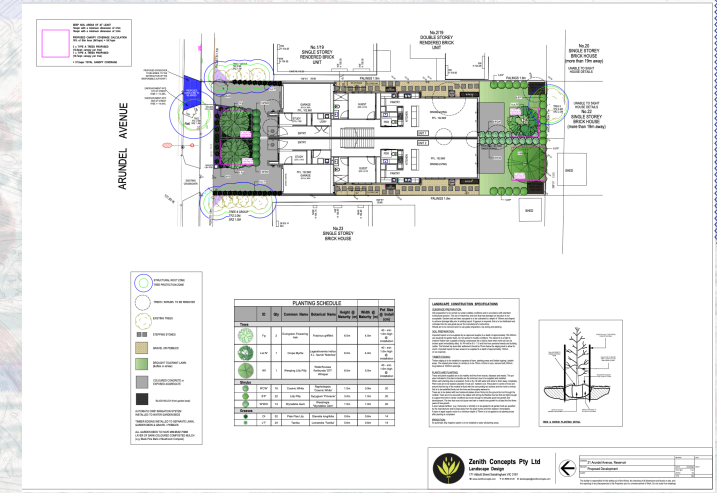
II.3.iii: Mock Clause 55 Assessment: Landscape Drawings

The Landscape drawings were also an integral part of the evaluation. Using these documents, I am able to discern which trees or vegetation objects were considered significant to the site. These drawings were also useful insofar as they provided an indication of where newly proposed vegetation would be located so that way I could evaluate ancillary requirements such as for Clause 55.03-4 regarding unobscured entry objectives.



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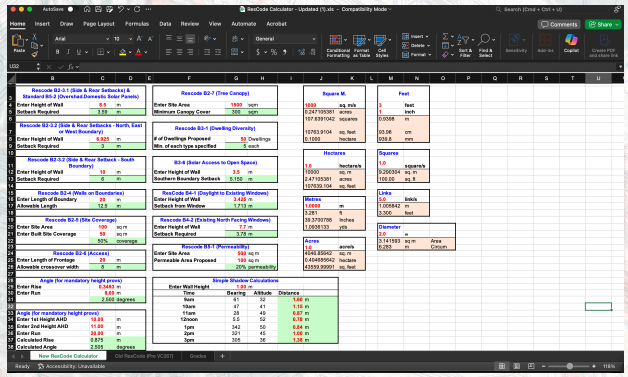
II.3.iv: Mock Clause 55 Assessment: Rescode Calculator



The Rescode Calculator is an important tool that Jacob gave me which is used to as the name suggests, evaluate the extent to which the development meets the standard. What this tools does is it uses each specific standard within the planning scheme for the Clause 55 section and calculates the maximum allowed setback or height or area on roof to determine the requirements for meeting the standard. This tool was integral to my evaluation and I used it where the scheme called for specific area or height requirements.

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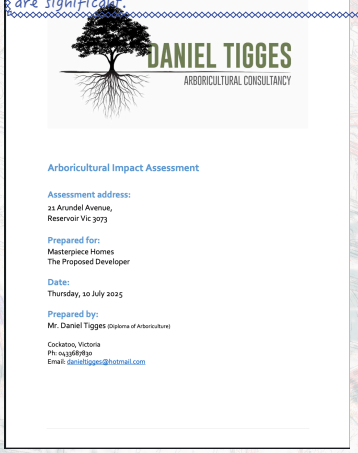
II.3.v: Mock Clause 55 Assessment: Arborist Report

I did not use the arborist report a great deal only because Jacob had explained to me many of the considerations such as the tree-protection zones etc that would be relevant for this report. But ordinarily these are iused to evaluate whether vegetation is native or what specific structures are significant.



DANIEL TIGGES
ARBORICULTURAL CONSULTANCY

Arboricultural Impact Assessment

Assessment address:
21 Arundel Avenue,
Reservoir Vic 3073

Prepared for:
Masterpiece Homes
The Proposed Developer

Date:
Thursday, 10 July 2025

Prepared by:
Mr. Daniel Tigges (Diploma of Arboriculture)

Cockatoo, Victoria
Ph: 0438[illegible]0
Email: danieltigges@hotmail.com



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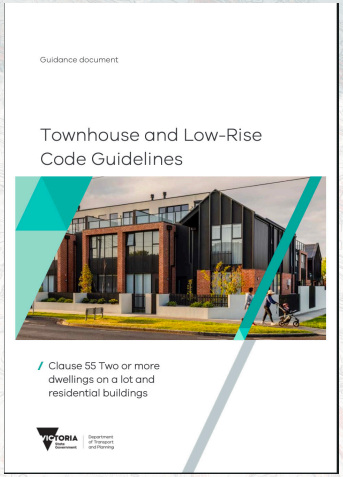
II.3.vi: Mock Clause 55 Assessment: Townhouse and Low Rise Code Guidelines 2025



Guidance document

Townhouse and Low-Rise Code Guidelines

Clause 55 Two or more dwellings on a lot and residential buildings

VICTORIA State Government | Department of Transport and Planning

The Townhouse and low-rise code guidelines are taken from the planning scheme and overview the requirements for the approval of townhouse or Clause 55 developments.

For this project, I mostly used the planning scheme instead of this document because I found navigation more intuitive given my own familiarity with the planning scheme.

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II.4: Project Sheets

Project sheets are an uncommon and unique task at Urbis, they are typically produced to showcase a specific project we worked on as a kind of proclamation of achievement. The only project sheet I produced was for Clare and it was actually a really exciting project located at the end of the Mornington Peninsula towards the inlet to Port Phillip Bay.

Project Sheets are simply just a 250 word summary of what a project was, who the project was for and the impact Urbis and our intervention has.

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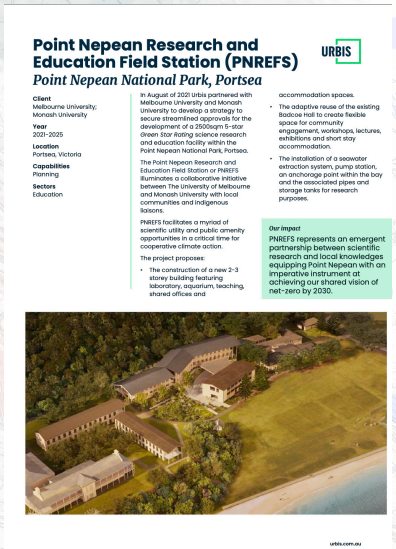
II.4.i: Project Sheets : Point Nepean Research and Educatonal Field Station (PNREFS)

This project was actually very exciting, it was a project sheet that was displayed at Urbis' booth for the Industry Night hosted by the Urban Collective. The project sheet displays a research centre located at the end of the Mornington Peninsula in Point Nepean National Park completed for both Melbourne and Monash Universities. The site is for a research centre that aims to enhance understanding of Port Phillip



Point Nepean Research and Education Field Station (PNREFS)

URBIS

Point Nepean National Park, Portsea

Client
Melbourne University; Monash University

Year
2021-2025

Location
Portsea, Victoria

Capabilities
Planning

Sectors
Education

In August of 2021 Urbis partnered with Melbourne University and Monash University to develop a strategy to secure streamlined approvals for the development of a 2500sqm 5-star Green Star Rating science research and education facility within the Point Nepean National Park, Portsea.

The Point Nepean Research and Education Field Station or PNREFS illuminates a collaborative initiative between The University of Melbourne and Monash University with local communities and Indigenous liaisons.

PNREFS facilitates a myriad of scientific utility and public amenity opportunities in a critical time for cooperative climate action.

The project proposes:

- The construction of a new 2-3 storey building featuring laboratory, aquarium, teaching, shared offices and accommodation spaces.
- The adaptive reuse of the existing Badcoe Hall to create flexible space for community engagement, workshops, lectures, exhibitions and short stay accommodation.
- The installation of a seawater extraction system, pump station, an anchorage point within the bay and the associated pipes and storage tanks for research purposes.

Our impact

PNREFS represents an emergent partnership between scientific research and local knowledges equipping Point Nepean with an imperative instrument at achieving our shared vision of net-zero by 2030.

urbis.com.au

URBIS

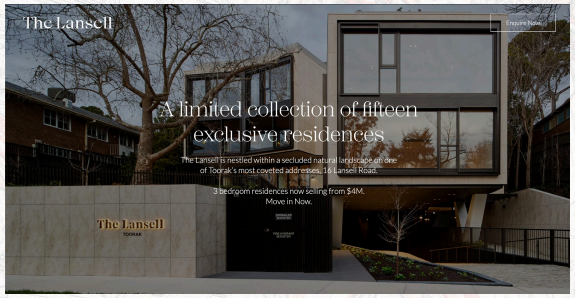
II.5: Site Visits

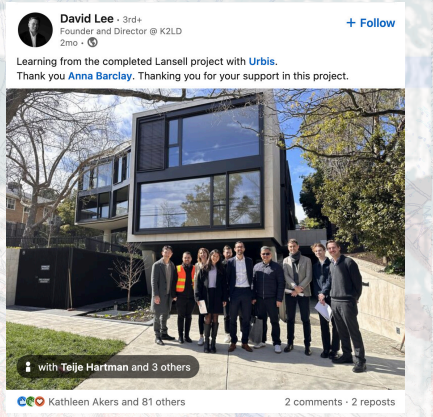
I was very lucky to be able to participate in a site visit while I was with Urbis. These events are relatively infrequent however represent huge milestones for Urbis. They are typically events where the senior consultant who provided planning expertise on a project is invited along with a few other members to represent Urbis. Typically, the developers, the builders, the architects and council join. They are semi-structured guided tours of the site, our contributions and generally an exhibition of a project once completed.

URBIS

II.5.i: Site Visits : The Lansell : Toorak

I was incredibly lucky to have visited the Lansell on behalf o Urbis. This kind of site visit happened very infrequently and represented a hugely exciting site and project. The Lansell had been developed for the better half of the past decade and faced multiform barriers that jeopardised the project. From objectors who had to be paid off to changing builders to different development environments, this project was an incredibly difficult one for the developers, Urbis and the builders. This project was unique insofar as the developers were also the architects and this was their only project, it was a small close-knit team who worked closely with Urbis to ensure their passion project could see its own completion.





It was an amazing opportunity for me and for Urbis. We were able to represent the company in a project that took 7 years and gather some snazzy photographs along the way!

URBIS



The Lansell

16 Lansell Road, Toorak

KEY STAKEHOLDERS & CONSULTANTS

Client	The SHC Group
Architect	K2LD Architects & Interiors
Landscape	Jack Merlo
Council	Stonnington
Barrister	Adrian Finanzio
Planner	Urbis (Anna Barclay & team)
Urban D.	Ratio (Catherine Hegger)
Solicitors	NRF (Sally McIndoe & team)
Builder	Camillo Builders
Engineer	Edge
Services	MacCormack
RBS	Phillip Chun

KEY PROJECT MILESTONES

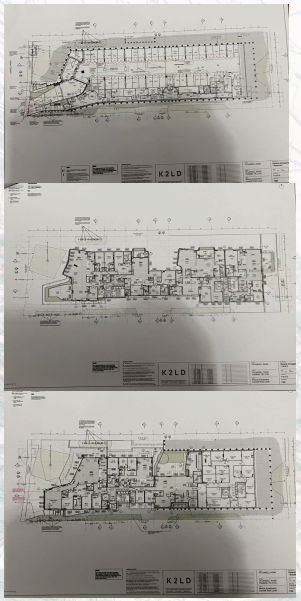
01-12-2018	Land purchase
30-07-2018	Planning application
14-02-2020	NOD to reject application
04-06-2020	VCAT CC (online)
03-08-2020	VCAT hearing (5-days, online)
15-10-2020	VCAT permit received
31-05-2023	Head contract signed
27-07-2022	Soil turning ceremony
20-08-2023	Start of construction
24-04-2024	Top-out ceremony
05-09-2024	Practical completion

PROJECT DETAILS

Land size	2954 m²
Coverage	56%
GFA*	7732m²*
NSA	4292
Apartments	15
Carparks	38
Smallest	Apt. 102: 183m², 2-Bed, 2-Bath
Largest	Apt. 302: 472m², 4-bed, 4-Bath

KEY DESIGN CHARACTERISTICS

- Elongated site dimensions 96m x 30m
- Approximately 9m topography fall East to West
- Neighbourhood character & garden precinct
- Double, tripple and 360 degree apartment orientation
- Lush perimter landscaping to shared boundaries
- Porcelain facade, kobblestone entry, marble floors & benchtops, timber veneer walls & joinery



We toured the entire facility. It was a luxurious place that I would have been very happy to have lived if I had $5 million to spend. There were 15 units each with their own carparks, secluded open space and beautiful spaces. Its location in Toorak was also a very prisine spot. I believe that Lansell Road is where many diplomats live in Melbourne.

Overall, this was a formative experience that I am happy I got to experience as it advanced my professional identity tremendously. It was also a great opportunity to step into the shoes of other built-environment professionals such as architects, developers and builders to see what the day to day for some of these professionals looks like.

URBIS

Folio Conclusion

This folio documents all of the projects that I had the opportunity to take part in as part of my time with Urbis. There many projects that I worked on each displaying unique opportunities available to planners. From on-the-ground site work to demonstrative project sheets, to technical site evaluation, the material inscriptions of the professional urban planner represent a diverse array of different artefacts.

Over the course of 13 weeks I collected a number of these different tasks and with the help of other student planners and senior consultants, I was able to complete a great diverse array of different projects.

Chapter III: Reflection

My experience at Urbis was the first professional experience of this kind of my life. It required of me a repour and collaboration that I had not experienced thus far at university or in the other positions I had held in my life. Three months progressed rather quickly and despite only going in once a week, I felt greatly challenged by the role. This program was provided through a collaborative effort by Melbourne University and Urbis to be completed while concluding my university studies at Melbourne University. This was also a rather competitive program as I was informed that I was selected from among other student planners who had applied. Urbis' role as among the largest built-environment consultancies in Australia makes it a prestigious environment to work, and their employees well respected within Melbourne and Australia.

According to academic scholarship on work-integrated learning (WIL), student professional experiences are becoming a critical method by which students may fortify disciplinary abilities as well as develop interchangeable skills (Crebert et al. 2004; Dempsey et al. 2023; Jackson et al. 2023). These programs have been described as opportunities of "identity work" whereby students may exhibit the extent to which their personal capabilities and ambitions may align with and enhance professional career pathways (Dempsey et al. 2023). Urban planning is an especially dynamic field for these career pathways to be demonstrated as within planning are several professional silos whereby the planning professional's role may be partitioned (Fox-Rogers and Murphy, 2015; Howe, 1980). WIL can therefore be a quintessential component for developing a planning professional's career trajectory (Smith et al, 2009; Reddan & Rauchle, 2017). However, this paradigm also creates a discrepancy between those students who were able to secure a WIL opportunity and those that were not with potential for equity shortfalls as well as economic challenges (Yates, 2024).

For evaluating the importance this experience had on developing my own professional planning background, I reflectively evaluate the personal learning goals (PLGs) that I set prior to the completion of this program and predict how these PLGs and their outcomes may enhance the future of my own career trajectory as well as the broad future of professional planning practice itself.

III.1 General Learning Experiences

At Urbis, my primary responsibility was responding to the requests of senior consultants and aiding them in conducting background research into existing conditions for development sites. A fortune that I was lucky enough to be provided with were the expertise of other student planners working alongside me. Others such as Mitch, Matthew, Hayden, Jack, Tom, Dehao, Noah, Emma and Vy were among those other student planners who aided me in my completion of research tasks. Senior consultants were also incredible assets for me at Urbis, their experience within Planning and the diversity of roles they came from manifested in a wealth of knowledge that could resolve most challenges that I encountered. The most prominent of these senior consultants that I aided and who aided me included Fidel, Kathleen, Christina, Vicky, Jacob, Mick, Jaimie and Laura. The large group of practitioners and knowledge-holders created a welcoming and engaging professional atmosphere.

Beside the PLGs that I set for myself, the most critical skills that I developed were communication and collaboration competencies. I recall, the first day at Urbis was overwhelming for me, not only because I was first introduced to my laptop, the workplace and many new faces, but also the methods by which information was dispersed. These methods included Microsoft Teams and Outlook for emails. The number of Teams channels and the organisaton of these information vectors was a completely new experience for me and resulted in a steep moment of personal learning. I remembered finding it exceedingly difficult to locate notifications at first. These reflections illuminate another important factor that this vocational placement helped advance for myself, locating personal shortcomings. I discovered a great deal of personal shortcomings during this experience, trepidations that I had not previosuly known myself to possess. These moments of pause included the technical proficiencies in professional communication vectors as previously discussed, but they also included more amorphous qualities such as when to ask questions and how to frame these questions. For example, discerning what to include within Site Kits was always a challenge for me that I did not effectively begin to mitigate until week 6.

According to the academic scholarship on WIL opportunities, the general learning outcomes available to students can be enhanced through the unique opportunities for community and empathy offered by environments of WIL (Ewin et al., 2024). These opportunities for empathy such as the assistance offered by senior consultants and other student planners at Urbis aided me in more effectively working alongside professionals. WIL is well documented to aid students in the developing of "generic skills" including communication, critical analysis, teamwork, and problem solving (Crebert et al. 2004). These outcomes are reflected in my own experienced difficulties engaging with the Microsoft Teams channels and critically reflecting on what information to include in the Site Kits, which were aided by collaboration with others as well as iterative professionalisation that was impressed on me from experiential project completion. Finally, the benefits that I received from the experience were not the only to be disseminated from the vocational placement, scholarship reveals that organisations also benefit from the application of WIL opportunities. The synergistic benefits of WIL manifest for organisations in the form of cost to organisations, often students can be conscripted at lower costs to organisations and while there is a need to invest time and training, it has been found that these costs are often worth the investment by organisations (Kemp et al., 2021).

III.2 Personal Learning Goals

A key factor in engaging in this vocational placement at Urbis was the development of Personal Learning Goals (PLGs). PLGs have been documented within academic scholarship to offer students advantages to personal autonomy when engaging in WIL (Zimmerman, 2013) and to enhance opportunities for positive learning outcomes especially when instructors are involved (Buchanan et al., 2022).

For my vocational placement at Urbis, I formed three major PLGs that I wished to pursue while engaging with my vocational placement and upon reviewing feedback from my interim vocational placement report I have amended these PLGs. My original goals are as follows:

Initial Goal 1: Expanding Personal Urban Planning Capacity in a workplace Environment

Initial Goal 2: Gaining Experience with the Tasks of Professional Planners

Initial Goal 3: Expanding Knowledge of Thesis Topic Research

These initial goals were too broad and therefore eluded easy definition. As I reflect on the completion of my program there are several amendments I wish to implement within this personal reflection. To begin with I wish to reframe those initial goals into:

PLG 1: Effectively work within Collaborative Teams of Diverse Planning Professionals

PLG 2: Understanding the role of the private consultant in delivering public utility: The Reconciliation with Neoliberal Urban Planning.

PLG 3: Expanding Thesis Topic Research Knowledge: Revealing the Barriers and Facilitators facing Open-Source Software and Open-Access Data for practicing Professional Urban Planners.

These adjustments made my goals more operationalisable which is more reflective of the approaches advocated in WIL pedagogy academic scholarship (Buchanan et al., 2022)

III.2.i: **PLG 1:** Effectively Work within Collaborative Teams of Diverse Planning Professionals

This goal pertains to my ability to work alongside others. As has already been discussed, over the course of my placement this has been a major learning opportunity for me. When initially beginning, I struggled to manage the Microsoft Teams messages and navigate the corporate Microsoft Outlook. Over the course of 13 weeks, these practices became naturalised, and I found it much easier to engage with these mechanisms in completing my projects. This may be a reflection not only in technical competencies through a routine workflow using these instruments but also a reflection of my growing confidence working alongside senior consultants and other student planning peers.

At the conclusion of my placement, I was able to effectively work alongside both the senior consultants as well as my fellow student planners. I was even able to effectively communicate on behalf of Urbis when engaging in tasks such as the holiday advertising period task where I had to make calls with local councils and inquire about the holiday period planning permit advertisement adjustments. This exemplifies Schön's (1983) "Reflective Practitioner" where iterative action gives way to professionalism.

III.2.ii: **PLG 2:** Understanding the Role of the Private Consultant in Delivering Public Utility

This second PLG reflects a departure from my original second goal "Gaining Experience with the Tasks of Professional Planners" to reflect another point of personal trepidation that I experience in my studies and to make this goal more specific and quantifiable. Commencing my studies at Melbourne University and the learning that I have conducted at university, a major scepticism that I have experienced regards the mechanisms by which built-environment interventions are dispersed within Global North contexts. Specifically, the conflation between market dynamics and the provision of public utility. I have therefore been unconvinced by the existence of large market firms such as Urbis who provide developers with typically more capital with better quality planning services compared to those who have less. This asymmetrical application of services could lead to unequal dispersal of services therefore exacerbating many of the criticisms of Neoliberal practice (Kirk, 2023).

This PLG therefore confronts my own scepticisms. I as a planning Master's student wish to engage in the professional world in a way that would be economically intelligent for myself, although at the same time I do not wish to be misguided by normative professional practice which may not serve every echelon of society in an egalitarian fashion. This is perhaps a difficult goal therefore to be completely satisfied with. While I am incredibly fortunate to have been given the opportunity to work for Urbis and have met a surfeit of wonderful people at Urbis, my scepticisms of private market utility provision remains unabated. My participation on projects such as the Site Kit for low-density housing provision in Shepparton perhaps is the greatest affirmation of this scepticism as despite my own awareness of the dangers of seeking to rezone an Urban Floodway Zone (UFZ) into residential zoning, Urbis still aided a potential developer in achieving this aim. However, there were moments when I did see the value of Urbis in providing public good. My very first Site Kit for Fidel which was conducted in coordination with Housing First Victoria is an example of potential egalitarianism. Housing First Victoria is a community-run not-for-profit organisation, and their primary goal is to provide affordable and community-provided housing and Urbis' aiding of them did provide me a moment of reconsideration of my sometimes-cynical discernment of Neoliberal utility provision.

This goal was therefore partially met as although I did aid in attempting to rezone an urban floodway zone in Shepparton, I also helped collaborate in a project that would give a major not-for profit the means to develop more social housing in a community-first way. This has been documented as "Dual Accountability" (Leshinsky & Legacy, 2015) within literature reflecting the common occurrences of ethical dilemmas in professional arenas.

III.2.iii: **PLG 3:** Expanding Thesis Research Knowledge: Revealing the barriers and Facilitators facing Open-Source Software and Open Access Data for practicing professional Urban Planners.

This goal is rather specific and reflects my own ancillary goal of familiarisation with my thesis topic that I was completing alongside my vocational placement at Urbis. My topic investigates the specific barriers and facilitators that impact Open-Source Software and Open-Access Data within professional planning practice. These tools represent decentralised software instruments that are produced and dispersed not by proprietary companies like Microsoft or Adobe but by communities of passionate programmers, developers and built-environment professionals. What I noticed while at Urbis were many of the patterns that I had encountered in the literature for my thesis research. For example, professional siloing, or the process of professionals being confined to specific role orientations is a process that had accelerated alongside the digital automation of built-environment practice (Howe, 1980; Howe, 1992; Fox-Rogers & Murphy, 2015).

Urbis exemplifies this paradigm as not only does the firm include separate divisions for professionals: Landscape Architecture, Urban Design, Transport Engineering, Urban Planning, Heritage but also within each of these divisions, we segregate roles. For Jacob, who I worked with as part of my mock Clause 55 Assessment, he would be relegated to evaluating the performance of rescode assessments, whereas for Fidel, he would be a collaborator with developers looking to engage Urbis in planning advice. This segregation of skills reminds me of my bachelor's studies in economics and the term "comparative advantage" (Ricardo, 1821) where instead of prioritising market producers who are generally proficient at producing a myriad of products, it is instead preferred to incorporate multiple producers who specialise in one specific skillset to maximise production.

For my thesis topic, this was an unfortunate vindication. As a major barrier that I speak about within my thesis are the discrete role orientations of planners that reduce the transferability of many open-source instruments within practice. This experience helped me to contextualise many of the shortcomings identified within my thesis therefore I would consider this goal met. The few tools that I did use as part of my projects were almost exclusively proprietary software artefact. For example for the preparation of all of my reports, I used Microsoft Office, mostly Microsoft Word, for my communication and collaboration, I used Microsoft Outlook and Teams, for satellite imagery I used Nearmap, for site context, I used Google Streetview. The only digital instruments that I used that were pluralistic or truly accessible were those provided by the Victorian or Australian Governments, these included the planning scheme, VicPlan, Austlii or Council websites, while these are great services, they do not represent the decentralised creation of knowledge that my thesis confronted in the dispersal of digital instruments.

Chapter IV: Conclusion
The Future of Professional Practice

Based on my experience at Urbis, the future of urban planning practice will be undeniably more automated. Our reliance on digital twin and data portals such as Austlii, VicPlan and Nearmap among others represent an ever-expanding array of digital artefacts which in many cases are authored through proprietary mechanisms that enhance spatial planning and digital information repositories. For the future of practice, I do not see a legitimate challenging of existing power structures as I would like to see. Instead, I see an exacerbation of Neoliberal service provision, digital automation and the further professional siloing of the professional planner. One thing that perhaps I do see which I am excited about are the prevalence of community organised groups such as Housing First Victoria or Nightingale who are rethinking normative housing provision to instead include more pluralistic strategies. In the case of these alternative developers, Urbis has a role to play as it is already helping these groups as was the case for my Albert Park Site Kit and with the potential to stand alongside these alternatives in creating a more community-driven future for housing provision.

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Revealing the Barriers and Facilitators Impacting Uptake of Open-Source Software and Open-Access Data Within Built-Environment Professional Practice Using Actor-Network Theory

by

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B.S. The University of Cincinnati, 2023

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2025

ABSTRACT

This thesis investigates the barriers and the facilitators impacting uptake of Free/Libre Open-Source Software (FLOSS) and Open-Access Data (OAD) among built-environment professionals in Greater Melbourne, Victoria, Australia. By adapting Actor-Network Theory (ANT), this research examines software uptake in professional practice not as a product of individual logical choice but rather as a series of negotiations among heterogeneous actors within professional networks. The study responds to critical concerns of the Smart City's reliance on proprietary technologies by exploring how Open-Source principles might redistribute agency and uphold democracy within professional practice. Through twelve semi-structured interviews with urban planners, designers, engineers, and geospatial analysts across public, private and educational sectors, this exploratory qualitative research employs an adapted ANT methodology that identifies the key domains shaping FLOSS and OAD uptake within professional networks. The outcome reveals that for the uptake of FLOSS instrumentation there must be a successful formation of networks of social actors. The major elements opposing this network formation was found to include IT departments, crystallised workflows within proprietary software, the expectation for specific file formats, concerns of credibility that could be derived in incorporating alternative instruments and the segregation of professional roles within contemporary practice. The most powerful facilitators identified included 'Vanguard Actors', informal networks of peer support and modular plugin ecosystems that expanded the appeal of FLOSS and OAD in practice. This minor thesis identifies and makes recommendations for strategies to construct durable FLOSS networks by utilising collaboration of institutional organisations and social actors. To the best knowledge of the author, this study provides the first systematic network analysis of FLOSS and OAD adoption within professional built-environment practice.

COUNT OF WORDS EXCLUDING ABSTRACT, GLOSSARY, TITLE, DECLARATION, TABLE OF CONTENTS, LIST OF FIGURES, LIST OF TABLES, REFERNCES AND APPENDICES: 10037

DECLARATION OF AUTHORSHIP

I, Graham Thomas Inglert, hereby declare that this minor thesis is my own work and to the best of my knowledge, reflects the extent of my intellectual capacity.

This thesis does not contain any material that has been accepted for the award of any other degree or diploma in any educational institution, and, to the best of my knowledge, contains no material previously published or written by another person, except where due reference is made in the text of the thesis. The thesis is fewer than 11,000 words in length, exclusive of abstracts, keywords, footnotes, maps and bibliographies.

ACKNOWLEDGEMENTS

While this minor thesis reflects eight months of my own iterative refinement, it represents a two-year journey of academic challenge that I could not have hoped to complete without the aid of many important people. Although I am thankful to all, I am unable to adequately extend the credit that is due.

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My sincere appreciation also goes out to those who volunteered to participate within this thesis research, their insights and expertise provided rich personal accounts that facilitated this project's completion.

I am genuinely grateful to Mr. Kenneth and Mrs. Lynette Wheat who so graciously allowed me a place to call home while I completed my master's studies. At last, my eternal gratitude is with my mother and my father, who's support, and encouragement ignited my passion for urban environments and sustained my interest in bettering our collective built-realm.

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GLOSSARY

Proprietary Software: Software applications that are owned and managed by individual entities, usually in the form of corporations that control intellectual property and where source code and utilisation remains restricted through licensing agreements. (Wise, 2012), (Weber, 2004).

Free/Libre Open-Source Software (FLOSS): Software applications whereby the source code is openly available for inspection, modification and redistribution under various licensing agreements such as the GNU Public Access License (GPL). The term incorporating “free software” and “open-source software”. This differs from proprietary software insofar as FLOSS empowers users through freedoms of access, modification and distribution where proprietary software restricts access to such mechanisms (Stallman, 2015).

Open Access Data (OAD): Data sets available within the public domain free to access, use and redistribute applicable within FLOSS or other instruments without licensing restrictions. Prominent repositories of public access data include Openstreetmap, government data portals and citizen science programs such as purpleAir (Barkjohn et al., 2021).

Actor-Network Theory (ANT): The analytical framework applied within this study that considers social and technical factors as necessary together for the formation of network assemblages. These network associations may stabilise into routine practice and social structures therefore determining collective behaviours. (Callon, 1986; Latour, 1987).

Smart Cities: Urban environments that are defined by the application of communication technology and the Internet of Things (IoT) used to accrue and analyse data with the original intention of improving urban quality through efficiency and automation. This term has become

associated with neoliberalism and the emergent anti-democratic nature of contemporary corporatism (Zanella et al., 2018; Cardullo & Kitchin, 2019).

Open-Source Urbanism (OSU): An agonistic response to Smart Cities where open-source philosophy is applied within urban contexts to prioritise built-environment processes. Founded on collaboration, decentralisation of knowledge and citizen-produced programmes intending to improve urban life through collective decision making. Typically, a grass-roots movement that materialises through successive iterations. (Berisha & Juvančič, 2022).

Geographic Information Systems (GIS): These instruments are used for capturing, storing and analysis geographical data for the purpose of small or large scale analytical or projection purposes. These instruments function as necessary elements in contemporary planning practice such as Esri's ArcGIS or FLOSS alternatives like GrassGIS, QDAL or QGIS.

Built-Environment Professionals: Urban planners, urban designers, civil engineers, spatial analysts and architects who together mould the structural development of urban centres through technical expertise and democratic facilitation.

Translation: A key component of ANT whereby each actor defines the role of others creating networks of relationships (Callon, 1986).

Enrolment: A component of ANT that complements Translation in which the actors within networks establish obligations and dependency on one-another that crystallise collective action into formalised routine practices (Callon, 1986).

Vanguards Actors: Individuals who actively push expectations by demonstrating the utility of alternative technological instrumentation through proficient exhibition. Vanguards play a crucial role in translating digital instruments to colleagues and facilitating new network formation.

Chapter I: Introduction

1.1 Background and Setting

The integration of digital instrumentation in professional urban planning practice has progressed significantly over the past half-century. What first emerged in the mid 1950s as fledgling exercises of digital computing and urban data processing (Creighton et al., 1959) has evolved into a profession that eclipses planning to incorporate a collective network of built-environment professionals each occupying the discrete roles of digital aptitude where practice is actioned. Geographic Information Systems (GIS), data projection, statistical analysis, report preparation, and creative design have become obligatory passage points (Latour 1990) through which the contemporary network of built-environment practitioners must negotiate, conforming to the discrete role orientations and therefore normative occupations they encompass.

Smart Cities have emerged as the vehicle of digital urban practice, moulded by collective digital instrumentation (Schaffers et al., 2011). While originally envisioned as an amalgam of information and communication technologies (ICT) and the Internet of Things (IoT) to generate and analyse data intending to improve urban life through efficiency and sustainability (Zanella et al., 2018), Smart Cities have now become tied to austerity-driven neoliberalism (Kirk, 2023; Cardullo & Kitchin, 2019; Albino et al., 2015; Grossi & Pianezzi 2017). Contemporary Smart City discourse identifies these networks as reliant on private corporate mechanisms for technology provision in urban governance. Characterisations include "Dracula Urbanism" (Kirk, 2023) and "anti-democratic neoliberalism" (Cardullo & Kitchin, 2019), reflecting apoplexy over

the acquiescence of user-agency to large market actors such as IBM, Cisco Systems, Siemens AG and others who utilise utopian entrepreneurialism to position themselves as essential partners in urban digital transformation (Albino et al., 2015). As Smart City development has become synonymous with a dependency on market provision, there materialises a reduction of the citizen from an agent of political action to that of data generation, expediting capital extraction (Grossi & Pianezzi, 2017). Understanding this threat requires narrowing focus from large scale urban infrastructure to examine the digital instruments that practitioners use daily, the specific utensils by which practitioner knowledge is fabricated, analysed and dispersed.

These specific instruments comprise a standard-issue digital toolbox mediating built-environment practice often authored by proprietary software companies. The specific uses include as GIS platforms such as Esri's ArcGIS suite, Computer-Aided Design (CAD) software like Autodesk's AutoCAD and Revit, Graphical suites such as Adobe's Creative Suite, Office suites such as Microsoft 365, Statistical analysis platforms like SPSS and Stata and many others (Mader & Schenk, 2017). Yet, parallel to this proprietary dominance, Free/Libre Open-Source Software (FLOSS) alternatives have expanded significantly. FLOSS tools represent solutions typically developed by non-profit communities rather than market providers and distributed through public access licenses such as the GNU General Public License (GPL) free to run, study and modify for all users. (Stallman, 2015). QGIS is among the most popular FLOSS alternative within built-environment practice. Others such as LibreOffice, Blender, R studio and Python are among only a few of the ever-expanding array of FLOSS tools challenging normative proprietary dominance (Yap et al., 2022; Xia et al., 2024). These FLOSS instruments, coupled with complementary Open Access Data (OAD) repositories like OpenStreetMap (Haklay & Weber, 2008), government open data portals, and citizen science platforms like PurpleAir (Barkjohn et

al., 2021), present mechanism for which communities may produce relevant data and disperse it freely and accessibly for all potential users. Extensive literature demonstrates the competence of FLOSS and OAD across planning domains (Boeing et al., 2022; Pires et al., 2019; Gani et al., 2024), however there remains a lack of scholarship investigating the strategies to increase uptake of these instruments among professionals.

Greater Melbourne, Victoria, Australia is a prominent case for investigating the rising digital interface with contemporary neoliberal practice and the development of the Smart City. As one of Australia's largest metropolitan centres and among the fastest urbanising regions in the Global North, projected to reach 6.4 million residents by 2034, with significant growth around outer suburbs (Rahnama et al., 2020). Greater Melbourne embodies the interwoven nature of market-driven Smart City initiatives and individual professional practice. The City of Melbourne positions itself as leader in Smart City interventions including public city-wide Wi-Fi, urban sensing, and extensive publicly provided open-data portals (Tariq et al., 2020). This private-public partnership approach can be described as the "entrepreneurial smart city" model prioritising technological solutions through market providers (Vanolo, 2016).

At the state level, the Government of Victoria invests in digital planning infrastructure tools including VicPlan (Victorian Government , 2023) and DataVic (Victorian Government, 2021), therefore encouraging standardised practice across planning authorities and private consultancies. This smart development has occurred through partnering with private firms and facilitation by major educational institutions like The University of Melbourne where built-environment study programmes like the Master of Urban Planning, Urban Design, and Civil Engineering are taught through proprietary instruments such as Esri's ArcGIS (The University of

Melbourne, 2022). Melbourne's context provides a transferable setting for examining the uptake barriers and facilitators facing FLOSS and OAD instrumentation in practice within neoliberal Smart City contexts.

Through inclusion of current and future professionals within built-environment practice across Greater Melbourne, representing public sector agencies (local and state government), private consultancies, and master's-level planning students at Melbourne and RMIT Universities, this minor thesis utilises an ANT framework to identify the barriers and the facilitators currently impacting uptake of FLOSS and OAD instruments within professional built-environment practice.

1.2 Data Collection Procedure

This study employs an exploratory qualitative research study using semi-structured interviews as its data collection method. The interview participants were selected among currently practicing planning professionals, designers, engineers, and geospatial analysts who represent a collection of diverse actors within professional built-environment practice. These participants were recruited through sampling via email and LinkedIn messaging (Appendix A) across four practitioner categories: public sector planners (local councils located within Greater Melbourne Statistical Area), private sector planners (consultancies and private development facilitators), Melbourne University urban planning and urban design students (master's level), and RMIT University urban planning students (master's level). Interviews spanned 30 to 70 minutes, focusing on eleven core questions exploring participants' professional roles, organisational contexts, software usage patterns, and extent of experiences with FLOSS and OAD (Appendix C). Participant Details can be found in Table 1.

Participant #	Current Role	Broad Discipline	Current Organisation	Sex	Years of Experience Within Field	Extent of FLOSS/OAD Use
1	Urban Designer / Committee Member	Urban Design	Urban Design Forum Australia / Geelong City Council	Male	10-15	Extensive
2	Urban Planning Specialist – Senior Associate	Urban Planning	CS Town Planning	Male	15+	None
3	Master's Student	Urban Planning	Melbourne University	Male	1 to 5	Extensive
4	Master's Student	Urban Planning	RMIT University	Male	1 to 5	Somewhat
5	Master's Student/ Planning Assistant	Urban Planning	Melbourne University / Cogency Melbourne	Male	1 to 5	Somewhat
6	Master's Student	Urban Planning	Melbourne University	Male	1 to 5	Somewhat
7	Master's Student / Urban Design Assistant	Urban Design	Melbourne University / Urbis Melbourne	Female	1 to 5	Somewhat
8	Master's Student / Assistant Planner	Urban Planning	Melbourne University / Tract Melbourne	Male	1 to 5	Somewhat
9	Transport Engineer	Geospatial Analysis	Maribyrnong City Council	Male	5 to 10	Extensive
10	Strategic Growth Manager	Urban Planning	Greater Dandenong City Council	Female	15+	None
11	Maps Officer / Cartography Librarian	Geospatial Projection	Melbourne University	Male	15+	Extensive
12	Data Analyst	Geospatial Analysis	Infrastructure Victoria	Male	1 to 5	Extensive

Table 1: Research Participants Breakdown (Information can be found in Appendix E).

Data analysis followed the Qualitative Codebook method (Creswell, 2017) and organised with consideration of Yin (2014) and MacCallum et al. (2019). The transcribed interviews were systematically coded using thematic analysis principles (Naeem et al., 2023). This strategy sanctioned identification of seven major thematic codes enacting Actor-Network Theory concepts: (1)Non-Human Actors, (2)Human Actors, (3)Material Inscriptions, (4)Stability and Fragility, (5)Interactions and Relations, (6)Legitimacy Work, and (7)Translation and Enrolment. These codes were categorised by response frequency (Figure 2) and analysed to reveal thematic patterns in the identification of barriers and facilitators impacting the uptake of FLOSS and OAD instruments within built-environment practice.

1.3 Project Outcome

To the best knowledge of the author, this minor thesis is the first systematic examination of FLOSS and OAD uptake barriers and facilitators within professional built-environment practice. This novel study utilises an adapted model of the Actor-Network Theory framework informed by Callon (1986) and Latour (1987) & (1990) to demonstrate that software choice in professional networks is not a technical decision of problem-solving capacity but instead the result of composite negotiations among diverse actors.

The study identifies seven significant domains where FLOSS networks either are successfully formed or fragmented: (1) Non-Human Actors: The Software Bazaar, Black Boxes and Cognitive Entanglements; (2) Human Actors: The Gatekeepers and Vanguards in FLOSS Translation; (3) Material Inscriptions: Routine Scripting and Incarcerative File Formats; (4) Stability and Fragility: Dynamism, Agency and Phantasmagorical Unreliability (5) Interactions and Relations: An Enthusiastic Community Marred by Preconceived Legitimate Practice; (6)

Legitimacy Work: A Future of Publicly Accessible Privacy Infringement; and (7) Translation and Enrolment: Vanguards in Need of Institutional Backing.

These seven domains were organised as buckets to which responses were coded therefore revealing specific barriers and facilitators within each domain. Among these key barriers are IT departments operating as passage points who obligate practice, the crystallised processes of routine software practice amalgamating into subconscious antagonism towards alternative mechanisms, persistent file expectations unique to proprietary software reinforcing dependence, the trepidation over the perceived concerns of legitimacy and credibility that occur when transitioning platforms, and general segregation of role responsibilities among professional planners often reducing the easy transfer of knowledge and behaviour. The coding and analysis process also revealed certain facilitators unique to FLOSS and OAD, including 'Vanguard Actors', those who demonstrate expertise through practical application and are therefore able to translate utility to superiors and decision-makers, extensive informal networks of peer support, modularity in plugin ecosystems that allow greater agility for software application, and the expanding availability of public data-sets.

This project advocates in favour of reform within the social and technical networks of professional practice to facilitate a greater uptake of FLOSS and OAD instruments within professional networks. IT departments must be enroled, educational curricula should encourage greater application whether through coursework or partnerships, networks of legitimacy can be created across institutional arenas, and extending practitioners agency by using hybrid software approaches where users are permitted software agency but professional relationships with clientele and partners are retained.

1.4 Statement of Problem and Research Question

Despite extensive technical literature demonstrating that FLOSS alternatives can effectively complete planning tasks across multiple domains (Boeing et al., 2022;Pires et al., 2019;Gani et al., 2024) and extensive surveys cataloguing the expanding array of FLOSS options for geographical sciences (Mader & Schenk, 2017;Yap et al., 2022;Xia et al., 2024), to the best knowledge of the author, there are comparably few studies that examine how widespread these tools currently are within contemporary practice. There have been related studies on Linux operating systems that aid in explaining how demonstrated advantages offered by the FLOSS model do not necessarily equate to higher user uptake (Awan, 2022;Ovadia, 2013), however fall short of investigating actor-network dimensionality. Recognising this research gap necessitates transcending technical feature comparisons to examine the social and technical networks within which individual software choices are imbued.

To aid in bridging this research gap, this thesis aims to answer the following question:

What social and technical factors create barriers reducing uptake or facilitators expanding uptake of FLOSS and OAD instruments within professional built-environment practice?

1.5 Limitations of Study

This minor thesis faces several methodological limitations that should be recognised.

The small sample size may provide limitations in terms of generalisability across the Greater Melbourne collective professional practice. This could also reduce generalisability across the Australian national built-environment practice.

A more comprehensive Actor-Network Theory analysis would ideally incorporate a greater time-period investigation, following actors and networks as they accrue over time. The incorporation of focusing on practitioners also may present limitations for analysing other potential actors or organisations which would otherwise be disenfranchised by the method employed here.

Finally, the study's focus on Greater Melbourne, Victoria's planning practice limits comparison across other contexts with varying geographies or institutional conglomerates and may not reflect how other national or international cases would facilitate or inhibit practical FLOSS and OAD dispersal within built-environment practice.

1.6 Basic Assumptions of Study

This project assumes that the data analysed within this minor thesis will be useful in understanding software uptake choices as more than just a question of technical superiority but as a question of social and technical network formation. This research project assumes that the participants involved were truthful in their answers and more broadly, that current and future practitioners possess valuable knowledge about their professional contexts and organisational dynamics. This study assumes that these contributions can illuminate patterns of uptake with the capacity to inform a greater expansion of knowledge pertaining to FLOSS and OAD implementation strategies within professional built-environment practice.

Chapter II: Literature Review

This literature review details five areas: (1) Smart Cites and the impacts of a changing Digital Industry; (2) Neoliberalism and Open-Source Urbanism as a Disruptor; (3) Open-Source Software and Open-Access Data as Instruments in Practice; (4) The Role of the Professional Built-Environment: Planners, Designers, Engineers and Analysts; (5) Using Actor-Networks to Trace Application of FLOSS in Practice

2.1 Smart Cities and the Impacts of a Changing Digital Industry

Urban development in the second half of the 20th century is denoted by the advancement of computer technology. Within this context, forecasting for growth has become intertwined with the development of computer technologies including data collection and information systems. Roger L. Creighton, Douglas Carroll Jr. and Graham Finney are among the first academics to apply these newly emerging digital technologies with direct urbanism considerations in their 1959 journal article: *Data Processing for City Planning* (Creighton et al., 1959). In this article, the emerging distinction between the analogue and the digital machine is discussed. Specifically, the digital machine's potential to produce vivid spatial imagery of

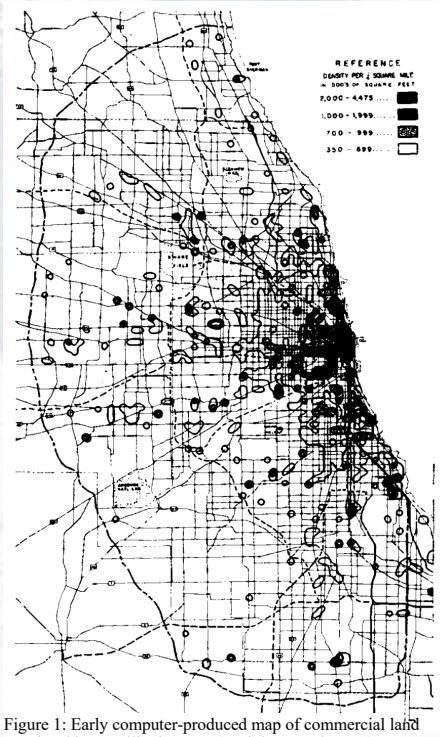

Figure 1: Early computer-produced map of commercial land area in Chicago, Illinois, USA (Creighton et al.,1959)

urban phenomena (Figure 1). with the capacity to “reduce voluminous data to the point where they can be analyzed”.(p.103). Critically, the authors describe how the skills to operate these instruments of spatial analysis will increasingly become a prerequisite for the practice of urban geography and decision making.

This relationship between urban form and digital technologies has intensified since the mid 20th century, further revolutionising how urban and built-environment planning is executed. According to Brotchie et al. (1987), information and communication technologies (ICT) have substantially ignited a change in the traditional patterns of work and residential proximity, impressing a digital transformation of urban policymaking and practice (Figure 2). This transformation accelerated as local governments raced to keep up and embrace Geographic Information Systems (GIS) and other ancillary digital planning tools as mechanisms to streamline zoning and automate practice to resist austerity (Batty, 2021). These technologies also



Figure 2: Man seated at computer using 3-D architectural design system. 1982. Prints and Photographs Division. (Library of Congress, 2024)

facilitated private utility providers in the installation of infrastructure (Maeng & Nedovic-Budic, 2008) therefore further encouraging market-led infrastructure provision.

The Smart City concept embodies this transition. In this paradigm, Smart Cities envision urban environments saturated with interconnected sensors, data streams, and computational infrastructure. These structures incorporate the Internet of Things (IoT) within urban contexts (Zanella et al. 2018). Smart Cities were positioned as necessary responses to the double-edged difficulties of sustainability amid rapid urbanisation (Bibri & Krogstie, 2017), promising data-driven optimisation with a necessary inclusion of computerised and algorithmic intervention.

The implementation of ever-smarter city visions has however garnered immense criticism within academic scholarship for its reliance on corporate technology provision (Albino et al., 2015; Grossi & Pianezzi, 2017; Shelton et al., 2014). This pursuit of Smart Cities is typically described through essential partnerships with multinational ICT firms, creating what Grossi & Pianezzi (2017) identify as a problematic transformation of citizens from political actors to data points for corporate extraction. Major technology corporations including IBM, Cisco Systems, and Siemens AG arrange themselves as the arbiters in Smart City transformation (Albino et al., 2015), however, interventions in settings like Songdo, South Korea, Masdar City, U.A.E. and PlanIT Valley, Portugal have been criticised for oversimplifying urban complexity and prioritising corporate interests over human-scale urban needs (Shelton et al., 2014).

These Smart City implementations have now sensationally been coded through terms like "Dracula Urbanism" (Kirk, 2023), "anti-democratic neoliberalism" (Cardullo & Kitchin, 2019), and as adjacent to an emerging "techno-feudalism" (Varoufakis, 2023; Gilbert, 2024), a perhaps even more sensational term. This, however should not be considered an explicitly luddite

endeavour, Alizadeh & Sharifi (2023) argue, the problem lies not in the choice to incorporate digital urban technologies but to implement them exclusively through proprietary, market-led platforms. By recognising that neoliberalism rather than automation is the primary concern may sanction a consideration of alternative arrangements of technology in urban realms that might enable alternative ideas, with the capacity to redistribute agency within professional practice to operationalise grassroots communities as powerful agents of change.

2.2 Neoliberalism and Open-Source Urbanism as a Disruptor

The widespread critique of Smart Cities' reliance on market-action reflects broader concerns of neoliberalism within urban realms itself. Grossi & Pianezzi's (2017) iterate this problematic application as a reduction of citizenry from political actors to consumers and data generators. This commercialisation of choice doesn't just include the large-scale Smart City infrastructure but also the individual desktop software tools that practitioners use daily to plan and to build new infrastructure, the specific instruments through which planning knowledge is produced, analysed, and exhibited.

The response to this has been one of decentralising knowledge and expertise, Open-Source Urbanism (OSU) has become a prominent new philosophy whereby grassroots and pluralistic approaches to urban policymaking prioritising where collective citizen can decide urban intervention. Berisha & Juvančič (2022) describe OSU as an enabling of participation through adapting open-source principles from computer software development platforms. Prominant community led platforms that have emerged include Openstreetmap.org (Haklay & Weber, 2008) and Bikemaps.org (Nelson et al., 2015) and Purpleair/Sensors.community (Barkjohn et al., 2021). These interventions also have taken the form of direct citizen

participation in agonistic movements like guerilla gardening or citizen-led housing such as in Space-S in Eindhoven, Netherlands (Berisha & Juvančič, 2022). The iterative process of citizen-led OSU can be seen in Figure 3.



Figure 3. *El Campo de Cebada*: The iterative process of community led urban design in Madrid, Spain promoting collective building and open-source experience (Moreira, 2021).

OSU is also consistent with prevailing historical visions of democratic city building. Kevin Lynch (1981) describes urban spaces as an ideal egalitarian society of local control where dominant power structures are subverted, Chantal Mouffe (2005) uses social democracy as a precursor for her "Multipolar Societies", Sherry Arnstein (1969) in her "Ladder Of Citizen Participation" describes the end-goal of citizen planning to be one of citizen control where power is shared by the populace.

These prominent visions of democratic urbanism conceptually reflect open-source development models, which themselves prioritise collaborative contribution over centralised

proprietary control. However, as Raymond's (2001) *Cathedral and the Bazaar* documents, successful open-source projects require more than just the veneer of ideological alliances to also encompass the construction of wide-ranging networks capable of aligning distributed labour and technical standards in their opposing of proprietary transgressions.

2.3 Open-Source Software, Open-Access Data and User Autonomy as a Feature

Free/Libre Open-Source Software (FLOSS) (Stallman 2015) and Open-Access Data (OAD) (Neves et al., 2020) have emerged as open and pluralistic software instruments that may challenge the dominance of proprietary software infrastructure.

FLOSS (Free/Libre Open Source Software) is an encompassing term that broadly refers to software applications whose source code is available for inspection modification and redistribution as mediated through licenses that grant user autonomy such as the GNU public access License to modify and share software (Stallman, 2015). This term applies to both "free software" and "open-source software" which

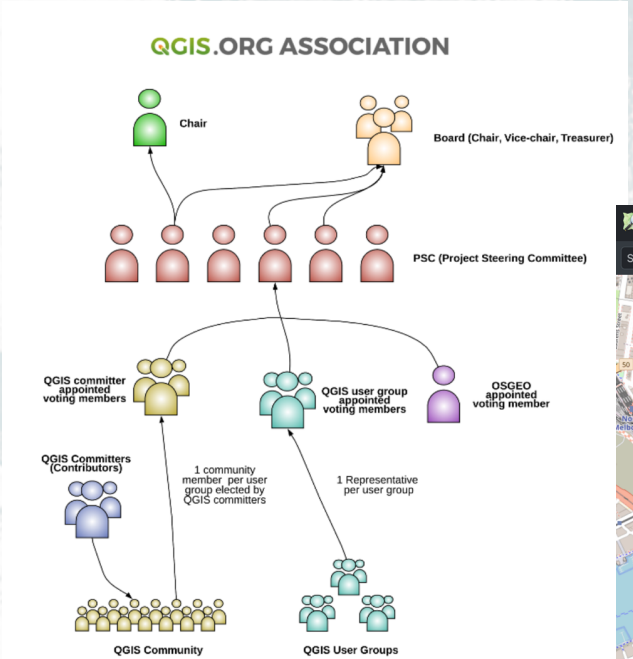

Figure 4: QGIS organisational structure, espousing FLOSS principles of decentralised & community-led knowledge generation. (QGIS Organisation, 2025)

are not necessarily the same thing but often used interchangeably. There is typically an emphasis on liberty and user rights as well as collaboration and democratic iterative processing (figure 4) and conjoined to an opposition to restrictive proprietary processes (Raymond, 2001). It is necessary to note that FLOSS would not apply to proprietary software which is dispersed through "freeware" methods as is often confused unless the underlying source code is available to modify and disperse without restriction (Mader & Schenk, 2017). The term emphasises freedom not only in the monetary sense but also in the autonomy and agency sense.

Open Access Data (OAD), on the other hand which is adjacent and in many cases ancillary to FLOSS, concerns publicly available datasets that can be freely accessed and repurposed without licensing restrictions or requirements for payment (Neves et al., 2020). OpenStreetMap's crowd-compiled geographic information is among the most prominent OAD archives (Haklay & Weber, 2008) (Figure 5). Also included are open government data portals providing administrative and spatial datasets and citizen science platforms like PurpleAir

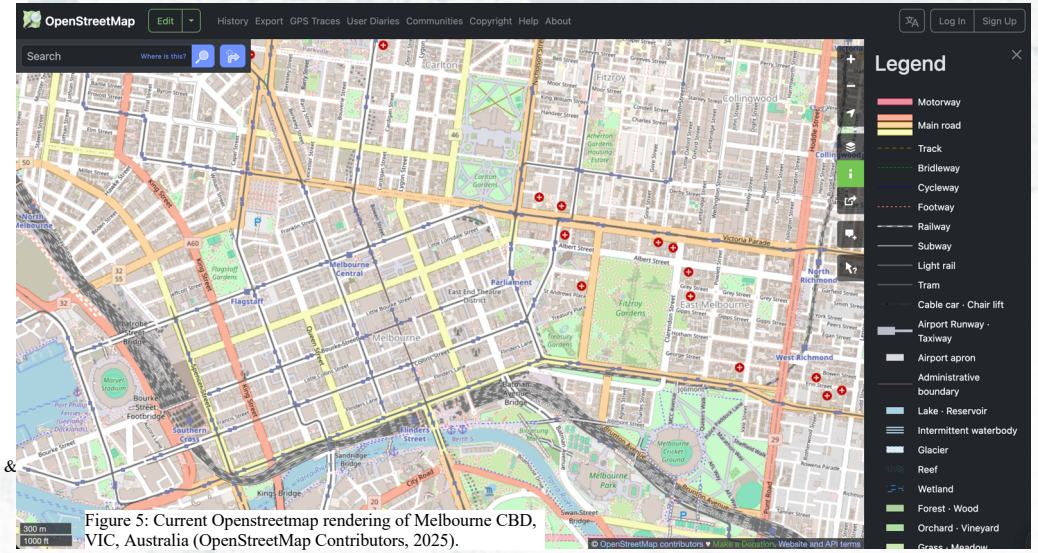

Figure 5: Current Openstreetmap rendering of Melbourne CBD, VIC, Australia (OpenStreetMap Contributors, 2025).

(Barkjohn et al., 2021) that democratise environmental monitoring. FLOSS and OAD when incorporated alongside each other represent both the technical infrastructures and philosophical commitments to freedom of knowledge and the application of such knowledge (Weber, 2004).

Smartphones and mobile computing are also key players in the creation of built-environment data such as through tactics like crowdsourcing. However, unlike the FLOSS model, much of the tactics employed by mobile computing data generation rely on proprietary applications further activating Grossi & Pianezzi's (2017) observation of citizens as data generators rather than decision makers. These tactics have come to be known as "citizen sensing" (Coulson et al., 2021), or what is often appropriated as the misnomer: the "democratization of data" (Kopackova & Libalova, 2023), implying citizens have autonomy over their data which in practice they cannot freely access or redistribute (Huang et al., 2020). Applications such as Waze or Google maps exemplify this paradigm whereby crowdsourced travel data is utilised to generate real-time traffic congestion and navigation data (Hoseinzadeh et al., 2020), however unlike Openstreetmap data, Waze and Google data cannot be repurposed within GIS or other complementary data analysis software with complete user autonomy (Haklay & Weber, 2008).

The landscape of FLOSS and OAD tools available to built-environment practitioners has expanded greatly in recent years (Yap et al. 2022; Xia et al. 2024), already materialising into substantial challengers to market-led distributions within practice. However, this market-led proprietary software still maintains prominence within arenas of practice (Mader & Schenk 2017). Wise (2012) defines these dominant options as solutions owned and managed by single entities primarily for profit through the control of intellectual software, and they have dominated

professional built-environment practice since the 1980s (Weber, 2004). Companies including Adobe, Microsoft, Autodesk, Oracle, and Esri develop and distribute proprietary tools for office suites, graphical design, CAD, database management, and GIS, becoming industry standards (Mader & Schenk, 2017). These instruments now function as what Bruno Latour (1990) may describe as obligatory passage points, or structures by which practice must acquiesce, regardless of individual practitioner preference.

There is a manifold array of recent literature that documents just how many FLOSS and OAD alternatives are available to practitioners (Mader & Schenk, 2017; Yap et al., 2022, Xia et al., 2024). And there are an emergent number of studies demonstrating their utility in practice (Boeing et al., 2022; Pires et al., 2019; Gani et al. 2024). These studies have illuminated the possibilities for applying Openstreetmap data alongside FLOSS analytical tools to construct the spatial indicators of sustainable cities (Boeing et al., 2022), methods to document the successful implementation of FLOSS in land-use mapping (Pires et al., 2019; Gani et al., 2024) and comprehensive index work completed by Mader & Schenk (2017), Yap et al. (2022), and Xia et al. (2024) to catalogue the ever expanding array of FLOSS

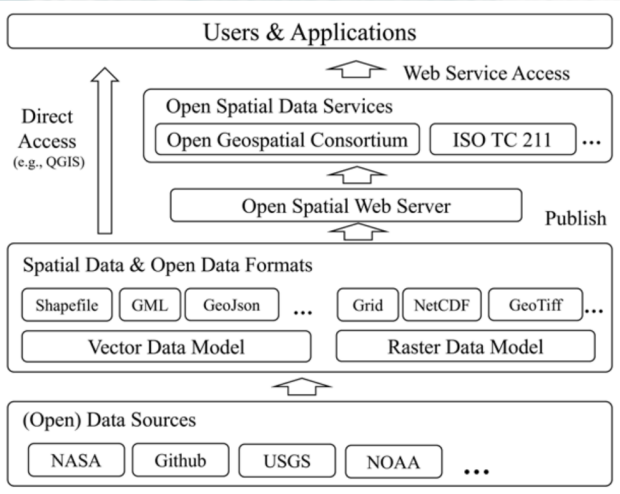

Figure 6. *The Architecture of Spatial Data*, organisatonal structure of OAD to FLOSS to final product. (Xia et al., 2024, p 28).

and OAD tools available to practitioners or enthusiasts with processes for application (Figure 6). These tools comprise but are certainly not limited to LibreOffice, Blender, QGIS and Inkscape.

FLOSS desktop operating systems such as the various Linux distributions may however provide a useful case to illustrate what possible limitations FLOSS encounters in practice. Linux has dominated server infrastructure and some mobile systems like Android for many years but has nonetheless failed to penetrate the share of desktop operating systems which themselves are shaped by proprietary systems such as Mac or Windows (Moody, 2015), however studies have shown that Linux offers key advantages over its proprietary counterparts such as cost of ownership and hardware efficiency(Awan, 2022; Ovadia, 2013). This result may reveal that other factors perhaps could be more significant for users rather than technical efficiency. This example while useful technically, could manifest other idiosyncrasies when evaluated through direct urbanism considerations. There have however been inadequate research studies investigating FLOSS and OAD uptake within built-environment arenas of practice.

Where studies of user uptake of FLOSS in built-environment practice have been lacking, there has not been a lack in terms of the number of FLOSS tools available. Recent scholarship reveals the ever-expanding array of FLOSS and OAD instruments available to practitioners (Von Hippel 2005; Von Krogh & Spaeth 2007; Bhatt et al. 2016). Von Krogh & Spaeth (2007), these studies have shown that there are key benefits to these new platforms such as modular architecture, transparent development processes, and passionate user communities. These qualities have been described as opportunity flashpoints to democratise technological dispersion more dynamically than what is offered by corporate alternatives (Von Hippel 2005). These benefits have been coined as "frugal innovation" (Bhatt et al. 2016) in contexts of limited

resources such as India where local communities in many cases utilise FLOSS tools precisely because of their advantages in agility and cost that proprietary means cannot offer or would be uneconomical to incorporate. To the best knowledge of the author however, there remains a lack of critical studies investigating the factors that determine uptake of FLOSS and OAD within professional contexts. To amend this shortcoming, new studies should examine the networks that may decide this idiosyncrasy.

2.4 The Role of the Built-Environment Professional: Planners, Designers, Engineers and Analysts

For amending the research gap facing FLOSS and OAD uptake, recognising the often-segregated roles of planners and their responsibilities is therefore necessary. As has been described by critical literature (Alexander, 2002; Moroni, 2018), for the modern built-environment professional, a fulfilment of the public interest is a primary intermediary for which their role is formed. Social justice is an emergent mechanism for leveraging the role of planners as well (Dadashpoor et al., 2024), whereby social equity is necessarily incorporated (Deakin, 1999; Comber et al., 2008). This perceived democratic shift has ironically occurred alongside the automation of planning using digital instruments provided by proprietary means. This microcosm has been described (Batty 2021) whereby planning education must balance their roles in both democratic facilitation and a multiplying arena of digital tools (Sabri & Witte, 2023).

Howe (1980) describes the unique roles available to planners. These roles are described as three distinct role orientations: the technician who provides objective expertise, the politician who mediates interests, and hybridised positions which fuse these approaches to varying degrees. In her subsequent work (Howe, 1992) this “public interest” is described as determined by

planners depending on the specific role orientation they occupy. The technicians encompass binary pragmaticism through rationality whereby politicians value responding to the needs of democratic principles. Subsequent studies (Fox-Rogers & Murphy's 2015) have revealed that these idiosyncrasies in roles see further partitioning via the increased inclusion of technological instrumentation. In these automated settings, planners often struggle to juggle their professional roles, now embodying technical experts, democratic facilitators, implementers of policy and advocates of community cohesion. Within this paradigm there emerges an ethical Catch-22 for digital built-environment professionals as to play the role of "technical experts" who in many cases, must utilise undemocratic proprietary software, would require relinquishing the principles of the "democratic facilitator" who champions accessibility and transparency.

It is therefore philosophically anathema for a committed, democratic facilitator to rely on proprietary software tools which could exclude community members from decisive engagement in the case of technical analysis. At present, there could also be difficulty as a planner who adopts FLOSS or OAD tools only to be met with chastisement over professional credibility among colleagues who are entrenched within proprietary digital instrumentation. These paradoxes echo Howe's (1992) observation that technological choices among decision makers morph into ethical dilemmas whereby they must choose who to exclude from participation in planning processes.

The changing arenas of technological automation have been documented within professional planning processes (Albrechts, 1991) where historically with each apparent revolution, the same anxiety is expressed by decision makers regarding deskilling, professional practice and that uncanny valley between democratic participation and technical proficiency.

Contemporary scholarship has determined that the emergent automation of planning processes may both conversely advance and inhibit the democratisation of planning processes (Sabri & Witte, 2023; Sharma et al., 2023). However, as has been discussed, the critical query is not whether to become a luddite but rather select carefully who's digital instruments to engage with and why. Professional identity has therefore become a reverberation of various networks competing for territory within Smart Planning practice encompassing educational institutions, employers and software distributors.

2.5 Using Actor-Networks to Trace Application of FLOSS in Practice

Actor Networks and specifically Actor Network Theory (ANT) may provide a critical utensil for engaging in the research gap. A method by which practitioner choices as those of network formation may be operationalised. This concept advanced by figures such as Michael Callon, Bruno Latour and Madaleine Akrich among others, fuses social and technical elements into a coherent decision-making process treating individuals as network actors or as Latour (2005) describes: "blind, myopic, workaholic, train-sniffing and collective traveler(s)" or 'ants' within colonies (p. 9). ANT may provide a critical theoretical rationalisation that could reveal the social advancements necessary to distribute FLOSS and OAD within the zeitgeist of professional practice. The following key concepts are critical for a successful formation of networks within ANT:

Translation: Crucial for network construction, translation is a process of revealing which actors define the roles and therefore the behaviours of others, with the capacity to create networks where previously none existed. Callon's (1986) study of the seemingly banal topic of scallop domestication organised translation as a four-sided process, that of (1) problemetisation,

(2) interessement (3) enrolment and (4) mobilisation. Each of these periods require the attentive maintenance of network contributors as to ensure a durable and long-lasting cohesion. (Callon, 1986 pp. 196-233).

Black boxing: Another core element of ANT, black boxes are a description of how networks are stabilised over time thereby making the internal mechanisms that spread and legitimate credible practice available for all to see. (Latour 1987 pp. 1-17). If software landscape is currently applied to this paradigm, proprietary software such as Esri's offerings may currently occupy black-boxed UI's to which other software must emulate to garner support.

Scripts of Action: Artefacts of practice that express how technical objects may divulge a certain selection of behaviours while at the same time explicitly preventing others. Sort of like direction manuals. (Akrich 1992 pp. 205-224).

Inscribed User: Personifications of Scripts of Action serving to be the objects of behavioural prediction, they are those users who have subscribed to scripts and encased within predictable actions. Processes of "de-scription" can be introduced as mechanisms to supplant intentional scripts. (Akrich's, 1992 pp. 205-224).

Irreversibility: How networks maintain continuity and resist dissolution. Having high irreversibility promotes durability whereas low irreversibility promotes fragility. This typically is a derivation of key coordinators and institutional constructs that maintain cohesion (Callon 1991 pp. 132-161). Irreversibility may explain why when key organisers who demonstrate FLOSS proficiency depart from organisations, those FLOSS practices may also dissolve.

Institutional isomorphism: This concept considers the conforming of various organisations to standardise practice between them. This can be achieved through variously passive or predatory mechanisms such as explicit coercion, limitation or simply normative expectations (DiMaggio & Powell, 1983, pp. 147-160).

Cultural Capital: This concept reflects a general professional repour that can be accrued through visible action therefore gaining notoriety and having a disproportionate influence on actors within your own network or other external networks (Bourdieu, 1986, pp. 243-248).

Weak Ties: How information spreads through professional networks, where through informal colloquiality and relationships among peers, ideas and eventually practice can spread (Granovetter's, 1973, pp. 1360-1366).

Communities of Practice: The process for which entry-level individuals adopt the practices of routine behaviour within socialisation or emulating the practice of contemporaries (Lave & Wenger's, 1991, pp. 29-43).

ANT's relevance to FLOSS adoption materialises when recognising that software choice is seldom only technical. Proprietary software has achieved veritable hegemony because they have been constructed within successful network formations. The choice of clients to prefer specific file formats, IT departments to negotiate long-term contracting with enterprise licensing, and professional cultural expectations. The success of companies such as Adobe, Esri, Autodesk and others therefore should be seen as a successful integration of network constructions.

To break this status-quo and encourage a further uptake of FLOSS within professional practice, the principles of ANT should be incorporated into the open-source distribution method

for practice. This study begins this discussion and reinterprets the critical question of "why don't built-environment practitioners use FLOSS or OAD" to instead: "What networks can stabilise current software choice in practice, and what alternative networks may facilitate FLOSS and OAD to form and survive?". Unlike any other study to the author's best knowledge, this minor thesis employs ANT theory as a direct instrument for analysing how professional built-environment practice utilises these network structures to either facilitate uptake or fabricate barriers that impede uptake.

Chapter III: Methodology:

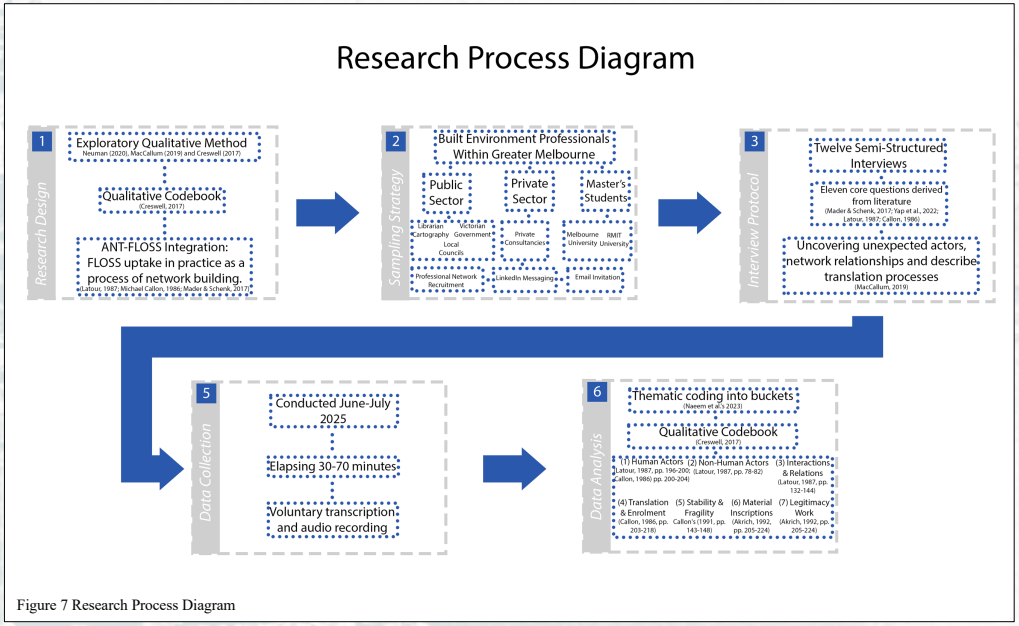

Figure 7 Research Process Diagram

3.1 Research Design

This study employs an amended exploratory qualitative research design informed by Creswell's (2017) *Research Design, Qualitative, Quantitative, and Mixed Methods Approach* to investigate the barriers and facilitators impacting FLOSS and OAD uptake among built-environment professionals in Greater Melbourne, Victoria, Australia. The qualitative approach as informed by Neuman (2020), MacCallum (2019) and Creswell (2017) was selected as most

appropriate for examining the often, large networks that surround software uptake in professional practice. This exploratory design encourages a closer inspection into how practitioners themselves navigate institutional contexts and make software choices.

Research is based in ANT theory informed by the work of Michael Callon (1986) and Bruno Latour (1987) and (1990) which considers technological adoption not as a derivation of individual rational choices but as a process of network-building among different actors. Semi-structured interviews were selected to conduct this research as according to Diana MacCallum et al. (2019), these kinds of methods often encourage a dynamism inviting unexpected connections, however maintain a consistency in structure between possibly differing subjects (MacCallum et al., 2019).

3.2 Sampling Strategy and Population

Twelve participants were recruited as part of this study, representing a diverse array of professionals within Greater Melbourne's built-environment professional networks. Practitioners were selected based on having exposure to proprietary and FLOSS to illuminate potential network dynamics in line with recruitment methods by Creswell (2017). The sample included public sector planners from local and state government agencies, private sector consultants and master's-level planning and design students from Melbourne and RMIT Universities. A diverse subsection of participants such as these are useful in understanding how context shapes the differing components of built-environment networks.

Recruitment occurred through professional networks, email invitations, and LinkedIn messaging (Appendix A). Within this process, practitioners of diverse experience were

prioritised, especially those with FLOSS and OAD experience: students entering their disciplines, mid-career professionals navigating constraints of organisations and senior practitioners with decision-making authority. By having a variety like this, the ANT principle of networks containing actors of various capacities as instruments for the enrolment of others and the stabilisation of networks was demonstrated (Latour, 1990).

3.3 Development of Interview Protocol

The semi-structured interview method was used to encourage an organic emergence of ANT concepts and maintain conversational adaptability. Eleven core questions (Appendix C) explored participants' professional identities, their context within their organisations, workflows and perspectives on FLOSS and OAD instruments as derived by the indexed tools available to practitioners (Mader & Schenk, 2017; Yap et al., 2022) and ANT principles (Latour, 1987; (Callon, 1986). The semi-structured format was chosen in favour of completely structured interviews as according to Diana MacCallum et al. (2019), allows participants to introduce unexpected actors and reveal unpredicted relationships among actors within networks. This approach respects that researchers cannot predict in advance which actors will prove significant in any one network.

The questions (Appendix C) queried participants on the network factors influencing professional software uptake, specifically querying encountered tools, whether others influenced their patterns of uptake, the obstacles they face, and how they respond to the requirements of institutions.

3.4 Data Collection Procedures

Interviews were conducted between June and August of 2025 elapsing from 30 to 70 minutes. All participants were supplied informed consent forms that were voluntarily signed (Appendix D), contributing direct explanation of research purposes and anonymity. Interviews were recorded and transcribed as permitted by participants. Practitioners with extensive FLOSS experience happened to provide more extensive accounts of their experiences while those with less exposure presented rich personal anecdotes regarding the potential barriers impacting their own uptake.

3.5 Data Analysis Framework

Data analysis adapted Creswell's (2017) qualitative codebook approach in which distinct codes were created to reflect ANT's nature for inter-actor relations. The responses provided by subjects were manually sorted into their relevant codes (Appendix E). Those responses that did not fit into any relevant code were left uncoded. Analysis proceeded through a five-part iterative process of (1) familiarisation with interview transcripts, (2) identification of emergent themes, (3) indexing, (4) charting, and (5) interpretation. Seven major thematic codes were developed to investigate ANT concepts with different dimensions manifesting in the formation and dissolution of networks surrounding FLOSS and OAD uptake in practice. The seven distinct codes used in this analysis are as follows:

3.5.1 Human Actors:

An operationalising of ANT's principle of symmetry (Callon, 1986, pp. 200-204) by examining how different human actors, such as individual practitioners, IT staff or policymakers

attempt to determine the behaviours of others (Latour, 1987, pp. 196-200). This process recounted which human actors functioned as translators or gatekeepers who either advocated for FLOSS and OAD or against it, rationalising how identities shaped networks.

3.5.2 Non-Human Actors:

A recognition of specific instruments, whether that be FLOSS or proprietary software, data formats, and other infrastructure as active individuals in networks, reflecting ANT's principle to grant symmetry to non-human entities (Callon, 1986, pp. 200-204). Non-Human Actors are treated as actants with agency rather than passive instruments (Latour, 1987, pp. 78-82). This code traces how software functionality, or technical architecture may impact uptake patterns.

3.5.3 Interactions and Relations:

The interfaces among actors. This could encompass 'workarounds' practitioners develop, collaborations or conflicts. This code describes ANT's consideration of associations rather than entities (Latour, 1987, pp. 132-144), and in doing so, investigates how relationships may build new networks as opposed to normative social consolidations deciding outcomes.

3.5.4 Translation and Enrolment

This code is a reflection of the "Four Moments of Translation" (Callon, 1986, pp. 203-218): (1) Problematisation: Why FLOSS matters.

(2) Interessement: the attraction of users to experiment.

(3) Enrolment: the defining of roles within software or digital networks.

(4) Mobilisation: the sustaining of commitments and tracing of successful of networks.

3.5.5 Stability and Fragility

An application of Callon's (1991, pp. 143-148) concept of irreversibility or the degree to which networks resist dismantling. In this context, the durable nature of codes is documented through routine practices and the enforcement of proprietary hegemony. These instances may include events of instability or unreliability that create opportunities for alternatives that might stabilise into new instruments for practice.

3.5.6 Material Inscriptions

The templates, standards, and deliverable expectations within practice that influence assumptions about legitimate or credible practice (Latour, 1990, pp. 103-131). These artefacts operate as “scripts of action” (Akrich, 1992, pp. 205-224) that coerce certain behaviours while forbidding others. These include the file formats of proprietary software outputs that determine the possibilities for collaboration, the templates that organisations create for their deliverables and also the standardised expectations that may exclude FLOSS compatibility.

3.5.7 Legitimacy Work

Reflections of discrepancies in reliability or credibility associated with behaviours in practice. This code includes the efforts to establish professional acceptance and build reputation within sceptical institutional contexts, which in this case could be “Fact Building” (Callon 1986, pp. 224-229) or the connecting of FLOSS legitimacy to ANT’s processes of network construction.

Adapting Naeem et al.'s (2023) keyword approach to thematic analysis, this study interprets response themes symmetrically with the seven codes to place responses into buckets. These transcribed and coded responses were then ranked by frequency and analysed to reveal patterns (Table 2). This ranking provided insight into which networks or factors of networks proved most consequential for practitioners while at the same time, acknowledging that frequency alone does not determine significance.

3.6 Trustworthiness and Credibility

This minor thesis research study incorporated a collection of strategies to guarantee trustworthiness, it adapted the principle of naturalistic inquiry as provided by Yin (2014, pp. 45-49). The credibility of the research was reinforced through extensive consideration with transcripts and cycles of iterative coding aimed at revealing patterns as they appeared advocated for by Creswell (2017, pp. 201-204). These results were organised across participants therefore comparing the accounts from student, practitioners in public sectors and consultants of private sectors while also noting idiosyncrasies while avoiding the imposition of researcher preconceptions on the dialogue of the participant.

This study’s reliability is accounted for in the data collection and analysis iteration process found in Appendix E. This section provides a transparent recount of the research method applied. The description of participant characteristics and organisational settings is also present permitting readers to assess the potential for findings to be applied over other contexts as advocated for by MacCallum et al., (2019, pp. 60-61). while simultaneously recognising the geographical and professional context of Greater Melbourne.

Chapter IV: Results and Discussion

Twelve semi-structured interviews were administered for this research study. These interviews spanned 30-70 minutes with a concentration on 11 central questions (Appendix C) pertaining to the professional's role, their organisation and the relationship they have as a practitioner with digital technology, particularly open-source software and the application of open-access data.

4.1 Demographics and Roles

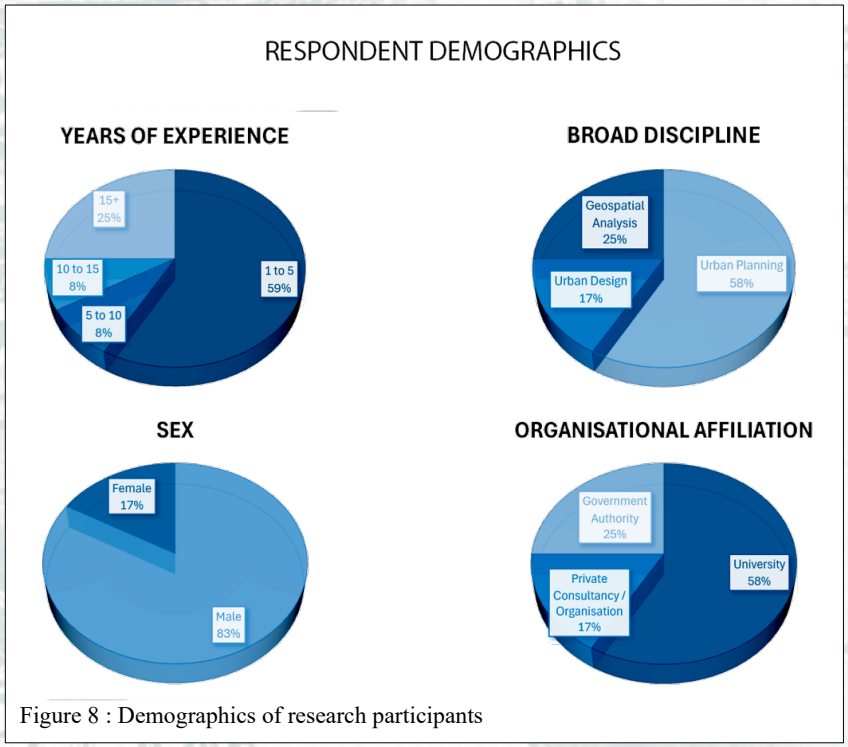

Figure 8 : Demographics of research participants

The participant ages spanned from middle 20s to late 50s. 10 participants were male and 2 were female, it was uncertain if this is a result of fewer women within technical roles or if male practitioners are more available for interview. The participants were gathered from a range of disciplines within the geographic sciences, including urban planning, urban design, cartographical analysis, and geospatial analysis (Figure 1). Participants were experienced in an array of different organisational backgrounds all centred within metropolitan Melbourne, Victoria including local city councils, private consultancy groups, state government officials and Master's level students at both Melbourne University and RMIT University. (Table 2).

4.2 Overall Codes and Response Rate

The results reveal seven major identified arenas of discourse that featured both facilitating factors that encouraged uptake of FLOSS and use of OAD but also revealed barriers inhibiting uptake within professional practice (Table 2); (Figure 2).

Key Domain Codes	Total Responses (Organised by response frequency: highest to lowest)	Most Identified Examples of Themes	Key Facilitators	Key Barriers
1. Non-Human Actors	502	FLOSS & OAD tools; Proprietary software; Data formats	Community-driven instruments, Cost, High access data availability	The crystallisation of proprietary workflows
2. Human Actors	397	Peers; IT staff; policy-makers; developers	Individual Vanguards who influence peers, Professional and Educational networks	IT departments enforcing restrictions, Confidence limitations
3. Material Inscriptions	158	Templates; Standards; Deliverables	Routinisation of workflows, relevancy advantages from community-driven solutions	File format expectation
4. Stability/ Fragility	127	Routine practice; Breakdown events; Experimentation	Flexible organisational software policies,	Established proprietary routines, inherent bias towards offerings with large market support
5. Interactions/ Relations	89	Workarounds; Collaboration; Conflict	Informal peer support networks (online forums),	Differing professional roles inhibiting broad knowledges among decision-makers
6. Legitimacy Work	82	Professional acceptance; Reputation; Authority	Earning validation through recognised demonstration	Industry standard associations, privacy infringement of publicly accessible data
7. Translation and Enrolment	45	Persuasion; Demonstration; Enrolment of tools	Individuals as vanguards for translation, peer-to-peer communication networks	Absence of compelling use cases, lack of structured training infrastructure

Table 2: Breakdown of coding analysis revealing instances of each coded response with facilitators and barriers to each response present.

4.3 Individual Codes Analysis and Discussion

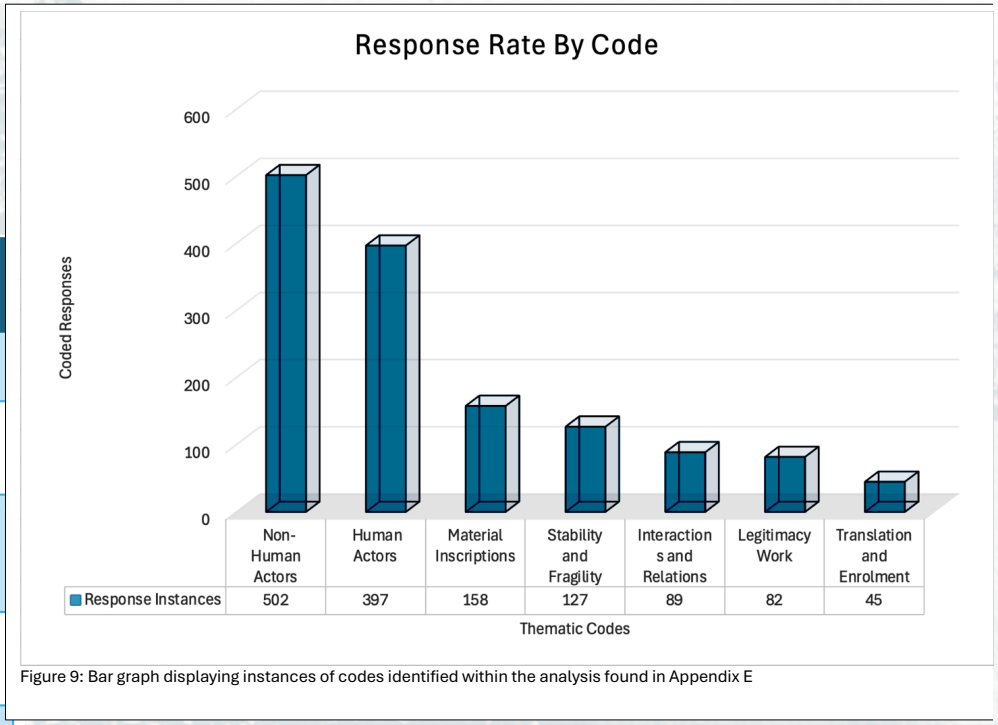

Figure 9: Bar graph displaying instances of codes identified within the analysis found in Appendix E

4.3.1 Non-Human Actors: The Software Bazaar, Black Boxes and Cognitive Entanglements

With 502 coded responses Non-Human Actors appeared the most identified component of FLOSS and OAD uptake. Non-Human Actors often are identified as digital artefacts with the potential to both enable or restrict FLOSS and OAD. These artifacts manifested as modular plugin ecosystems and extensive community support networks like online forums helping to reinforce the ideas of synergistic development that are unique to FLOSS and OAD. Participant 12 explains this reflection:

"I'd say one of the massive advantages of R is its open-source package library... And thank God someone has written some function or package years ago and they've maintained it. And it solves… my exact issue."

This phenomenon is identified by Raymond (2001) as the model of the "bazaar" where a decentralisation of innovation is reinforced through many iterations of peer collaboration. Utility is defined over time in this model which contrasts the normative centralised and closed ideas of proprietary software (Weber, 2004).

Similarly, the availability of OAD was seen as simply transformative, as Participant #11 reflected:

"And then the open spatial revolutions happened... things really sped up at about 2015. And with a lot of open data portals, large amounts of data started really being pushed out."

As is reflected in the scholarship pertaining to these repositories such as Openstreetmap, a core aspect is the redistribution of power away from proprietary mechanisms, therefore empowering individual practitioners in a way that proprietary data sources simply cannot (Haklay & Weber, 2008; Neves et al., 2020). Despite this revelation, cognitive crystallisation of the workflows unique to proprietary software still remained.

Participant #9 explains:

"She was a former ArcGIS user, now she's been converted to QGIS. But the way that she approaches problems is thinking... Oh, I remember the ArcGIS function that I would use... Oh… that's not in QGIS."

Subconscious proprietary behaviouralism such as this reflect "Irreversibility" (Callon 1986) and "Black Boxes". Serious inhibitors that face FLOSS and OAD in which social and technical formations resist alternative translations. Participant #7 illustrated this dependence:

"I mean, I think because I am already studying and I already have the educational license licenses like for Rhino... I'm really done with Adobe, but I think my life kind of has always revolved around it, so. So I think I would find it really hard to go onto like, affinity."

These crystallised behaviours do reflect the idea of "Technological Momentum" (Hughes's 1987) where proprietary tools display themselves as anchors that mould future practice through their own nuances. To encourage a greater FLOSS and OAD uptake, these bulwarks need to be addressed, and the black boxes of practice must be opened.

4.3.2 Human Actors: The Gatekeepers and Vanguards in FLOSS Translation

Human Actors with 397 instances was the second most identified response, appearing as mediators of FLOSS and OAD network implementation. These mediators operated in both facilitatory and impeding ways. Most notably these human actors emerged as what this study calls "Vanguard Actors" who demonstrated FLOSS and OAD utility through proficient demonstration and discouraging professional scepticism.

Participant #9 describes this:

"I think (REDACTED NAME) *was one of those people who initially saw me coding when I joined IV* (Infrastructure Victoria). *She didn't understand why I was doing it... once she saw the kind of things that could be done and the value that they added into the work that we did at IV, her tune changed entirely."*

As Von Hippel (2005) explains, proficient individuals may emerge as powerful translators for new tools being implemented. Institutions also played a significant role with Participant #9 continuing:

"I only got into open-source coding because I attended... a class with someone named (REDACTED NAME) *who did... He introduced us to modelling using R... I thought it was the coolest thing I'd ever seen."*

These early introductions help to reinforce "Communities of Practice" (Lave & Wenger, 1991) in which early participation can provide a bedrock for future assumptions and exhibition.

Unfortunately, when these vanguards leave their practices, their constructed FLOSS networks may not persist. This example is what Callon (1991) may describe as "low irreversibility" and recent studies have shown these limitations (Berisha & Juvenčič, 2022).

The barrier counterpart to these vanguards could be what Dimaggio and Powell (1983) describe as "institutional isomorphism". In which the brand familiarity and the conformity to expectations may inhibit more obscure alternatives with potential technical superiority (Ovadia, 2013). This diminishes these potentially vanguard actors as they themselves still operate within normative and risk-averse arenas that often disfavour open-source for more well-known proprietary offerings.

4.3.3 Material Inscriptions: Routine Scripting and Incarcerative File Formats

The next major code was that of Material Inscriptions which appeared 158 times. These responses described the discrepancy often felt among the potential of FLOSS and the deliverable formats of real practice, where reproducible workflows can be created but the persistent proprietary formats of files reduce the potential saturation of alternative tools.

Participant #9 describes:

"So he just like made the… base map template that we use every single time we have a new site and it has all of our…extracted...GIS groups data so that we can use that in every new project. So it is a bit more seamless."

These emergent themes can be seen through Akrich's (1992) notion of "scripts," where artefacts mould behaviour through routine inscription. Another key element: the perceived quality of the data on offer also impacted the potential for scripting as Participant #11 states:

"I find especially with the OpenStreetMap. OpenStreetMap is the most current of all the online maps…I've used it time and again in official capacity and we've recently used it as well for some mapping exercise internally."

This unique description challenges normative expectations of the inherent unreliability of OAD or FLOSS instruments whereby in some cases they can be perceived as superior when demonstrating novel applicability as accounted by Haklay & Weber (2008) and Boeing et al., (2022). Although, proprietary file formats remain difficult bulwarks to thwart. Participant #7 remarked:

"You can't collaborate with someone. Like, let's Say it's a project in Photoshop. You can't send them that project file if they use Affinity and vice versa... No one's going to accept your weird affinity file to work on."

These inscribed artefacts function as programmes of exclusion that often reduce decision making to proprietary normativity. Some FLOSS tools have taken actions to mitigate these barriers through universal export compatibility of foreign file formats like QGIS and Blender, studies have found that the weaponisation of formatting preserves market control for proprietary

companies (Shen, 2005) and therefore operate as persistent gatekeepers against FLOSS and OAD penetration.

4.3.4. Stability and Fragility: Dynamism, Agency and Phantasmagorical Unreliability

Stability and Fragility was coded 127 times. This element was rather difficult, offering a paradoxical dynamic. FLOSS has the potential to crystallise and become stable once it is integrated in practice, but the transition phase is perceived as volatile and risky. Organisational flexibility appeared as a critical quality appreciated by practitioners who used FLOSS and helped address stability concerns.

Participant #12 says:

"I'm fortunate that my current position let me use the same tools and the same workflow that I had done for YIMBY Melbourne. They're very flexible about that. They're like, just do whatever works."

This emergence presents Callon's (1986) "Interessement" in which practitioners navigate their own autonomy within their respective organisations and whatever barriers may be present facing that autonomy. However, when practitioners only use proprietary instruments, there are inertial forces that reinforce habitual workflow practice maybe contributing to a discouragement of future experimentation.

Participant #7 reflects:

"I mean, I think because I am already studying and I already have the educational license licenses like for Rhino... I'm really done with Adobe, but I think my life kind of has always revolved around it, so. So I think I would find it really hard to go onto like, affinity."

Weber (2004) speaks on a similar theme where the entrenchment of practice redefines the rationality of the user, and therefore making alternatives appear volatile and uncertain. These perceptions of instability were identified on numerous occasions despite equal utility for practitioners. Participant #2 iterates this bias:

"I've tended to rely on using software companies that are established that you have to pay for because they're more, they're more reliable."

This response could be interpreted through a social bias that links cost to legitimacy often identified in studies (Ovadia, 2013; Awan, 2022). In the ANT framework, Latour (1987) describes how artefacts often gain stability in networks through a symbolism of authority rather than sometimes the explicit function they encompass.

4.3.5 Interactions and Relations: An Enthusiastic Community Marred by Preconceived Legitimate Practice

In 89 instances, Interactions and Relations manifested as peer relationships that appeared to facilitate FLOSS and OAD uptake within professional networks.

Participant #8 describes:

"So I think I become more confident to use that (QGIS) in these days... because I've got a lot of friends... If we have any problem then we can just discuss with them."

This response confirms Granovetter's (1973) "Strength of Weak Ties," whereby informal and sometimes colloquial connections saturate innovation. The decentralised nature of FLOSS reiterates this feeling with Participant #12 stating:

"Sometimes I've had problems with some small plugin. You just email the guy, you're like, please, I'm having this issue... I'm always continually surprised about how much free time people dedicate to improving open-source software."

Participant #9 highlighted similar experiences:

"You know, and an open-source software has a strong community... There's notice boards and discussion circles and tutorial videos and everything you need online."

These relationships and feeling contribute to a "Legitimate Peripheral Participation" (Lave & Wenger, 1991), in which users accrue proficiency through collaborative iteration. However, the discrete role orientations of planners reduce the potential agility of practice that may encourage FLOSS and OAD adoption.

Participant #1 discusses:

"And there's risk. There's risks as well like in the urban designer taking on too much of that role. Because if we, you know, most of us... won't have any formal training in GIS... There'll be very much a GIS team is usually in a completely different division."

These professional segregations unfortunately reinforce Fox-Rogers and Murphy's (2015) "Professional Siloing" reducing the inter-operation of practitioners within networks and reducing the potential for FLOSS and OAD innovation

4.3.6. Legitimacy Work: A Future of Publicly Accessible Privacy Infringement

Legitimacy work was coded 82 times. Enumerating that perceptions of credibility provide serious trepidations facing FLOSS and OAD distribution in practice. However, if a visible project was seen to be produced using FLOSS or OAD, this was a huge reputational boon for practitioners using these instruments.

Participant #12 describes:

"So then last year I did three research projects for YIMBY Melbourne, Pretty big ones. They all got decent amount of press and media attention... And then I used that to get my current job as a data analyst at Infrastructure Victoria."

Similarly, Participant #9 described how showcasing open-source capabilities…

"definitely turned a lot of heads"

Bourdieu's (1986) "Cultural Capital" could be the theorisation of this phenomenon where innovative practitioners accrue repour. Another positive observation was the proven capability of these tools after repeated use also improved legitimacy perception. Participant #11 observed:

"Higher quality, more reliable. I find especially with the OpenStreetMap... I've used it time and again in official capacity."

However, the normative institutional biases reiterate that proprietary tools were perceived as more professional and therefore more credible. Participant #3 explained:

"And you feel more professional if you use the industry standard. You feel like a professional... ArcGIS, like it's. And things like Photoshop, they're like industry standards."

This reiterates "normative isomorphism" (DiMaggio & Powell, 1980) and "neoliberal professionalism" (Grossi & Pianezzi, 2017), in which the legitimacy of products is typically a recognition of brand status. Public sector participants also recounted the perceived privacy risks in FLOSS and OAD. Participant #10 states:

"And again, it might be because of my role in government…the red flag for me is the privacy and confidentiality… we will have open data, everything can be accessible and confidentiality and the privacy and of all of this problems that it created."

Results like these have been identified already in studies as "Open Data Paradoxes" Kapacková & Libalová (2023) in which there is an ebb and a flow between pushing boundaries and conforming to expectations.

4.3.7. Translation and Enrolment: Vanguards in Need of Institutional Backing

Translation and Enrolment was coded the fewest of all the coded responses with 42 instances. These responses reiterated the role of Vanguard Actors, the skilled advocates who lead colleagues through the process of transitioning software.

Participant #9 implores:

"I think someone needs to take the lead and invest in this and then people around them who might be less inclined... Will learn through the value that it creates, but not before then."

Practitioner #9's own introduction experience illustrates the importance of influential educators:

"I only got into open source coding because I attended... a class with someone named [REDACTED NAME] *who did... He introduced us to modeling using R."*

These "Moments of Translation," (Callon, 1986) where successful enrolment depends on persuasive intermediaries is iterated in this response with informal exposure to peers appearing consequential. Participant #3 described:

"Just word of mouth. I just had a friend who I saw was using it in class one day I was like, wow, that looks great. Downloaded it five minutes later and then we're set up."

These flexible and low-barrier paths push grassroots dispersion, however they are repeatedly hindered by the support of institutions which limit the possible sustainability of these tools.

Participant #6 noted:

"So you insist me to use some open source software... But that's literally my stereotype is that that's literally so clunky and I don't know where to start. And also the learning resources is much more not that organised."

Participant #10 also recounted failed efforts for implementing new instruments:

"So the transferring all of the data... implementing training and integrating with the other systems... they all hadn't been supported... So then even the software might be good. The implementation failed."

In a situation where institutional alignment is not present, even the most innovative of expansions could still be remain fragile. This is what Callon (1991) describes as "Incomplete Mobilisation". FLOSS and OAD require durable and extensive pathways of enrolment if they are to resist dissolution.

Chapter V: Impact and Recommendations

5.1 Impact

To the best knowledge of the author, this is the first research project to reveal the barriers and facilitators of open-source software (FLOSS) and open-access data (OAD) within professional geospatial, planning and design practice. FLOSS tools and the benefits they entail have been previously well documented (Mader & Schenk, 2017; Yap et al., 2022; Pardo-García, 2018), however this study has taken a new approach of investigating the specific networks that may either facilitate or impede FLOSS and OAD usage in professional practice through consideration of "Open-Source Urbanism" (OSU) (Berisha & Juvančič, 2022) and democratic urban spaces provided by "Multipolarism" (Mouffe, 2005) "Ideal egalitarian societies" (Lynch, 1981) and "Citizen Control" (Arnstein, 1969). The analysis of twelve semi-structured interviews with planners, designers, analysts, and others within built environment practice has illuminated that the uptake of FLOSS and OAD in practice derives from the cooperating of various human actors, institutions and behaviours. The most prominent barriers to emerge included IT departments that adopted the role of gatekeepers, cognitive crystallisation of workflows, legitimacy and privacy concerns, and the segregation of professional roles within professional practice. The most prominent facilitator to emerge from this research were 'Vanguard Actors' who operated as key advocates within organisations orienting colleagues towards recognising the utility and agility offered by FLOSS and OAD tools.

5.2 Limitations

The outcomes documented within this study did encounter an array of limitations, potentially inhibiting broader applicability. The choice to utilise a relatively limited sample size of twelve semi-structured interviews, could reduce the generalisable quality that a more desirable encompassing studies may aim for across broader Australian geospatial, planning or design realms. The selective sampling approach, while seeking to locate practitioners with authoritative positions or with experience in FLOSS may favour the documentation of already constructed FLOSS and OAD networks therefore diminishing the accounts of fledgeling network construction. A more comprehensive study that perhaps included a greater cross-sectional sample may mitigate this limitation by following actors and networks over the process of development possibly better activating many of the ANT principles that would render network formation and retention. Nonetheless, interview results do provide snapshots into present networks but are unable to completely reiterate the dynamic processes of translation, enrolment, or stabilisation that typically take months or years to fully mature. This condition therefore may create an effect where the journaling of network irreversibility becomes estranged whether FLOSS networks are constructed or dissolve.

The choice of practitioners as interview subjects may also invite perspectives that are more conservative with respect to identifying clientele, as official roles may inhibit a candid criticism of IT departments or software distributors as to avoid potential interpersonal conflicts. An ideal ANT study would prioritise a symmetrical following of each actor including these clientele and IT departments which this study lacked the resources for.

Finally, the choice to conduct this study exclusively within the Melbourne, Victoria context does reduce the ability to compare other regional or national networks that could display different environments or regulations for FLOSS and OAD uptake. The findings should therefore be understood as specific to this particular collection of actors, institutions, and material processes that constitute Greater Melbourne planning at this particular moment.

5.3 Project Observations

The transcripts resulting from the semi-structured interviews have documented the differing behaviours of digital practice available to practitioners within organisational networks. Organisations that provided practitioners agency in determining software practice had a greater potential for utilising FLOSS and OAD, whereas IT programs who enforced specific software appeared as what Latour (1991) may describe as an "anti-program" impeding uptake. Government organisations and their practitioners did display an elevated perspective of scepticism toward FLOSS and OAD, therefore encompassing a more reserved approach. These professional taboos of security protocols and accountability could be considered gatekeepers in the way of FLOSS and OAD uptake.

Educational spaces appeared as an uncaptured opportunity for FLOSS and OAD to take hold. While it is true these organisations have relationships with proprietary providers, the flexible nature of students often encourages a novel opportunism that professional practitioners may elude. There were also generational dimensions to this study's outcome. Master's students exhibited a greater willingness to explore FLOSS and OAD compared to their often older practitioner counterparts, although still themselves express a degree of reservation, conforming to professional expectations of proprietary software aptitude.

5.4 Conclusion and Recommendations for Practice

This minor thesis has investigated the research question:

What social and technical factors create barriers reducing uptake or facilitators expanding uptake of FLOSS and OAD instruments within professional built-environment practice?

The transcript and coding process results suggest that successful FLOSS induction in Greater Melbourne built-environment practice is best characterised not as individual decision-making but as an interlocked process of network translation and stabilisation requiring simultaneous enrolment and arrangement of heterogeneous actors. To ensure a successful formation of FLOSS and OAD networks, these identified 'Vanguard Actors' must open the black boxes for institutional gatekeepers. To this end, the contemporary professional legitimacy networks of digital built-environment practice must be reconstructed to allow for increased agency for individual practitioners encouraging successful enrolment of FLOSS and OAD within professional practice networks.

The choice to employ ANT theory provided a valuable proxy for revealing the social and technical dimensions regarding Melbournian built-environment software preference when actors have competing interests. Software choice serves as the outcome of successful or unsuccessful attempts to form and stabilise heterogeneous networks capable of producing effective planning, design, geospatial or analytical outputs. The results of this research study demonstrate that FLOSS uptake in professional practice among planners, designers, engineers, geospatial analysts and others practicing in the built-environment sciences within Greater Melbourne, Victoria

requires the purposeful construction of social and technical networks that can enrol and retain myriad actors with competing interests.

Based on the transcripts and coding process, there appears specific recommendations for practice emerging for organisations wishing to build these FLOSS and OAD networks:

5.4.1 Holistic Enrolment Among Organisations:

Organisations need to take a decisive stance to enrol their IT departments and senior decision-makers into FLOSS and OAD practice. This approach would require an exhibition on the logistical process for implementation alongside institutional objectives of cost reduction, flexibility and collaborative development processes unique to the open-source model.

5.4.2 Opening Black Boxes within Education:

Changing the programmes of education departments to include FLOSS and OAD could open several black boxes in professional practice. A change such as this may alter the assumptions long held between practice and the objects of study as by altering the tools used in those objects of study. This more decisive approach may reduce the crystallisation of proprietary workflows that was identified as a significant barrier within the coded responses as through introducing future professionals to institutionally sanctioned alternative tools.

5.4.3 Constructing Large Industry FLOSS Networks

To construct encompassing networks of translators, further distribution of FLOSS and OAD instrumentation within public arenas may provide a opportunites for the increased

enrolment of future or current practitioners. These processes that may facilitate development could be achieved through a more formal action of endorsement or dynamic training courses.

5.4.4 Forming Hybridised Network Schemes:

Another element of increased flexibility could by a merging of FLOSS, OAD and proprietary practice together. Organisations may find value in implementing some open-source tools while retaining the relationships with clients and professional groups that would at-present prioritise proprietary offerings. By doing this, there would be a recognition of the necessity for flexible practice while greater FLOSS technical capability evolves.

5.5 Recommendations for Further Research

While this study has begun the correspondence of FLOSS and OAD uptake within practice, there are several arenas that require further investigation:

A more extensive tracing of FLOSS evolution over time is necessary. This may take the form of a *Longitudinal Network Analysis* potentially able to more critically scrutinise which network connections appear as decisive, and which do not. As demonstrated by Greenhalgh & Stones's (2010) study of healthcare IT implementation, these processes may reveal insights that the cross-sectional analysis employed here could not.

Comparative Network Studies could also be another option available to future researchers. Bartels et al. (2020) have provided case study research guidance for urban and regional studies which in the case of FLOSS or OAD network formation, may reveal methods to

transfer successful uptake across differing regional contexts as perhaps they could incorporate intergovernmental or national nuances omitted within the scope of this study.

Clients and IT departments did appear as crucial actors whose enrolment would be necessary for greater FLOSS uptake. A study that incorporates many stakeholders of potentially heterogenous orientation could provide potentially extensive opportunities to clients. A future study may explore these actors more critically to understand how to incorporate FLOSS into their practice. Matt et al.'s (2021) recent study: *The role of innovation ecosystems in Industry 4.0 adoption*. could be a jumping-off point, showing how multi-stakeholder relationships impact the adoption of new technology particularly illuminating how FLOSS and OAD could be perceived as risky or a threat to legitimate credibility.

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Appendix A.

Email & LinkedIn Recruitment Message

Subject: Invitation to Participate in a Research Interview on Digital Tools in Planning and Design

Dear [Name],

I hope this message finds you well. My name is Graham Inglert, and I am a Master of Urban Planning student at the University of Melbourne. I am currently undertaking a minor thesis supervised by Professor Alan March, and I'm reaching out to invite you to participate in a research interview for this project.

This research explores how digital desktop software, especially open-source and open-access tools—is used in planning and design practice. It aims to understand how such tools might support greater digital independence for professionals like planners, designers, architects, and others working in the geographic sciences.

If you choose to take part, the process involves a one-on-one audio-recorded interview (via Zoom or in person at a public location of your choice and at your convenience) that will take no more than one hour. We'll be discussing your professional experiences and views on digital software used in your field.

Participation is entirely voluntary, and you're welcome to skip any questions or withdraw at any time. While there is no financial compensation, your insights could contribute meaningfully to future planning and digital policy discussions.

Attached are the project summary and consent form to be signed should you agree to participate. If you are interested or have any questions, feel free to reply to this email or contact me directly at **ginglert@student.unimelb.edu.au**.

Thank you for considering this opportunity, I would greatly value your input.

Warm regards,
Graham Inglert
Master of Urban Planning
University of Melbourne
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Supervised by:
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Appendix B.

Plain Language Statement

Melbourne School of Design

Project: Master of Urban Planning Minor Thesis

Project Supervisor: Professor Alan March
Tel: +61 3 8344 7077 Email: alanpm@unimelb.edu.au
Additional Researchers:
Graham Inglert, Master of Urban Planning
Email: ginglert@student.unimelb.edu.au

Introduction
Thank you for your interest in participating in this research project. The following few pages will provide you with further information about the project, so that you can decide if you would like to take part in this research.

Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

Your participation is voluntary. If you don't wish to take part, you don't have to. If you begin participating, you can also stop at any time.

What is this research about?
This research considers the role that desktop software has in planning and design practice. This thesis examines the role of open-source and open-access desktop software to supplement current digital practice with the goal of increased digital sovereignty for planners, designers, architects, urban sociologists and other practitioners within the geographic sciences.

What will I be asked to do?
Should you agree to participate, you will be asked to take part in an audio-recorded interview that will last approximately 45-60 minutes conducted either by zoom or in-person at a public location at your convenience. The interviews investigate your professional role as a planner, designer, or other adjacent field professional with respect to digital desktop software used in completing the tasks associated with your professional role.

What are the possible benefits?
We cannot promise that you will directly benefit from your participation in this research project, nor will we pay or reimburse you for your participation. Your responses may contribute to further understandings on addressing the challenges posed by the current distribution of digital desktop software for design and planning practice.

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What are the possible risks?
In the interview, we will be talking about your views on making decisions about personal desktop software and digital instruments pertaining to your current or future role as a planner, designer, architect or urban sociologist. There is a risk that these questions may cause you discomfort, or if you have had negative experiences, that discussing them could be distressing. If there are any questions that you don't want to answer, or if you feel uncomfortable at any point, just let the interviewer know and they will move on to the next question. all information you share is strictly confidential and will not be attributed to your name

Do I have to take part?
No. Participation is completely voluntary. You can withdraw at any time by writing to the responsible researcher: Alan March (see above for contact details). If you withdraw, any unprocessed data collected from you will be destroyed and not used in the study.

Will I hear about the results of this project?
A copy of the thesis will be available in the University of Melbourne's online research repository; 'Minerva', upon request, the researcher can forward the results of this research to your email following the project's completion.

What will happen to information about me?
All data pertaining to this research including transcripts, recordings and documents containing personal information will be kept on a secure, password-protected computer. Published material will contain your professional role, title and organisation. No published material will contain confidential individual personal information including name, age, gender and other information that can be used to trace you or your identity.

Where can I get further information?
If you would like more information about the project, please contact the researchers; Professor Alan March: Email: alanpm@unimelb.edu.au, Phone: +61 3 8344 7077, Graham Inglert: Email: ginglert@student.unimelb.edu.au.

Who can I contact if I have any concerns about the project?
This project has human research ethics approval from The University of Melbourne 30907. If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Research Integrity Administrator, Office of Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 3 8344 1376 or Email: research-integrity@unimelb.edu.au. All complaints will be treated confidentially. In any correspondence please provide the name of the research team and/or the name or ethics ID number of the research project.

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Appendix C.

1. Can you walk me through your journey into the geographic sciences? How did you come into your current role, and what does your professional identity look like within your organisation?

2. What does a typical day in your role look like? How do digital tools shape or structure that day?

3. Can you recall a moment when desktop software solved a major challenge in your work?

4. How has your progression into more senior or specialised roles changed your relationship with built-environment software? Do you use it more, less, or differently now?

5. Have you ever found yourself limited by the digital tools at your disposal? What was missing, and did you find a workaround?

6. What do you think keeps professionals like yourself from exploring new or different software tools?

7. Can you think of a time when the software you were using actually got in the way of your work?

8. If your organisation didn't provide your software, and you had to choose what to invest in yourself , what would you keep, what would you get rid of, and what would you include instead?

9. When you hear the terms 'Open-Source' or 'Open-Access', what associations or impressions come to mind? Have you ever experimented with tools like QGIS or OpenStreetMap?

   9a. What would it take for you to feel comfortable integrating open-source tools into your daily work?

10. In your view, how much power do large software companies hold in shaping the tools, and even the mindsets, of professionals in the built environment? Explain.

11. Do you see open-source tools, open-access data, or ideas like digital sovereignty playing a role in giving practitioners more independence from major software platforms? What would need to change for these alternatives to become a necessary part of your everyday practice?

Appendix D.

Consent Form

Melbourne School of Design

Project: Master of Urban Planning Minor Thesis

Project Supervisor: Professor Alan March
Tel: +61 3 8344 7077 Email: alanpm@unimelb.edu.au
Additional Researchers: Graham Inglert, Master of Urban Planning
Email: ginglert@student.unimelb.edu.au

Name of Participant: _____

1. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written plain language statement to keep.
2. I understand that the purpose of this research is to investigate the role of desktop software and the opportunities for open-source software in planning and design practice.
3. I understand that my participation in this project is for research purposes only.
4. I acknowledge that the possible effects of participating in this research project have been explained to my satisfaction.
5. In this project I will be required to participate in an interview discussing my role as a planner, designer or other professional working in the geographic sciences in relation to desktop digital software that is necessary for the completion of my role.
6. I understand that my interviews may be audio recorded and involve a transcription of my words for analysis and use within research.
7. I understand that my participation is voluntary and that I am free to withdraw from this project anytime without explanation or prejudice and to withdraw any unprocessed data that I have provided.
8. I understand that the data from this research will be stored at the University of Melbourne and will be destroyed 5 years after publication.
9. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements; my data will be password protected and accessible only by the named researchers.
10. I understand that my name and my role will remain anonymous in this study, but my employer and/or educational institution will be named.
11. I understand that after I sign and return this consent form, it will be retained by the researcher.

Participant Signature: _____ **Date:** _____

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Appendix E.

ANT CODING MASTER DOCUMENT:

Verbatim Interview Subject Quotes and Corresponding ANT Codes

1. Participant #1 : Urban Designer / Committee Member- Geelong City Council / Urban Design Forum Australia

Direct Quote (Subject)	ANT Code(s)
Yeah, yeah. Q1.	Uncoded
Yeah, sure. So currently my identity is an urban designer. And yeah, I started out, I started out originally studying architecture and then I kind of fell into urban design through an internship with the city of Hobart and that was where I got into the geographical sciences and I basically self taught myself how to use QGIs.	Human Actors; Non-Human Actors
Right.	Uncoded
And then it was actually like, it was actually kind of the thing that got me into urban design because at that time, and this is a quite a common situation in councils, they weren't doing mapping really for like planning or design or strategic design purposes.	Human Actors; Material Inscriptions
Yeah, yeah.	Uncoded
They had like a geographic GIS team who were doing, maintaining an asset database yet GIS files that kind of record where things are and doing kind of, you know, various GIs, I guess what they do to support	Human Actors; Non-Human Actors

If interested in complete master coding document (207 pages) contact me directly:

ginglert@student.unimelb.edu.au; ginglert@gmail.com.

Conclusion

This portfolio has provided a comprehensive record of my academic development, professional training, and identity as an urban planner. Through an exhibition of eleven distinct projects, it demonstrates a progression from foundational theoretical inquiry to advanced analytical, design, and professional practice. Collectively, these works reflect my ability to engage critically with planning theory, translate complex data into operational insights, and communicate ideas clearly through written, analytical, and visual formats.

The projects contained within this portfolio display my competencies across the core responsibilities of contemporary urban planning. My argumentative essays demonstrate a capacity for critical thinking, independent research, and theoretical synthesis, while my analytical reports highlight technical proficiency in GIS, policy evaluation, and evidence-based decision-making. The design and infographic works showcase my ability to interpret spatial conditions, communicate visually, and employ industry-standard software to support planning outcomes. Finally, my professional placement report and master's thesis reflect my readiness to operate within professional and academic environments, managing large-scale projects, conducting original research, and contributing meaningfully to planning discourse.

Together, these works capture not only the skills I have developed through my studies at the University of Melbourne and my placement at Urbis, Melbourne, but also my intellectuality, motivation, and commitment to the planning profession. This portfolio stands as a culmination of my work to date and a foundation for the next stage of my career, as I continue to pursue thoughtful, equitable, and prospective urban planning practice.



Above:
My being awarded the Master of Urban Planning in December 2025. Photographed alongside the Chancellor of the University of Melbourne.